

**Investigation into the collision
between the Australian bulk ship
RIVER EMBLEY
and the Royal Australian Navy patrol boat
HMAS FREMANTLE
off Heath Reef, in the Great Barrier Reef
at about 2209 on 13 March 1997**



Report 112



COMMONWEALTH DEPARTMENT OF
**TRANSPORT AND
REGIONAL DEVELOPMENT**

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Navigation Act 1912
Navigation (Marine Casualty) Regulations
investigation into the collision
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Published: January 1997

ISBN 0 642 19980 9

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Sources of Information

Officers and Master of River Embley

Torres Strait and Great Barrier Reef Reporting System, Hay Point

ASP Ship Management

Australian Maritime Safety Authority

The Inspector gratefully acknowledges the cooperation of the Royal Australian Navy and the Chairman of the Board of Inquiry.

Summary

On the afternoon of 13 March 1997, the Royal Australian Naval patrol vessel Fremantle left an anchorage off the Flinders Group of Islands, at the eastern side of Princess Charlotte Bay, and, in company with two other patrol boats following astern, commenced passage for Thursday Island. The vessels followed a planned route utilising the inner route of the Great Barrier Reef at a speed of about 15 knots.

At this time the Australian bulk carrier River Embley was on a south bound loaded passage approaching Piper Reef some 150 miles to the north. River Embley was loaded to a draught of about 12.2 m and while underway, at speeds of between 13 and 14 knots, was drawing about 13.5 m allowing for squat. The navigation was under the direction of a licensed Reef pilot.

At about 2100, the three warships were approaching Heath Reef from the South and River Embley was approaching the reef from the north. The depth of water in the area meant that River Embley was obliged to keep to the eastern side of the two way route and pass about 3 cables off Heath Reef. VHF contact between those on the bridge of HMAS Fremantle and River Embley was established and the message passed that River Embley was a deep draught vessel and the distance the Pilot intended passing off the Reef. The vessels were closing at about 28.5 knots on nearly reciprocal courses with the first two of the three patrol boats crossing ahead of River Embley.

A few minutes after 2100, the lead patrol boat HMAS Fremantle crossed ahead of River Embley, followed by the second vessel in line, the third altered course to pass between River Embley and Heath Reef.

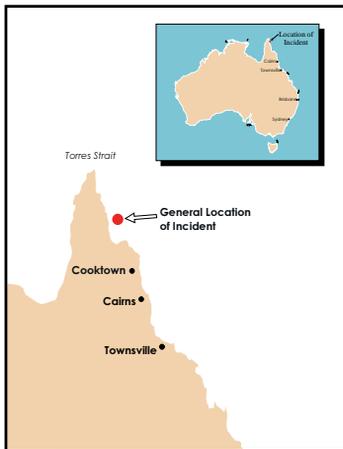
HMAS Fremantle made a number of slight alterations and, at about 2108 the rudder was put 20° to starboard. The patrol boat collided with River Embley. There were some slight injuries sustained aboard the patrol vessel as a result of the collision, but nobody on either vessel was seriously hurt. No pollution resulted from the collision.

Damage was sustained to the port side of the patrol boat and some damage was caused to the hull plating close to River Embley's bow and further aft in way of number 3 ballast tank.

Narrative

River Embley

The bridge equipment includes a GPS display, two radars (one of which is an Automatic Radar Plotting Aid - ARPA), gyro compass and bearing repeaters, automatic steering and a course recorder plotter. There are also two VHF sets and a watch alarm on the bridge.



Location of incident

The vessel has a crew of 22, who work about six weeks on and six weeks off on alternate “swings”. Bridge sea watches consist of an officer and an integrated rating. At night the integrated rating acts as a lookout and is available to steer the vessel manually should it be necessary to override the automatic pilot.

The Master has a Master Class 1 certificate of competency. He has had 22 years command experience in a wide variety of ships and had been in command of River Embley for six months.

The Third Mate, who kept the 8-12 watch (2000 to 2400), has a Second Mate Class 1 Certificate, which he has held for five and a half years. He has experience on tankers and bulk carriers trading in Australian coastal waters and within the Great Barrier Reef. He first joined River Embley in January 1996.

The Pilot had first joined the pilot service serving the Great Barrier Reef in 1967 after some 23 years at sea world wide, including time in command.

Fremantle

HMAS Fremantle is a patrol boat and was built in 1979 in the United Kingdom. It is 41.86 m in length, with a beam of 7.13 m, a draught of 2.4 m and has a displacement of 211 tons.

The patrol boat is powered by two diesel engines which can be controlled from the bridge or from the machinery control room, situated below the main deck.

It normally operates with a crew of 23, but on 13 March the crew numbered 24. This included the Commanding Officer, the Executive Officer, the Navigating officer and the Fourth and Fifth Officers, both under watchkeeping training. The composition of the bridge watch is dependent upon the boat's operational role and the experience of the officers. On routine sea passages, whatever the officer manning, two ratings are assigned to each bridge watch, alternating wheel and lookout duties, hour and hour about. Additionally two ratings are assigned to duty in the machinery control room.

Patrol boats are small and the lay out compact. The Ward room and Commanding Officer's cabin are within a few metres of the short flight of eight steps to the bridge (wheelhouse). The bridge itself is cramped with the chart table to the starboard after side, next to the "Captain's chair" which is also against the after bulkhead, with the steps from the accommodation on one side and the chart table on the other. Between the chart table and the chair is the VHF transceiver. The wheel and helmsman's position is on the port side forward, with engine controls on either side (emergency controls to the left). On the centre line is a gyro compass and pelorus, by a raised platform where the con is taken from. On the starboard side is the radar and, next to that, steps leading forward to the patrol boat's administrative office.

Smoking is only allowed outside the accommodation and at night only allowed on the flying bridge, where the lookout is kept in all but heavy weather conditions.

Fremantle is based in Sydney and normally operates off the east coast and Bass Strait as well as undertaking deployments in the Pacific Region.

The Incident

River Embley

The bulk carrier River Embley sailed from Weipa at 0606 on 12 March 1997 with a full load of 71,774 tonnes of bauxite for Gladstone. The ship's draught was 12.46 m forward and 12.5 m aft in fresh water, equating to a deepest draught of 12.18m in salt water. The crew consisted of 22, including the Master and, in addition, the ship carried a Pilot from Marine Coast Pilots, who had joined the vessel off Cairns fairway buoy at 0800 on 8 March and who had piloted River Embley on the north-bound voyage, and an instructor who was conducting safety courses for the ship's crew.

At 0424 on 13 March, the engine was put on standby and the revolutions were reduced to manoeuvring full ahead and, at 0435, the ship entered Varzin Passage. A report had been made to "Reefcentre" giving details of the ship, including details of the vessel's draught. At 0616, the vessel passed Harrison Rock buoy and, at 0736, the revolutions were increased to navigation full ahead when passing Herald Patches at the eastern end of the Prince of Wales Channel.

The south bound passage through the inner route proceeded without incident throughout the day. Routine "Reefreports" were passed at the mandatory reporting points of Alpha North and Inset Reef.

Sunset was at about 1845. The two masthead lights, the sidelights and sternlight, which are not turned off during the day, were all burning.

At about 1955, the Third Mate, who was to keep the 2000 to 2400 watch, arrived on the bridge. He and the Mate discussed the ship's position, course and speed, the anticipated course changes and the

lights of a large number of fishing vessels which could be seen ahead. The sky was partly covered in cloud, the night dark, with a light wind and good visibility.

At 2000, the Integrated Ratings on lookout duty also changed.

River Embley's automatic radar plotting aid was in operation "north up" on the six mile range. The ship was offset on the screen giving a display nine miles ahead. The plot was based on true motion and true vectors. There was no gyro error either on the steering gyro or the bearing repeaters, but there was a one degree error on the radar bearing cursor.

A fleet of some 40 to 50 fishing vessels, were encountered between Cape Direction and Bow Reef. River Embley passed to the west of Bow Reef, in the two-way route, at 2130, making good a speed of a little over 13.5 knots. The Pilot maintained the vessel on a track to the eastern (port) side of the two-way route, in the deeper water.

Depths of 12 m and 14 m lie on the west side of the route, while depths of 16 m lie to the extreme eastern side. The width of the marked two-way route on the chart, between Bow Reef and Heath Reef is 0.8 of a mile and the 15 m depth contour extends well into the marked route, leaving a channel in water of more than 15 m of only 3.5 cables. The tidal height at this time at Morris Island was about 1.7 m. Given a draught of about 12 m forward and a squat of at least 1.5 m, the under keel clearance was about 4 m, and possibly a little less.

River Embley had earlier detected a south-bound vessel, making good about 8.5 knots which the Pilot anticipated overtaking in the region of Heath Reef. The Pilot considered that he might have to pass to the east of Heath Reef, however this other vessel shaped a course to the east of the light and River Embley maintained its planned course.

Shortly before 2150, the Pilot and the Third Mate saw a number of lights ahead, which they initially took to be distant fishing vessels.

The Pilot switched the radar range to 24 miles to see if any of the vessels seen ahead were in the vicinity of Heath Reef. The only target returns were those of Heath and Morris Reefs.

At 2150, when off Ellis Reef and 5.1 miles north of Heath Reef, the ship altered course from 167° to 179° true and gyro. The Master, who frequently visited the bridge to monitor the ship's progress went below to rest. From his position on the starboard bridge wing, the lookout also reported the lights as being fine to starboard. Shortly after three targets were seen towards the edge of the radar display at about 8 miles.

Before plotting the 2200 position, the Third Mate checked the ARPA and "acquired" the targets on the ARPA display. By eye he saw two of the vessels fine on the port bow and the other, the closest, almost dead ahead. The Third Mate then fixed the ship's position by radar. Having plotted the position on the chart and making allowance for the three minutes necessary for a reliable ARPA plot, he again checked the screen. He recalled that the vectors were much longer than he expected and he realised that they were not fishermen and he recalled the speed shown by the ARPA was 15 or 16 knots. Looking through binoculars, both the lookout and Third Mate could see the closest vessel, dead ahead showing a masthead light and a green side light, as was the second vessel. The third vessel was showing a masthead light and a red side light.

The Pilot surmised that the vessels were military and called "the vessels northbound to Heath Reef" on VHF Channel 16. A vessel, identifying itself as a warship, replied stating that it would pass "red to red". The Pilot acknowledged the message, which he assumed came from the lead vessel, which he estimated at this time to be between 2 and and 3 miles, nearly dead ahead. He advised that River Embley was a deep draught vessel and was shaping to pass three cables off Heath Reef and the warships could pass either side of the bulk carrier but there was not a great deal of room between it and Heath Reef.

At about 2203, the leading vessel had crossed to River Embley's starboard side and was still showing a green sidelight. The second vessel, about 5 degrees on the bulk carriers port bow, was perceived to be a threat. It was initially showing a green sidelight and then a red sidelight appeared, then the green light was shown alone and the vessel continued to the western side of the two-way route.

The leading vessel was by this time recalled as being clear on the starboard bow and the Pilot asked the Third Mate to alter to 176° , to give the second vessel a little more room. The Third Mate crossed to the wheel position to adjust the course when the first vessel, now estimated to be 30° to starboard, suddenly showed a red light and appeared to be moving rapidly at right angles to River Embley's line of advance. It was immediately apparent that the vessels were on collision courses and the immediate reaction by those on the River Embley's bridge was one of disbelief.

Before the Third Mate could adjust course, the Pilot told him to sound five short and rapid blasts on the whistle. The Third Mate did so immediately as the Pilot picked up the VHF hand set and shouted words to the effect "what the hell do you think you are doing, you are going to hit us!".."

An acknowledgment was received from an unidentified vessel stating that his vessel was "coming to port now", to which the Pilot responded "you must go astern, for Christ's sake go astern quickly".

The smaller vessel was approaching rapidly from the starboard side and the Third Mate started to alter course to port, away from the vessel crossing from starboard. The naval vessel was seen to be turning to starboard towards River Embley. The two vessels collided with the warship coming into contact close to River Embley's bow. On impact the Third Mate asked the Pilot whether he should stop engines and go astern.

The Pilot told him to stop but not go astern. The Third Mate brought the control lever to manoeuvring full ahead and after something less than 10 seconds put the engine telegraph to stop. The Third Mate telephoned the Master, as the Pilot put the telegraph to slow ahead to maintain steerage way.

A number of people arrived on the bridge. The first to arrive was a supernumerary instructor who had been running a safety course on board. The Master was in bed when he heard the whistle, he got up immediately and went to the forward window, as he did so the telephone rang and the Third mate informed him of the collision. He went immediately to the bridge, where he was joined by the Mate.

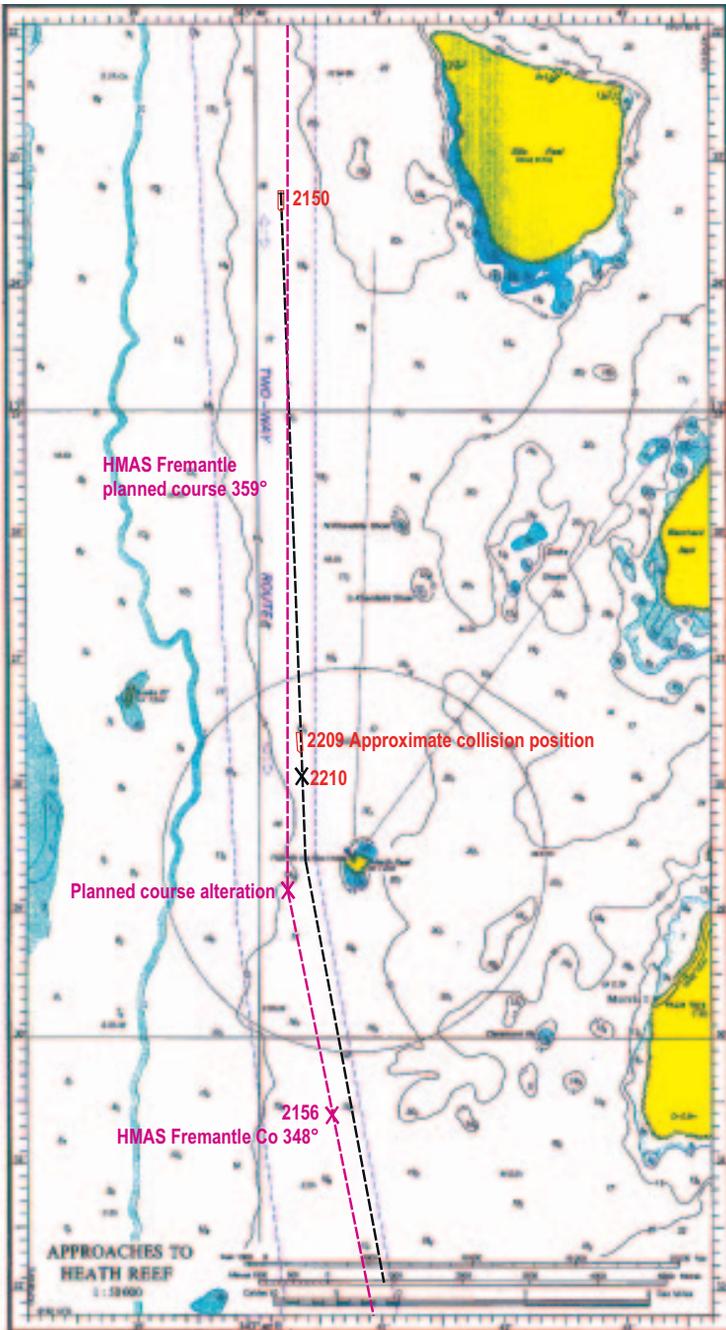
The VHF transmissions between River Embley and the patrol boats were overheard by the Master of Emu Bay (a fishing fleet tender vessel) which was the vessel ahead of River Embley and which passed to the east of Heath Reef.

HMAS Fremantle

On 9 March, Cyclone “Justin” was seen as a potential threat to the coastal ports in the area of Cairns and Townsville. HMAS Fremantle and five other naval vessels, berthed in Cairns, were ordered to a safe anchorage in the Flinders Group of Islands on the eastern side of Princess Charlotte Bay, in the Great Barrier Reef, some 200 miles north of Cairns.

Fremantle arrived at the anchorage on 10 March, joining other units of the Royal Australian Navy at anchor.

At about 1500 on 13 March, Fremantle, and two other patrol vessels, HMAS Bendigo and HMAS Gladstone were ordered north to Thursday Island, to replenish water and fuel and take on supplies. At about 1700, Fremantle and Bendigo weighed anchor and started passage for Thursday Island in column astern, with Fremantle as lead and command vessel. They were later joined by Gladstone, which had



Plotted course of River Embley & HMAS Fremantle

been away from the anchorage when the orders for Thursday Island had been received. The vessels were at half ahead with Fremantle's engines turning 600 rpm, giving a speed of about 15 knots, the engine revolutions being controlled from the machinery control room, engine orders being passed by telegraph from the wheelhouse.

Once clear of the anchorage, the flotilla settled in formation with about 1000 yards between each vessel. The flotilla instructions, issued by the Commanding Officer of Fremantle, were that each vessel was to maintain visual contact and take independent action to avoid other shipping. An ETA of 1030 14 March was set for Alert Patches at the eastern end of Prince of Wales Passage. The transit through Princess Charlotte Bay and northward from Eden Reef proceeded routinely with a seaman rating on the wheel, a seaman lookout on the flying bridge and an officer in charge of the watch and the con.

The Fifth Officer kept the watch from clear of the Flinders Group until 1945. The Commanding Officer had been on the bridge most of this time, sitting in his chair monitoring and advising the Fifth Officer in his navigation, which involved an intensive routine of fixing the ship's position every six minutes, and his watchkeeping priorities.

The Fourth Officer had arrived on the bridge at 1925 and by 1945, when he took over the watch, he had full night vision and was fully acquainted with the course, speed and of other vessels in the area. The Commanding Officer remained on the bridge monitoring the Fourth Officer until 2120 when the patrol boat was off Hay Island. The Fourth Officer was also fixing the ship's position every 6 minutes. Satisfied that the Fourth Officer was in complete control of the situation the Commanding Officer went to his cabin, about three metres from a flight of eight steps that led from the main deck to the bridge.

At about 2140, the rating lookout reported distant white lights, which was acknowledged by the Fourth Officer. At 2145, the two ratings exchanged duties and at 2148 Fremantle passed MacDonald Reef and

altered course to 348° for a position about 4 cables to the west of Heath Reef. At about this time the Fifth Officer went to the flying bridge to smoke.

At 2156, the Fourth Officer fixed the patrol boat's position, with the vessel on a course of 348°, making good a speed of 15 knots. The Fifth Officer could see the lights of an approaching merchant ship slightly to starboard, with masthead lights and both sidelights clearly visible. He went down to the bridge. The lookout also saw the distinctive lights and although he believed the lights had already been reported by the other rating, in view of being able to see both the sidelights, went down the short companion way to the bridge to make a report to the Fourth Officer. The Fourth Officer, who was standing by the radar, acknowledged the report.

At some time after 2200, a VHF call on channel 16 was received from the merchant ship, now with its masthead lights open and showing a strong green light and the port light closing out or no longer visible. The person on the merchant vessel identified the ship as "River Embley" and that the ship was "deep draught". The Fourth Officer acknowledged the message and stated that he would pass River Embley "red to red". River Embley replied that he was passing three cables off Heath Reef and the warships could "squeeze" between River Embley and Heath Reef.

The Fifth Officer positioned himself by the pelorus and expressed concern at the developing situation. From this time on events happened in quick succession and the recollections of the events vary and a totally clear picture is difficult to reconstruct.

Shortly after the VHF exchange, the Fourth Officer called the Commanding Officer advising him of an imminent course change to 359° and the alteration to 359° was completed. Shortly after, he informed the Commanding Officer that he had a merchant ship contact "to the left of 359 at about 2.5 miles" and shortly after a further

alteration to starboard to 008° was made. Upon the report of the merchant ship at 2.5 miles, the Commanding Officer went immediately from his cabin to the bridge. He immediately sat in his chair. Although he had been in darkness and in walking to the bridge had passed through a “red light” area, he had not acquired night vision and could not see anything ahead. The Fourth Officer briefed him as to the situation and was told that Fremantle had room to starboard. Unable to see anything and assuming that River Embley was not close, the Commanding Officer told the Fourth Officer to make a greater alteration to Starboard.

At about this time the Fifth Officer left the pelorus platform and returned quickly to the flying bridge. On the flying bridge the Fifth Officer and the rating look out were joined by the Navigating Officer, who, moments before, had left the wardroom and gone to the bridge, but to ease the congestion and more rapidly acquire night vision he continued to the flying bridge.

The Commanding Officer asked what rudder angle had been ordered and the Fourth Officer told him 10°, and the Commanding Officer advised him to increase the angle to 20°. At this time he became aware of voices on the VHF. Almost immediately the Commanding Officer saw a single green light and became aware of a “great black wall”. He immediately issued direct orders to the helmsman of “hard to starboard” and full astern.

On the flying bridge the Fifth Officer grabbed the Navigating Officer, who was on the port side and threw him from the port side to the starboard side and shouted “brace, brace, brace”. The rating lookout, also on the port side gripped the rail tightly and braced himself for the impact.

The two vessel's collided with the initial contact between Fremantle's port bow and the starboard bow of River Embley in way of frame 285. The patrol boat's stern then swung rapidly so that its port quarter came into heavy contact with the bulk carrier's starboard side in way of frame 224 on the deep frame/bulkhead between number 2 and 3 ballast tank.

Fremantle passed down River Embley's starboard side and came to rest with engine's stopped on a heading of about 255°.

The crew of the patrol boat went immediately into damage control mode. It was established that two seamen were injured in the collision, but otherwise injuries were slight. The patrol boat's forward port side, aft of the anchor, had been set in and the forecastle deck plating set up and aft the port corner of the transom stern had been distorted slightly, but the hull's integrity had not been breached.

Information was exchanged between Fremantle and River Embley and the Commanding Officer confirmed that he did not require any assistance. After checking the vessel integrity, passage to Thursday Island was resumed with HMAS Gladstone taking the lead position and with HMAS Bendigo astern of Fremantle.

Comparison of the course recorder roll and engine room print out with the chart positions and log book entries showed that the chart record and log book entries were consistent, within a minute in time, with the automatic remote records.

Based on this, it was established that in the hour before the collision River Embley was averaging a speed of 13.5 knots.

At 2020, when off Osborne Reef, River Embley altered course to 167°(T), and the vessel maintained this course until a little before 2150. Examination of the course recorder shows that River Embley's rudder was put 10° to starboard for a little under 30 seconds at about 2148:30 and the vessel responded at about 2148:45 and the swing was checked by putting the rudder 20° to port. At 2150 the vessel had reached a heading of 179° and the vessel settled on that course within two minutes. The vessel's head did not deviate by more than one degree until 2209 when eight degrees of port wheel was applied before, at 2209:15, full starboard rudder was applied. The ship reached a heading of 166° at 2211, before the ship came to a heading of 198° at 2213:30. At 2218 the ship resumed a course of 170°.

The collision occurred at about 2209. The evidence is that River Embley maintained course and speed until a few seconds before the collision occurred. Also, Fremantle having crossed River Embley's line of advance from port to starboard, attempted to recross the bulk carrier's bow to affect a port to port crossing. Fremantle struck River Embley at an angle, put by those on the River Embley as between 60° and 45° but may have been about 20°.

VHF communications

Contact by VHF radio was first established between Fremantle and River Embley after 2200. Subsequent VHF transmissions by the Pilot

on board River Embley, a few seconds before the collision, were probably answered by HMAS Bendigo.

The recollection of the words used in these VHF messages varies from witness to witness. There is little doubt, however, that as a result of the VHF messages it was understood that River Embley was a deep draught vessel and was shaping to pass 3 cables off Heath Reef Light. This is supported by the recollection of the Master of Emu Bay who heard these broadcasts and provided a statement to the Inspector.

The Collision Regulations

Steering and Sailing rules

The International Regulations for Preventing Collisions at Sea, 1972, as amended from time to time, apply to all vessels upon the high seas and in all waters connected therewith navigable by seagoing vessels.

Rule 2 clearly states:

Nothing in the Rules shall exonerate any vessel or the owner, master or crew thereof, from the consequences of any neglect to comply with these Rules or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

When River Embley and Fremantle were about 8 miles apart, River Embley was steering 179° and Fremantle and the patrol boats in company were steering 348°. Although the two vessels were converging at an angle of 11° and a speed of about 28.4 knots, both the radar plot and visual observations would have shown that the warships were crossing vessels within the meaning of the Regulations. Regardless of whether River Embley was constrained by draught or not, as the warships were on River Embley's port side they had an

unambiguous duty to keep clear of River Embley until finally passed and clear of the bulk carrier.

In the circumstances of the night of 13 March, it was the second patrol boat that was on a nearly constant bearing and of greatest concern to the Pilot and Third Mate of River Embley.

The lead patrol boat, HMAS Fremantle, had crossed from port to starboard and was apparently standing well clear, given the restricted nature of the waters off Heath Reef. The patrol boat's alteration of course to attempt to recross the bow was contrary to the rules and done at such a time, in restricted waters that neither the Pilot nor Third Mate on River Embley could have taken any action to avoid the collision.

Rule 5, "Lookout", requires:

Every vessel shall at all times maintain a proper lookout by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.

The reference to a lookout involves not only seeing or detecting a vessel but also "... involves the intelligent interpretation of the data received by way of [these] various scientific instruments."¹

Rule 7, Risk of collision, contains a mandatory and all embracing requirement that every vessel shall use all available means to determine if risk of collision exists and states that if there is doubt such risk shall be deemed to exist. It also states that assumptions shall not be made on the basis of scanty information.

(Note: Rules 5, 7, 8, 15, 16, 17, 18(d) and 28 are reproduced at annex 1)

¹ Mankabady, S., 1991, International Shipping Law, Vol II,

Lights and shapes

River Embley is 255 m in length and the bridge front is just over 198 m from the bow. The main mast light, at loaded draught is 38 m above sea level, the sidelights, 5.0 m forward of the main mast light are 20 m above sea level. The foremast light is 26 m above sea level and the horizontal distance between it and the main mast light is 183 m.

The navigation lights shown by River Embley were in accordance with Rule 23 - (Lights shown by power-driven vessels under way). These lights and the side light visibility across the bow had been checked in July 1996. Although the accounts by those on Fremantle of the angle at which River Embley's port side light cut out differ, there is no reason to believe that the red port light was incorrectly screened, or that it in any way confused those on board Fremantle.

The Fourth Officer of Fremantle had seen the navigation lights shown by River Embley. However, the Commanding Officer had not seen any of the lights and did not appreciate how close River Embley was to Fremantle.

The fact that River Embley was constrained by her draught was not indicated by the discretionary signals of three red lights in a vertical line "where they may best be seen". Under a strict interpretation of Rule 18(d)(i), unless exhibiting the signal, a vessel constrained by her draught cannot expect another vessel to observe the rule.

A number of reasons were given, by the Pilot and the Master during their separate interviews, for not showing what is an optional signal. It was claimed that the signal itself is not widely recognised, could lead to confusion, and its use was sometimes abused by vessels not constrained by their draught. Also, it was pointed out, because the top red light is close to the masthead light, it tended to be obscured and the signal had been taken as a vessel "not under command".

Additionally the separation of equally spaced lights at two metres was not sufficient separation on vessels approaching each other at full sea speed. The Master stated that the lights within the inner route are not routinely shown and that at times, given the closeness of rocks and reefs to the route in certain parts of the Reef, all vessels are constrained at times.

While acknowledging the optional nature of the “deep draught” lights, the Inspector cannot accept the reasons for deciding not to exhibit them. Perceived ignorance of others of the most basic measure of maritime competency, a thorough knowledge of the International Collision Regulations, is not an excuse for not showing a signal. Additionally, the lights are to be shown “where they may best be seen” and if obscured on the main mast, an alternative arrangement could be made. Also the 2 m separation is a minimum and, provided they are equally spaced, a greater separation is permitted

Having made this observation, which would be relevant if any deep draught vessel were the give way vessel, the issue of constraint of draught only arises in the context of rule 17 and action by River Embley as stand-on vessel, where the actions of the give-way vessel alone are insufficient to avoid collision.

HMAS Fremantle was showing the lights prescribed for vessels of less than 50 m in length, that is a single masthead light, port and starboard sidelights and a stern light. With only a single mast light and the side lights relatively close to the mast head light, any change in course by the patrol vessel is not readily apparent when relying on visual observations at night.

Sound and light signals

The Third Mate on River Embley sounded a warning signal on the ship’s forward mast whistle, as prescribed by Rule 34 (d). There are

varying reports by those on Fremantle as to whether one, three, four or five blasts were heard, and the Third Mate could not recollect whether or not he managed to complete the whistle signal.

There is little doubt that the whistle signal was sounded as soon as practicable after it was realised that Fremantle had altered on to a collision course and that the whistle signal stopped at or just before the moment of collision. Fremantle, travelling at 463 m/min was very close by this time.

The whistle controls are not connected to any light signal contact and sounding the sound signal did not simultaneously operate a mast light signal. Such a light signal would not have been directional and the Inspector is satisfied such a non-directional light would not have altered the circumstances leading to the collision.

With hindsight, it may have been better to use an Aldis lamp to attract the attention of the approaching vessel, under Rule 36. The Aldis lamp would also have illuminated the ship side and the expanse of hull between the foremast and the mainmast, removing any chance of ambiguity that the distance between the lights may have created in the minds of those on the patrol boat. In the event, the incident developed so rapidly there was insufficient time to get the Aldis lamp to the starboard side and the whistle signal was in accordance with the Rules and the most immediate solution to attract attention. In submission the Master stated that the use of the Aldis lamp would have destroyed night vision and would have been unacceptable both aboard and to an inquiry.

Fremantle made no whistle or light signals under the provisions of Rule 34 (a) or (b). The absence of this signal had no bearing on the outcome of the incident.

Reconstruction

River Embley was advancing at 416.7 m/min (6.95 m/sec) and Fremantle was moving at 463 m/min (7.72 m/sec).

There is an apparent ambiguity between the angle on the bow at which the patrol boats navigation lights were first sighted, as recalled by the Pilot, Third Mate and Lookout on board River Embley. At interview on River Embley's bridge, the Lookout recalled the lights were to starboard of the foremast light. His position was some 14 m from the centre line of the ship. Allowing for parallax, although the patrol boats appeared to the starboard side of the mast, when viewed from the centre line they would have been fine on the port bow, as described by the Pilot and Third Mate.

On Fremantle, although plotting the patrol boat's position at six minute intervals, the last position fix before the collision was made at 2156, between 12 and 13 minutes before the collision time. After this time Fremantle altered course a number of times, but no position for these course adjustments was recorded.

According to the evidence, Fremantle was near enough to dead ahead of River Embley when 2.5 miles from the bulk carrier's bow. Given both vessels' speed and course, the time at which they were 2.5 miles apart would have been at about 2203. Some time after this the patrol boat altered to 359°. At this time the two vessels were on reciprocal courses and the two vessels would have passed clear, with the approach speed of 28.5 knots. When the Commanding Officer arrived on the bridge and was briefed, between 1½ and 2½ minutes before the collision, Fremantle was on a course of 008°. The alteration of course by applying 20° of starboard wheel was made within 30 seconds of the collision during which time Fremantle would have covered a distance of about 200 m or 230 m.

Torres Strait and Great Barrier Reef reporting system

As of 1 January 1997, vessels of 50 m or more in overall length and, irrespective of length, oil tankers, liquefied gas carriers, chemical tankers and vessels carrying irradiated nuclear fuel, together with vessels engaged in towing tows of 150 m or more in length are required to subscribe to a mandatory ship movement reporting scheme.

The requirements are detailed in Marine Orders Part 56 - Reefrep, made under the provisions of the *Navigation Act 1912*.

Vessels are required to provide certain information, including their cargo and draught when entering the Great Barrier Reef area. Each vessel is then required to report its progress at certain designated points within the Reef. Reporting ships are furnished with information regarding other vessels in the reef that they may be expected to meet.

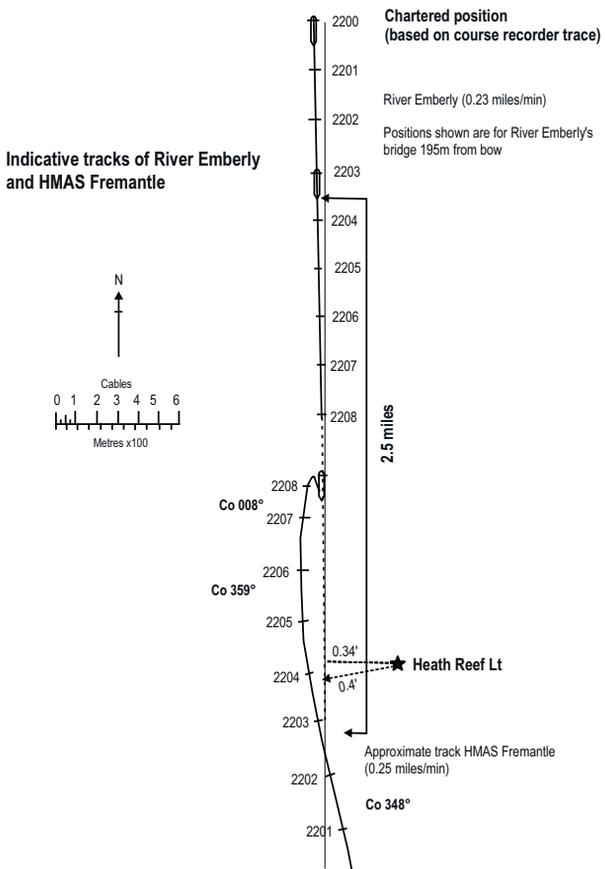
River Embley reported in accordance with these requirements. Royal Australian Naval vessels are not covered by the provisions of the Navigation Act, but, as a matter of policy, RAN vessels of more than 50 m now comply with the reporting scheme.

However, all three patrol boats were below the 50 m threshold. However had the vessels been monitoring the VHF channel for the Heath Reef area (channel 18 VHF) the patrol boats would have been aware of both the River Embley and the large merchant vessel Maersk Taian which was following River Embley in the region of Heath Reef

It would also have been of benefit for River Embley and other vessels to know that warships in company were navigating in the narrower waters of the two way route, to allow early contact and resolution of any passing manoeuvres.

Passage planning

River Embley transits the inner route of the Great Barrier Reef on a regular basis every ten or eleven days. Pilots have their own preferred passage plans, which are checked by ship's staff and discussed with the master and officers. River Embley was operating to such a plan, which was well tried and tested.



Indicative tracks of River Embley and HMAS Fremantle

In the area of Heath Reef, when two deep draught vessels meet in the area of restricted depth, the pilots exchange information and agree a plan on VHF radio. This may involve a change in speed or, more normally, the north bound vessel will go to the east of Heath Reef.

Fremantle was also following a passage plan in accordance with RAN operating procedures. However, whatever the quality of the plan, it was predicated solely on the 2.4 m draught of the patrol boat and did

not identify the waters off Heath Reef as being restricted for deep draught vessels or make any contingency for meeting a vessel constrained by its draught in an area where over half the width of the marked two-way route is less than 15 m.

Conclusions

These conclusions identify the different factors which contributed to the circumstances and causes of the incident and should not be read as apportioning blame or liability to any particular organisation or individual.

The collision between HMAS Fremantle and the bulk carrier River Embley was caused by the alteration to starboard of HMAS Fremantle when on River Embley's starboard side. The alteration by HMAS Fremantle was made at such a time that, regardless of being constrained by her draught, River Embley could not have taken any action that could have avoided the collision.

The reasons for HMAS Fremantle's actions are the subject of a Naval Board of Inquiry. They involve a complex chain of human factors, which include, but are not limited to:

- incomplete passage and contingency planning
- being unaware of the traffic in the reef
- lack of experience in traffic encounters within the Great Barrier Reef
- the decision to apply 20° of starboard helm based on incomplete and scanty information.

The absence of the deep draft signals on River Embley cannot be said to have directly contributed to the casualty. The patrol boats were advised that she was constrained by her draught and this was apparently acknowledged. However, had the signals been exhibited, they may have provided an additional prompt for those on Fremantle, as may the use of the Aldis lamp to attract attention had it been easily to hand.

Submissions

Sub-regulation 16 (3) of the Navigation (Marine Casualty) Regulations requires if a report, or part of a report, relates to a person's affairs to a material extent, the Inspector must, if it is reasonable to do so, give that person a copy of the report or relevant part of the report. Sub-regulation 16(4) provides that such a person may submit written comments or information relating to the report.

The final draft of the report, or parts thereof, was sent to the Master, Management Company, Third Mate and Pilot of River Embley. The final draft was also sent to the Commanding Officer and Watch Officer of HMAS Fremantle and to the Fleet Legal Officer, Maritime Headquarters, Royal Australian Navy.

The Master

In reference to the deep draught light signals:

As Master of River Embley, since reading the draft (report), I have had the ship's light checked by passing vessels, and have been advised that they are clearly visible. Basically, I consider that the reason for not showing the lights, rather than when especially limited, is that in thirty odd years of the trade, it has not been the practice to routinely show three red lights on deep vessels within the Reef. In the narrow areas of the Barrier Reef, and the closeness of the rocks, all vessels are constrained by their draft at times.

Should River Embley be targeted for the absence of a signal rarely used in the area over many years? After all,

it is noted that the “absence did not directly contribute”, and only may have provided a greater prompt.

Perhaps a signal indicating constraint due to length or manoeuvrability would be more indicative? Perhaps a conclusion indicating that a more appropriate signal in the Barrier Reef “may have provided a greater prompt” is more valuable to assist others to develop from this experience, not just comply with regulations.

In relation to the issue of the Aldis light being used to attract attention:

The Aldis lamp was readily available, on the wheelhouse after deck, connected to a battery, both being immediately available and portable.

As the risk of, or impending, collision had only been observed by either vessels crew immediately before impact, and the sound signals - whose use was closely at hand - not by hurrying some 10 metres to the wing (lighting an Aldis light in the wheelhouse would destroy night vision, and be both unacceptable both aboard and during an inquiry), were “completed at or just before the moment of collision”, use of the Aldis lamp was inappropriate in those brief moments.

The Pilot

The Pilot provided a number of points of clarification which have been incorporated into the text.

In relation to the issue of the optional deep draught signal he stated:

Since the collision I have noted a number of confusing signals purporting to be ‘deep draught’ signals. The River Boyne, when I passed her in Varzin Channel had what appeared to be 2 red lights showing above the mainmast light and it wasn’t until I was one cable off that I was able to distinguish the third light through binoculars.

Endeavour River had two widely separated red lights showing and when I called the Second Mate stated that they had some trouble with the middle light, He turned them off. Two other vessels have shown two red lights on one side of the mast and the third on the other side of the mast.

In relation to the length of time HMAS Fremantle was turning, the Pilot believes that the 30 second period stated in the report cannot be correct:

I have gone through a reconstruction of my movements and actions from the first sighting of Fremantle's red light and each time have come up with a minimum of 35 seconds. This was when Fremantle was well into her turn because I could see her red side light and part of her after deck. The turn must have started more than 35 seconds before the collision.

In relation to Reefrep the Pilot submitted:

It is unlikely that Fremantle and Embley would have been advised of each other's presence even if Fremantle had been reporting to Reefcentre. It is only very occasionally that a ship is advised of other ships in the Reef, other than those in the section that the ship is entering. Consequently, by the time the ship is halfway through the section, it has passed the reported ships and is then meeting unreported ships which had been in the next section. To be of use, the operators should report the time and speed of ships passing at least the next three reporting points ahead to enable the pilots to easily calculate the approximate times of meeting.

ASP Ship Management

Deep draught signals

Your comments on the display of deep draught lights are noted. The final comment on the subject in your conclusion is that “had the signals been exhibited they may have provided a greater prompt for those on Fremantle . . .”. To recap, according to your Report the command of Fremantle knew they were approaching a deep draught merchant vessel. They resolved to give way and to make the necessary course changes. They “expressed concern at the developing situation” and were sufficiently concerned that they made sure they kept the Commanding Officer informed, with the result that he came to the bridge. It seems to us that those on Fremantle were fully aware of River Embley, and fully prompted to take action with respect of it. Given these facts, what greater prompt would the deep draught lights have made, and what would those lights have prompted those on Fremantle to do which they did not intend to do already?

In respect of the Aldis lamp.

Given that there was a great deal of uncertainty as to whether the Naval vessels would pass down the port or starboard side of River Embley, it is difficult to see how the command of River Embley could have known where to position the Aldis lamp in readiness to give any warning necessary.

The Fleet Legal Officer RAN.

The Fleet Legal Officer had no comments to make on its substance.

Annex 1

Extracts from the International Regulations for Preventing Collisions at Sea, 1972, as amended and in force in Australia.

Rule 5 -Lookout

Every vessel shall at all times maintain a proper lookout by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.

Rule 7 -Risk of Collision

- (a) *Every vessel shall use all available means appropriate to the prevailing circumstances and conditions to determine if risk of collision exists. If there is any doubt such risk shall be deemed to exist.*
- (b) *Proper use shall be made of radar equipment if fitted and operational, including long range scanning to obtain early warning of risk of collision and radar plotting or equivalent systematic observation of detected objects.*
- (c) *Assumptions shall not be made on the basis of scanty information, especially scanty radar information.*
- (d) *In determining if risk of collision exists the following considerations shall be amongst those taken into account:*
 - (i) *such risk shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change;*

(ii) such risk may sometimes exist even when an appreciable bearing change is evident, particularly when approaching a very large vessel or tow or when approaching a vessel at close range.

Rule 8 - Action to avoid Collision

- (a) Any action taken to avoid collision shall, if the circumstances of the case admit, be positive, made in ample time and with due regard to the observance of good seamanship.*
- (b) Any alteration of course and/or speed to avoid collision shall, if the circumstances of the case admit, be large enough to be readily apparent to another vessel observing visually or by radar; a succession of small alterations of course and/or speed should be avoided.*
- (c) If there is sufficient sea room, alteration of course alone may be the most effective action to avoid a close-quarter situation provided that it is made in good time, is substantial and does not result in another close quarter situation.*
- (d) Action taken to avoid collision with another vessel shall be such as to result in passing at a safe distance. The effectiveness of the action shall be carefully checked until the other vessel is finally passed and clear.*
- (e) If necessary to avoid collision or allow more time to assess the situation, a vessel shall slacken her speed or take all way off by stopping or reversing her means of propulsion.*
- (f) (i) A vessel which, by any of these rules, is required not to impede the passage of another vessel shall, when required by the circumstances of the case, take early*

action to allow sufficient sea room for the safe passage of the other vessel

- (ii) *A vessel required not to impede the passage or safe passage of another vessel is not relieved of this obligation if approaching the other vessel so as to involve risk of collision and shall, when taking action, have full regard to the action which may be required by the rules of this part.*
- (iii) *A vessel the passage of which is not to be impeded remains fully obliged to comply with the rules of this part when the two vessels are approaching one another so as to involve risk of collision.*

Rule 15 - Crossing Situation

When two vessels are crossing so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way and shall, if the circumstances of the case admit, avoid crossing ahead of the other vessel.

Rule 16 - Action by Give-way Vessel

Every vessel which is directed to keep out of the way of another vessel shall, so far as possible, take early and substantial action to keep well clear.

Rule 17 - Action by stand-on vessel

- (a) (i) *Where one of two vessels is to keep out of the way the other shall keep her course and speed.*
- (ii) *The latter vessel may however take action to avoid collision by her manoeuvre alone, as soon as it becomes apparent to her that the vessel required to keep*

out of the way is not taking appropriate action in compliance with these rules.

- (b) When, from any cause, the vessel required to keep her course and speed finds herself so close that collision cannot be avoided by the action of the give-way vessel alone, she shall take such action as will best aid to avoid collision.*
- (c) A power-driven vessel which takes action in a crossing situation in accordance with sub-paragraph (a)(ii) of this Rule to avoid collision with another power-driven vessel shall, if the circumstances of the case admit, not alter course to port for a vessel on her own port side.*
- (d) This Rule does not relieve the give way vessel of her obligation to keep out of the way*

Rule 18 - Responsibility between Vessels

Except where Rules 9, 10 and 13 otherwise require

- (d) (I) Any vessel other than a vessel not under command or a vessel restricted in her ability to manoeuvre shall, if the circumstance of the case admit, avoid impeding the safe passage of a vessel constrained by her draught, exhibiting the signals in Rule 28.*
- (ii) A vessel constrained by her draught shall navigate with particular caution having full regard to her special conditions.*

Rule 28 - Vessels constrained by their Draught

A vessel constrained by her draught may, in addition to the lights prescribed for power-driven vessels in Rule 23, exhibit where they can best be seen three all-round red lights in a vertical line, or a cylinder.

Rule 36 - Signals to attract Attention

If necessary to attract attention of another vessel any vessel may make light or sound signals that cannot be mistaken for any signal authorised elsewhere in these Rules, or may direct the beam of her searchlight in the direction of the danger, in such a way as not to embarrass any vessel.

River Embley

IMO Number	8018144
Flag	Australian
Classification Society	Lloyd's Register
Ship Type	Bulk
Builder	Mitsubishi Heavy Industries, Nagasaki, Japan
Year Built	1982
Owner	Australian National Line
Ship Managers	ASP Ship Management
Gross Tonnage	51,035
Net Tonnage	16,346
Summer deadweight	76,305 tonnes
Summer draught	12.325 m
Length overall	255 m
Breadth	35.35 m
Moulded depth	18.3 m
Engine	One Mitsubishi MS-21-2 Steam turbine
Power	13,976 kW
Crew	22