ATSB
Australian Transport Safety Bureau

AUSTRALIAN TRANSPORT SAFETY BUREAU

MARINE SAFETY INVESTIGATION
REPORT 163

Independent investigation into the collision
between the Hong Kong flag bulk cargo vessel

Handymariner

and the fishing vessel

Lipari

off the south coast of Western Australia
on 18 January 2001

COMMONWEALTH DEPARTMENT OF TRANSPORT AND REGIONAL SERVICES

Report No 163

Navigation Act 1912
Navigation (Marine Casualty) Regulations
investigation into the collision
between the the Hong Kong flag bulk cargo vessel
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Summary

At 0300 on the morning of 18 January 2001, the Hong Kong flag geared bulk carrier *Handymariner* was 26 miles[1] off the coast of Western Australia, enroute to Bunbury to load a cargo of alumina. The ship was on a course of 156° (T) at a speed of 14 knots. The wind was from the south-south-east at force six with a rough sea of 1.5–2 m on a low swell. The visibility was estimated at 10 miles with a partly cloudy sky.

The same morning, a 15.65 m timber rock lobster fishing vessel, *Lipari*, left Port Bouvard at around 0310 to check its lobster pots which were set some 36 miles in a south-westerly direction from the port. On board *Lipari* were the skipper and two deckhands. Shortly after leaving port, the two deckhands went below to sleep. The skipper stayed on the vessel's fly bridge for the first six miles steering a course of 235° at 15 knots and then went down to the wheelhouse and engaged the autopilot. He remained in the wheelhouse listening to some music.

At 0410 the mate on watch on *Handymariner* detected *Lipari* ahead, and to port, of his ship and commenced tracking the fishing vessel on radar. The ARPA equipped radar indicated that *Lipari*'s range at its closest point of approach was going to be small, so the mate attempted to call the fishing vessel on VHF channel 16. Despite several radio calls he received no response as, unknown to him, *Lipari*'s VHF radio was not working. The mate then attempted to warn the fishing boat using an aldis lamp and the ship's forward whistle, but still received no response. *Lipari* maintained a steady course and speed.

When *Lipari* had closed to within four miles, the mate disengaged the ship's auto pilot and ordered the look-out onto the helm in preparation for a course alteration. *Lipari* continued to close with the ship on a steady course and speed, apparently unaware of the presence of the ship and unresponsive to *Handymariner*'s radio calls, light and sound signals. With a collision now imminent the mate ordered a course alteration to starboard.

At about this time the skipper in *Lipari*'s wheelhouse heard the ship's whistle. He made his way to the fly bridge where he identified the ship dead ahead. He turned the fishing vessel's helm hard to port but it responded slowly as the auto pilot was still engaged in the wheelhouse.

At approximately 0435 *Lipari* and *Handymariner* collided, the fishing vessel's starboard bow making contact with the ship's hull plating on the port side adjacent to number one hold. The ship sustained no damage and there were no injuries sustained by the crew of either vessel, but *Lipari* had been holed on the starboard bow above the waterline.

After the collision, *Lipari*'s skipper inspected the damage and decided that the vessel was not safe to work. He followed *Handymariner* for approximately five minutes before turning north to Fremantle. *Lipari* arrived safely at a boat repair facility in Fremantle later in the morning.

Handymariner resumed its course to Bunbury and arrived at the anchorage at 0736 without further incident.

[1] Miles referred as nautical miles = 1 852 m

Sources of information

The master and crew of *Handymariner*

The skipper of *Lipari*

Australian Maritime Safety Authority

Transport Western Australia

Vinci Seafoods Pty Ltd, Fremantle

Acknowledgments

The Inspector gratefully acknowledges the assistance of the Forensic Services division of the Australian Federal Police.

The Inspector is grateful to Interdynamics Pty Ltd (www.interdynamics.com) for the computer program, FAID 330E, which was used during the analysis of the fatigue factors.

Narrative

Lipari

Lipari (figure 1) is a 15.65 m timber rock lobster fishing boat of 21.28 GRT (gross registered tons) based in Fremantle, Western Australia. The vessel is registered with Transport, Marine Safety, Western Australia as a class 3B[2] vessel with the registration number F 350.

Lipari was built in 1981, by Marco Sobrero in Fremantle, Western Australia and is currently operated by Vinci Seafoods of Fremantle. The vessel's hull is constructed of marine ply timber over hardwood frames and has a beam of 4.26 m and a depth of 1.94 m. The hull and topsides are painted white with the rubbing strake, where the hull meets the deck at the bow, painted blue and faced with an aluminium strip. An 8-cylinder Detroit diesel engine, rated at 358 kW, drives a single fixed-pitch propeller to give the vessel a maximum speed of 18 knots. *Lipari* is equipped with electronic navigation and fishing aids including GPS (global positioning system), a chart plotter system and echo sounders. The communication systems include SSB MF/HF, 27Mhz and VHF radios.

In its configuration, *Lipari* is typical of many Western Australian rock lobster fishing boats. The wheelhouse is located forward of a large, unobstructed work deck at the rear of the vessel. Access to the wheelhouse is via a central door leading from the work deck with the helm, engine controls, compass, echo sounder and coxswain's chair located on the port side. A saloon area, fitted with a table and chairs, is located on the starboard side of the wheelhouse and a central companionway leads from the wheelhouse down to a bunkroom beneath it.

A second conning position is located above the wheelhouse on a fly bridge. The fly bridge is partially enclosed with a canvas canopy fitted with soft plastic clear panels on its forward, port and starboard sides. There are duplicate helm and engine controls at this position, with the VHF radio and GPS plotter fitted in a cabinet adjacent to the conning position.

At the time of the incident, the crew of *Lipari* consisted of a skipper and two deckhands.

The western rock lobster fishing season lasts from 15 November to 30 June each year. The fishery is primarily an inshore fishery with most of the recognised fishing grounds located between latitudes 22º and 35º south in depths of water between 50 and 300 m. Each lobster boat is licensed to carry and work a fixed number of lobster pots. *Lipari* is licensed to work 89 pots. The usual routine when fishing is to set the pots in known or previously productive fishing grounds using the GPS plotter. The pots are then checked each day, usually in the morning, by the boats which travel out from local ports. The catch is then transported to processing works in Fremantle where it is sorted, packaged and shipped to market.

Lipari's skipper holds a master class five certificate of competency. He is an experienced fishing vessel skipper and, at the time of the incident, had been skipper for seven years and had served as deck hand for nine years before that. During his 16 years of fishing he had worked exclusively around the south-west coast of Western Australia.

Handymariner

Handymariner (figure 2), (formerly *Durhambrook-80*) is a Hong Kong flag geared bulk carrier of 31 200 deadpweight tonnes at its summer draught of 10.33 m. The vessel is owned

[2] Seagoing fishing vessel for use in all operational areas up to and including offshore operations (*Lipari* is limited to 100 miles to seaward of the coast).

by *Handymariner* Shipping Company with the registered agents being COSCO (H.K.) Shipping Company of Hong Kong. It is classed ✠100A1, with ✠LMC[3] and UMS[4] notations, with Lloyd's Register.

Handymariner was built in 1978 by Sunderland Shipbuilders in Sunderland, Great Britain. The vessel has an overall length of 181.72 m, a moulded breadth of 23.10 m and a moulded depth of 14.50 m. The vessel is powered by a 4-cylinder Doxford 76JS6C single acting, opposed piston, direct reversing, 2-stroke diesel engine, of 8 827 kW. The main engine drives a single fixed-pitch propeller which gives the ship a service speed of 15.0 knots.

The vessel is of standard geared bulk carrier design with six holds and five gantry cranes, with the forward crane servicing both numbers one and two holds. The accommodation superstructure is located aft with the bridge located in the usual position at the top of the accommodation block. The hull is painted black, with dark red boot-topping, the cranes are painted buff and the accommodation block is painted white.

Handymariner has a crew of 30 comprising a master and three mates, radio officer, chief and four engineers, boatswain, carpenter, seven deck ratings, seven engine room ratings, three catering staff and two repairmen. The mates maintain a traditional four on, eight off, watchkeeping routine. At the time of the incident, all of the crew were Chinese nationals with the exception of the master who was Malaysian.

The master of *Handymariner* held a foreign-going masters certificate of competency issued in Panama and had 32 years experience at sea, the last 15 of which were in command. He had been on the vessel since August 2000 but had not previously been to Bunbury. The mate held a foreign-going master's certificate of competency issued in the Peoples Republic of China. He had 20 years experience at sea and had been mate for the previous five years. He had been on the vessel since September 2000 and, like the master, had not previously been to Bunbury.

The Incident

Handymariner

On 10 January 2001, *Handymariner* left Singapore on voyage number 128 bound for Bunbury in Western Australia to load a full cargo of alumina. The ship was in ballast and the trip south was uneventful with the ship's regular routines maintained.

At 0300 on 18 January, *Handymariner* was 26 miles off the Western Australian coast on a course of 156º(T) with the autopilot engaged and maintaining a speed of approximately 14 knots. The ship was well within the rock lobster fishing grounds marked on the navigation chart. The ship's navigation lights were fully operational and turned on. The wind was from the south-south-east at force six with a sea of 1.5–2 m on a low swell. The visibility was estimated at 10 miles with the sky partly cloudy. On watch was the second mate, with a deck rating acting as look-out. As the ship was entering an area of expected traffic the second mate decided to switch on the ship's 3-cm ARPA equipped radar set.

At 0345 the mate came to the bridge to relieve the second mate. During the watch hand-over, the second mate indicated that he had been tracking a number of small, fast, vessels on radar during the past hour. He pointed out a number of targets displayed on the 3-cm radar and both men were surprised at the speed of the vessels, as they were familiar with slower, Chinese, fishing boats. During the hand-over the second mate made a course alteration to avoid a small vessel ahead of the ship.

After the mate had taken the watch, he briefly switched the radar to the 12-mile range to see what traffic was ahead. He then switched the radar

[3] Notation assigned when machinery is constructed and installed under Lloyd's Special Survey in accordance with Lloyd's rules.

[4] Notation denotes ship may be operated with the machinery spaces unattended.

back to the 6-mile range. At around 0410 he saw a green light ahead and to port and assumed that the light was the starboard navigation light of another vessel. He checked the range and speed of the vessel on the radar and used the ARPA function to select it as a 'target'. The radar showed that the vessel's range at its closest point of approach (CPA) was going to be small and so the mate attempted to call the vessel on VHF channel 16:

'Small ship port side at 15 knots, how do you read?'

The mate received no answer to his first call and made several more attempts. He still received no response.

At approximately 0420, the mate checked the radar to see that the distance to the small vessel had closed to four miles. He then turned the autopilot off and ordered the look-out onto the helm in preparation for an alteration of course.

The mate continued to call on VHF 16. The smaller vessel did not respond at any time to his calls and maintained its speed and course. At this point the mate started to sound the ship's forward whistle using five short blasts at short intervals. He also tried to signal the vessel using the aldis lamp on the port side of the bridge. The mate indicated that when the distance to the smaller vessel had closed to less than two miles, he ordered 20° of starboard rudder, then full starboard rudder, to bring the ship onto a course which he thought was about 226°(T). The mate continued to sound the ship's forward whistle.

Lipari

At approximately 0310 on 18 January, *Lipari* left Dawesville Cut, south of Fremantle on the Western Australian south coast. The skipper was navigating the vessel with two deckhands on board. Shortly after leaving port, the two deckhands went below to sleep. The skipper stayed at the helm on the fly bridge, using the GPS to steer a course of 235° for the vessel's first line of lobster pots. *Lipari* was making headway at approximately 15 knots with its navigation lights on. After six miles or so, when he was satisfied that the vessel was on course, the skipper went down to the wheelhouse and engaged the autopilot. He stayed at the helm on the port side of the wheelhouse and listened to some music while periodically checking the vessel's heading and looking out.

During the next half-hour or so the skipper noticed several other vessels in his area which he took to be other rock lobster boats heading out to check their pots. These included three boats to starboard of his position and one ahead, a faster vessel skippered by a friend which had left port about the same time as *Lipari*.

At approximately 0405, the skipper's friend, now approximately 20 minutes ahead of *Lipari*, came into close quarters with *Handymariner* and identified the ship after mistaking its lights for those of a fishing vessel. He made several calls to *Lipari*'s skipper on VHF radio to warn him of the presence of the ship but did not receive a response. *Lipari*'s VHF radio had failed the previous day.

At around this time *Lipari*'s skipper stated that he saw *Handymariner*'s navigation lights and, like his friend, mistook them for the lights of a fishing vessel.

Approximately 1 hour and 25 minutes after leaving port, the skipper heard what he thought was a fog horn. He made his way to the fly bridge to see that the horizon appeared to be much darker than he expected and then identified *Handymariner*'s red boot-topping at the ship's waterline. He realised at this time that there was a ship dead ahead of his position at a range he estimated at just over 200 m. The skipper put the helm hard over to port to avoid a collision but *Lipari* responded slowly as the autopilot was still engaged.

Collision

At approximately 0435 *Lipari* and *Handymariner* collided, the fishing vessel's starboard bow making contact with the ship's hull plating on the port side adjacent to number one hold.

The mate and look-out on the bridge of *Handymariner* saw the fishing boat turning to

port, very close to the port side of the ship but were not sure whether the boat had actually made contact with the ship as there was no sound or feeling of an impact. They could not see anyone in the boat's wheelhouse and did not see any lights on the boat, other than its navigation lights. At this time the mate called the master to the bridge and continued to monitor the other vessel both visually and on radar. He continued to call on VHF channel 16 but he did not alter the ship's speed.

After *Lipari* had collided with *Handymariner*, one of the deckhands, woken by the commotion, came to the wheelhouse and disengaged the autopilot. The skipper did not alter *Lipari*'s speed before or immediately after the collision and continued to turn to port in a wide circle away from *Handymariner*. After his vessel was well clear of the ship the skipper stopped *Lipari* and went forward with a deckhand to inspect the bow for damage. The skipper saw that there was a hole in the hull planking on the starboard bow and the rubbing strake and some timber frames had been damaged. He realised that the damage was severe enough to prevent the vessel from working safely and made the decision to return to Fremantle for repairs. The skipper then made his way back the wheelhouse and turned on the MF/HF radio to see if the ship was trying to call him. He heard nothing on the MF/HF radio.

Once under way again, the skipper followed the ship for a period of about five minutes in an attempt to make contact. When he realised that the ship was not slowing down, he turned *Lipari* onto a northerly course and headed for Fremantle arriving safely some three hours later.

The master arrived on *Handymariner*'s bridge shortly after the collision. After conferring with the mate, the two men continued to monitor *Lipari*, both visually and on radar, but did not alter the ship's speed. They saw the fishing vessel follow them at 15 knots for a period of 5 minutes or so and then turn north. During this time they made several attempts to contact the vessel using VHF radio on channel 16. The master then instructed the mate to go forward with a torch and inspect the port side of the ship for any sign of a collision. He reported back a short time later to indicate that he could see no evidence that the two vessels had made contact. During this time the master altered the ship's heading to bring it back on course for Bunbury.

At 0736 on 18 January 2001, *Handymariner* arrived at the Bunbury anchorage without further incident.

Figure 3 is an extract from navigation chart AUS 334 which shows each vessel's course prior to the collision and the position of the collision.

FIGURE 3:
Extract from Aus 334 showing vessel courses and position of collision

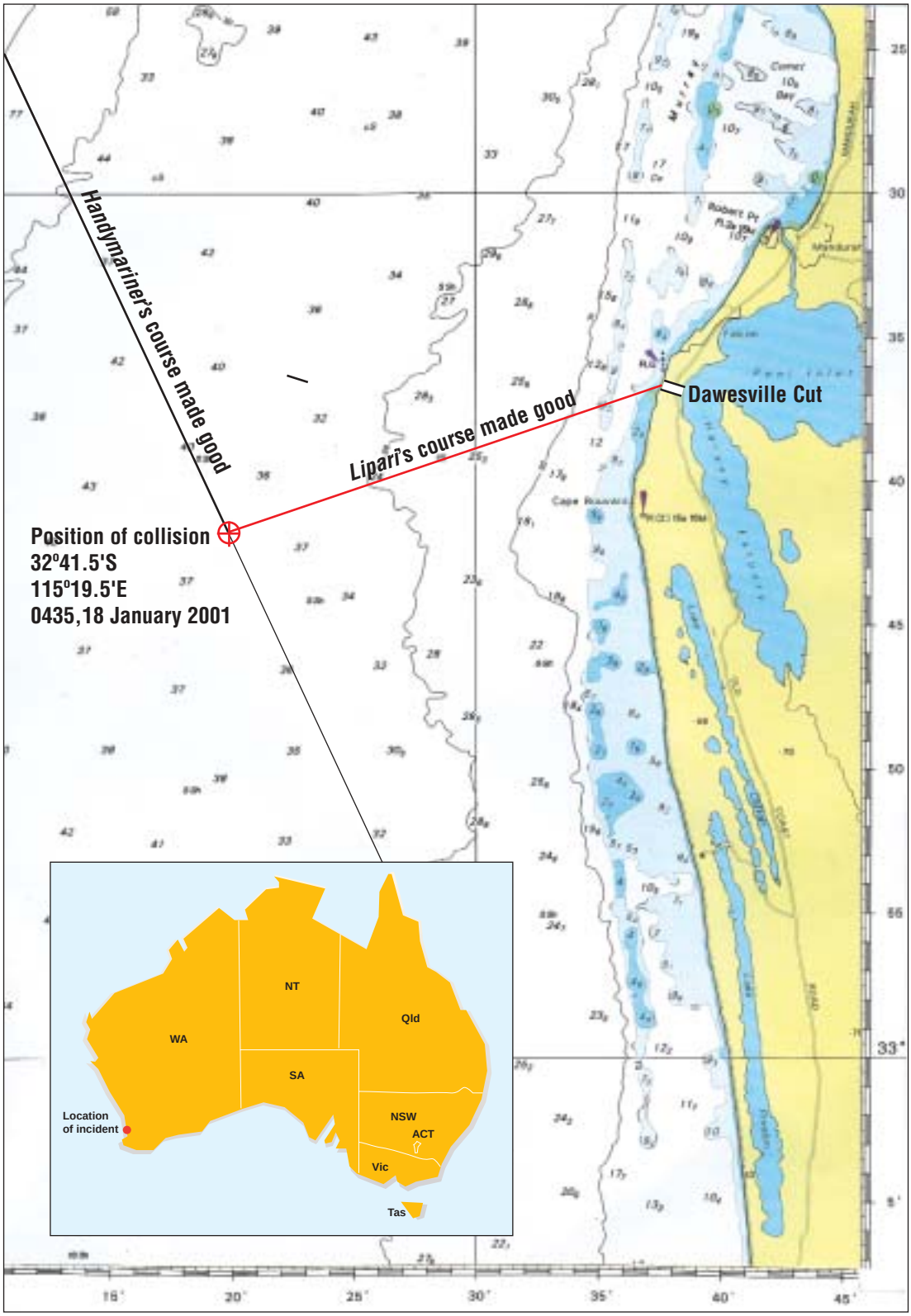


FIGURE 4:
Point of impact on *Handymariner*

FIGURE 5:
Damage to *Lipari*

Comment and analysis

Evidence

An investigator from the Australian Transport Safety Bureau (ATSB) attended *Handymariner* in Bunbury on 19 January 2001. Various evidence was obtained from the ship including copies of the ship's navigation charts, log books, movement book, passage plan and course recorder trace. The master and mate were interviewed and provided accounts of the incident. Inspection of the ship revealed some fresh scores in the hull paint on the port side adjacent to number one hold (figure 4). Samples of the hull paint and some blue paint, which had been deposited on the hull, were taken for analysis. There was no damage evident to either the framing or hull plating.

Lipari was examined in Fremantle on 20 January 2001 at the repair facility of North Port Boat Lifters. The vessel had been lifted from the water and was sitting on a cradle inside a workshop. *Lipari* presented as a well-maintained and well-equipped fishing vessel. Damage was noted in the area of the starboard bow with a hole in the marine ply hull planking and damage to the internal timber framing (figure 5). Samples of paint in the area of the damage were taken for analysis. It was noted that the VHF radio and GPS plotter had been removed from the cabinet adjacent to the conning position on the fly bridge.

Lipari's skipper was interviewed in Fremantle on the afternoon of 20 January 2001 at the premises of Vinci Seafood and later provided the investigation with details of his hours of work leading up to the incident and documentation relating to the purchase and subsequent repair of *Lipari*'s VHF radio. Like most fishing vessels of its type, *Lipari* is not equipped with any form of course recorder or automatic data recording device. The skipper's account of the collision is the only evidence relating to the course of events aboard *Lipari*.

Both deckhands were down below sleeping at the time of the collision.

VHF channel 16 is not monitored in the area of the collision and so a record of *Handymariner*'s calls to *Lipari* around the time of the collision was not available.

The paint samples taken from each vessel were passed to the Forensic Services division of the Australian Federal Police for examination. They analysed the samples using optical and X-ray fluorescent spectrographic techniques and provided the investigation with a report of their findings. The report concludes:

> The red/brown paint found on the '*Lipari*' has the same colour and chemical composition as the red/brown paint from the '*Handymariner*'. Therefore the red/brown paint found on the '*Lipari*' could have come from the '*Handymariner*'. The foreign paint on the '*Handymariner*' has the same layer sequence, physical properties and basic chemical composition as paint from the '*Lipari*'. Therefore the paint evidence strongly supports the proposition that the '*Lipari*' and the '*Handymariner*' have been in contact.

The Collision

Handymariner and *Lipari* collided at 0435 on 18 January 2001, at a position of 32° 41.5' S 115° 19.5' E, 14 miles west-south-west of Cape Bouvard. This was the GPS position and time recorded by the crew of *Handymariner*. *Lipari*'s skipper verified the time of the collision and the general area.

The location and the extent of damage to *Lipari*'s starboard bow indicates that the fishing vessel and *Handymariner* were at an oblique angle at the point of impact and supports the skipper's assertion that he was turning to port when the collision occurred. The damage to *Lipari* would have been significantly worse if its angle of attack with respect to the ship had been greater, given the speed of the fishing vessel at the time.

The location of the blue paint deposited on *Handymariner*'s hull plating adjacent to number one hold indicates the fishing vessel's point of impact and is consistent with the mate's observations at the time.

Lipari's skipper said that he identified *Handymariner* as a ship approximately 30 seconds before the collision, when he was close enough to identify the ship's boot-topping. Given a speed of 15 knots (7.7 m/s) at this time, *Lipari* would still have been more than 200 m from the ship with sufficient time for the skipper to disengage the vessel's autopilot and take evasive action or, indeed, to stop the vessel. It is more likely that the skipper did not identify the ship until it was at a range of around 100 m, 10–15 seconds before the collision. In submission, the skipper stated:

> …when he first identified 'HANDYMARINER' as a ship it was approximately 100 metres away.

The mate on watch stated that he had ordered 20° of starboard rudder and then full starboard rudder when *Lipari* had closed to within two miles and that the ship had come around onto a heading of 226°. The course recorder trace taken from *Handymariner* shows that a course alteration to starboard from 156° to approximately 185° took place at 0433. The trace shows that after *Handymariner*'s heading had reached 185°, the ship's heading came slowly back to port for a period of approximately five minutes. The trace then shows a large course alteration to port at approximately 0443 which brought the ship back onto its original course. The accuracy of the time scale on the recorder trace could not be verified but the recorded headings appeared to be reasonably accurate based on the previous courses steered.

The rate of turn for the course alteration to starboard at 0433 was calculated from the course recorder trace to be approximately 13° per minute which is relatively slow and is not consistent with the mate's recollection of his helm orders of 20° of starboard rudder then full starboard rudder. The timing of the alteration at 0433 is also not consistent with the time of collision at 0435 if the alteration was made when *Lipari* was still at a range of two miles as the mate recalled. This may be the result of the inaccuracy of the course recorder time scale although the time for the total manoeuvre, approximately 10 minutes (0433–0443), would suggest that the initial alteration to starboard occurred when *Lipari* was considerably closer than two miles. In conclusion, analysis of the course recorder trace indicates that the course alteration to starboard immediately prior to the collision was smaller, slower and occurred when the two vessels were much closer than the mate recalled.

On 18 January 2001, visibility was reported to be 'fair' by *Lipari*'s skipper and 10 miles by the crew of *Handymariner* although the sky was cloudy. Sunrise occurred at 0526 with civil twilight from 0501. At 0435 when the collision occurred it would have still been dark. The moon was two days past the last quarter at an azimuth of 70° and an altitude of 46°. Although the moon was behind *Lipari* in a position to aid the skipper in his identification of the ship, its phase and the cloudy sky would have resulted in a negligible amount of moonlight around the time of the collision.

Lipari's VHF radio

The mate and master on *Handymariner* stated that they attempted to call *Lipari* on VHF channel 16 repeatedly from about 0410 until approximately 0440 after the collision. They indicated that at no time before or after the collision did they receive a response from the fishing vessel. The skipper's friend in the fishing vessel ahead of *Lipari* also tried to warn him of the presence of the ship ahead and also received no response. Had *Lipari*'s skipper received a radio call from *Handymariner*, or his friend, in the 25 minutes prior to the collision, he would have been alerted to the presence of the ship and it is likely that the collision would have been avoided.

On the morning of 18 January *Lipari*'s VHF radio was not working when the vessel left port. *Lipari*'s skipper indicated that he had had a new VHF radio fitted to the fly bridge three days before the collision on 15 January. The day before, 17 January, the skipper found that the new radio was not working and, after arriving back in port that afternoon, arranged for the electrician who installed the radio to attend the vessel to repair it. The electrician performed a series of checks but could not repair the radio at the time. A second electrician attended the vessel in Fremantle after the collision and found that the voltage converter

which supplied the VHF radio had failed. The documentation supplied by the skipper included invoices for the purchase and installation of the radio, dated 15 January and an invoice for the supply and installation of a voltage converter dated 18 January.

The Western Australian radiotelephony requirements for commercial vessels are contained in the W.A. Marine (Radio Telephony) Regulations of 1981. Regulation 5 states that vessels such as *Lipari* with an operational area more than 20 miles from a coastal radio station must be equipped with a single side band MF/HF radio capable of receiving and transmitting on 2182, 4125 and 6215.5 kHz. There is no requirement for an additional VHF radio on such vessels registered in Western Australia nor under the current provisions of the Uniform Shipping Laws Code which is applicable in most other states. On the morning of 18 January, *Lipari* complied with the relevant statutory requirement as the vessel was fitted with a MF/HF radio. However, the skipper was not maintaining the radio watch required by Regulation 14 as the MF/HF radio was switched off in the time leading up to the collision.

VHF radio is the accepted standard method of radio communication between vessels at sea in reasonably close proximity (up to 20 miles or so). All ships[5] are obliged to carry VHF radios and maintain a listening watch on channel 16. Since the introduction of the Global Maritime Distress and Safety System (GMDSS) the 2182, 4125, 6215.5 kHz MF/HF radio frequencies are no longer routinely used or monitored by ships. For practical purposes it is now very difficult for another vessel to make radio contact with a ship using conventional (non GMDSS) MF/HF radio equipment. Likewise it is highly unlikely that a ship would attempt to call another vessel in its immediate area using the 2182, 4125, 6215.5 kHz MF/HF radio frequencies. Any vessel equipped with only a conventional MF/HF radio, as was *Lipari* on the morning of the collision, would have great difficulty making radio contact with a ship.

Without a functioning VHF radio, *Lipari*'s skipper had no practical way of communicating with shipping traffic in his area and thus no way of receiving the warnings from the crew of *Handymariner*.

For practical purposes most commercial vessels operating more than 20 miles from a coastal radio station are fitted with VHF radio, regardless of the lack of a statutory requirement to do so. To prevent situations like the collision between *Lipari* and *Handymariner*, all vessels operating in areas where there is shipping traffic (or indeed any commercial traffic) should carry a VHF radio and maintain a listening watch on channel 16.

Keeping a look-out

The International Regulations for Preventing Collisions at Sea, 1972, (COLREGS) '…apply to all vessels upon the high seas and in all waters connected therewith navigable by seagoing vessels.' The COLREGS contain specific requirements for keeping a look-out and actions to avoid collisions. Rule 5 'Look-out' states:

> Every vessel shall at all times maintain a proper look-out 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 the risk of collision.

In the case of the collision between *Lipari* and *Handymariner*, crew on both vessels were obliged to maintain a proper look-out by all appropriate means and thereby avoid a collision.

Handymariner

The bridge team on *Handymariner* in the time leading up to the collision consisted of the mate and a look-out. Both men were maintaining a visual look-out and the mate was using the 3-cm ARPA equipped radar to track the vessels in the area.

[5] Cargo vessels of more than 300 gross tons or passenger vessels carrying more than 12 passengers on an international voyage or navigating in open sea.

The mate identified *Lipari*'s starboard navigation light visually at approximately 0410 ahead and to port, at a range of six miles, and then commenced tracking the fishing vessel on the radar. At this time *Lipari* was maintaining a steady course and speed which allowed the ARPA software to calculate the fishing vessel's 'closest point of approach' and 'time to closest point of approach' reasonably accurately. The calculated range of the vessel at the 'closest point of approach' was small and the mate realised at this time, some 25 minutes prior to the collision, that the two vessels would be passing at close quarters.

The actions of the mate at this time were consistent with good navigational practice and in compliance with the provisions of the COLREGS as he had identified the fishing vessel and had used the radar to correctly assess the risk of collision.

Lipari

After leaving port and conning the vessel from the fly bridge for the first 6 miles, *Lipari*'s skipper went down to the wheelhouse and engaged the autopilot. For the next hour or so the skipper remained in the wheelhouse periodically checking the vessel's heading and keeping a look-out while listening to some music on the cassette player in the wheelhouse. He indicated that the music was fairly loud. Both deck hands were asleep in the cabin below the wheelhouse.

Initially the skipper noted some traffic in his area, ahead and to starboard, which he identified as other fishermen enroute to their crayfish pot lines. He stated that at around 0410 he saw *Handymariner*'s navigation lights, but no other lights on the ship. At this time the ship's lights visible from his position were the port navigation light and the mast lights forward and aft. He stated that he mistook the masthead light and the port light for those of a crayfish vessel some way ahead of his position and did not identify what the ship's forward mast light was. The skipper said that his experience of ships in the past had been in the area of Rottnest Island and that they were lit up along the deck 'like a Christmas tree'.

The skippers height of eye in the wheelhouse would have been in the order of 3 m making his horizon 3.6 miles. Taking the ship's forward and after draughts into account, *Handymariner*'s forward mast light was approximately 27 m above the waterline, the after masthead light approximately 30 m above the waterline with the port light about 24 m above the waterline. At a range of around 6 miles, when *Lipari*'s skipper indicated that he saw the ship's lights, they would have appeared much higher, with a greater separation between the port light and the masthead light than a normal fishing vessel at any distance visible to him in *Lipari*'s wheelhouse. Continued observation for a short period of time would also have revealed that the forward mast light was moving at the same speed and maintaining a constant distance from the other two lights. These observations even on the part of a casual observer would have indicated that the lights belonged to a large vessel. For any person with navigational experience and knowledge of the COLREGS, *Handymariner*'s navigation lights would have been readily identifiable as those of a power driven vessel underway of 50 m or more in length. It is a matter for some conjecture how *Lipari*'s skipper, with considerable experience, could have mistaken *Handymariner'*s navigation lights for those of a fishing vessel.

When the range between the two vessels had closed to approximately 3 miles, the mate on *Handymariner* indicated that he had used the aldis lamp on the port bridge wing to signal *Lipari*. The fishing vessel's skipper did not see this light which would have been easily visible in the wheelhouse had his look-out been even cursory.

The mate on *Handymariner* indicated that he had started to sound the ship's forward whistle when the range between the two vessel's had closed to approximately 4 miles. The COLREGS stipulate that *Handymariner*'s forward whistle (as a vessel less than 200 m in length) is audible for a minimum range of 1.5 miles ahead of the vessel in conditions of still air. At the time of the collision the wind was from the south-south-east at force 6. These conditions were not conducive for *Lipari*'s

skipper to hear the whistle given the fishing vessel's range and bearing from the ship at the time. Allowing for the reported wind strength and direction, the whistle was probably only clearly audible for a range of around 0.5 miles in *Lipari*'s direction.

Lipari's skipper stated that he was listening to loud music while he was sitting in the wheelhouse in the time leading up to the collision. The music would have effectively masked the sound of *Handymariner*'s whistle until the fishing vessel was very close to the ship. Had the skipper heard and identified this warning from the ship, even at a range of considerably less than half a mile, the collision could have been avoided. Thus, the music in the wheelhouse inhibited the skipper's ability to maintain an effective look-out using his hearing.

On the balance of the evidence it can only be concluded that the skipper's look-out in the wheelhouse of *Lipari* with respect to both sight and hearing in the period leading up to the collision was inadequate and ineffective and did not comply with the requirements of the COLREGS. The skipper knew, before leaving port, that *Lipari*'s VHF radio was inoperative and thus one of his most important aids to safe navigation was negated. Given this knowledge, the skipper should have been maintaining a higher level of watchkeeping vigilance; that he wasn't suggests that there may have been some other factor modifying his judgment and behaviour.

Actions to avoid a collision

There is an obligation on all vessels at sea to take appropriate actions to avoid a collision. A 'crossing situation' existed between *Lipari* and *Handymariner* on the morning of 18 January. In this situation *Lipari*, with the ship on its starboard side, was the 'give-way' vessel and *Handymariner* was the 'stand-on' vessel as defined by the COLREGS. As such, the first responsibility for taking action to avoid a collision rested with the fishing vessel, however there was still an onus on the ship to take any action necessary to avoid a collision. That a collision occurred at all means that there was a failure on the part of both parties.

The bridge crew on *Handymariner* took a number of actions to avoid a collision with *Lipari* after they had identified the risk of collision. Initially, these actions were consistent with the ship's responsibilities as the 'stand-on' vessel. At first they attempted to contact the fishing vessel using the internationally accepted means ie. VHF channel 16. When this failed they used both light and sound signals to try to warn *Lipari*. When it became evident that the fishing vessel was not responding to these warnings the mate ordered a course alteration of approximately 30° to starboard. The course alteration took place when the collision was imminent and was probably too little, too late, given that the mate had been tracking *Lipari* on a steady course and speed for the previous 20 minutes or so.

The skipper on *Lipari* did not identify *Handymariner* until after he had heard the ship's sound signal at an estimated range of around 100 m. His response at this time was to turn the fishing vessel hard to port. The skipper's actions in the time leading up to the collision were not in accordance with the COLREGS which state that the 'give-away vessel in a crossing situation, …shall, so far as possible, take early and substantial action to keep well clear.' The skipper's actions were far too late to avoid a close quarters situation as a direct result of his ineffective look-out and poor situational awareness at the time.

The skipper's final alteration to port in the last minute was not in accordance with the COLREGS and the practice of good seamanship which normally dictate that the 'give-way' vessel should alter course to starboard in a 'crossing situation'. However, in the event, allowing for the close proximity of the ship, each vessel's heading, the point of impact at the forward end of the ship and the speed and rate of turn of the fishing vessel at the time, the skipper's action in turning to port rather than starboard was probably correct. Had he turned to starboard, it is likely that the fishing vessel would have impacted squarely on the ship's after end with significantly more damage to both vessels.

Neither the skipper of *Lipari*, nor the mate on *Handymariner* made the decision to slow their

vessels when it was apparent that the collision was imminent.

The COLREGS state:

> 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.

It is a matter for some conjecture if the skipper had made a full astern movement when he identified the ship whether he could have stopped *Lipari* in time to avoid the collision. It appears that this option did not occur to him at the time.

Handymariner as the stand-on vessel, was obliged to maintain course and speed until such time as it became apparent that *Lipari* was not taking the appropriate action to avoid a collision. Given the speed of *Lipari* and the relatively long time taken to slow *Handymariner* it is unlikely that a decision by the mate to slow the ship, when it became reasonably apparent that *Lipari* was not going to giveway, would have prevented the collision. The mate expected that the fishing vessel had already, or would in sufficient time, identify the ship. He judged that any action to avoid a collision on the part of the much more manoeuvrable *Lipari* would have been effective up to the time that the two vessels were at relatively close quarters. Given the mate's assessment of the situation (which was reasonable) it is unlikely that he seriously considered slowing the ship at a time early enough to be effective, preferring to use the option of the course alteration at a later stage.

It is matter of some concern that neither vessel stopped after the collision. *Handymariner* resumed its original course and continued to steam away at full speed and initially *Lipari* also continued at full speed away from the ship. No direct contact between the vessels occurred to establish whether assistance was required or to exchange details. After arriving on the bridge and assessing the situation, *Handymariner*'s master was unsure if contact had actually occurred. He tracked *Lipari* as it followed the ship at full speed for 5 minutes or so after the collision, before turning north, and concluded from these actions that *Lipari* did not require assistance. Rather than making this presumption, it would have been prudent for the master to stop the ship and make direct contact with the fishing vessel to positively establish the circumstances and ensure the welfare of the crew of *Lipari*.

Fatigue

Fatigue may be described as a reduction in physical and/or mental capability as a result of physical or emotional exertion which may impair nearly all physical abilities including, strength, speed, reaction time, coordination and decision making. Fatigue may be described as acute or chronic. Acute fatigue occurs in a matter of hours as the result of excessive mental or physical activity and may be cured by a period of rest or sleep. A state of chronic fatigue is reached when the 'normal' period of rest or sleep is insufficient to restore an individual's working performance to its usual level. Chronic fatigue is insidious and usually develops over a period of time. Individuals suffering from chronic fatigue always perform below their personal best but are often unaware that their performance has been significantly degraded. In the worst case, chronic fatigue can drive an individual to sleep while at work often in the form of a momentary event or 'micro-sleep' which may last a few seconds or several minutes.

Lipari - lead up events

Prior to the morning of the collision, *Lipari*'s crew had spent a busy two and a half months fishing since the opening of the rock lobster fishing season on 15 November 2000. Based in Fremantle at first, then Two Rocks and finally Port Bouvard south of Fremantle, they had fished continuously since the opening of the season. The skipper indicated that a routine had been established with the vessel leaving port early each morning to arrive at the fishing grounds to commence checking the lobster pots around dawn each day. The length of each work day varied depending on the distance travelled to the lobster pot lines and the depth of water in which the pots were set. *Lipari*'s work day is longer when the distance to the pot lines is greater and when the pots are set in deeper water as more time is required to check each pot.

For the two weeks prior to the incident, when *Lipari* had been based in Port Bouvard, the lobster pots had been set in depths of water around 50 m some 36 miles from port. *Lipari* had been leaving port at around 0300 each day and arriving back in port at around 1430. After arriving back in the port the catch would be discharged and the crew free to rest, if there was no maintenance to do on the vessel. The skipper indicated that they did not fish in poor weather conditions although he also stated that he had had only 4 days off in the previous two and half months, none as a result of poor weather.

Fatigue analysis

The skipper of *Lipari* provided details of his hours of work and rest in the 5 days prior to collision. He indicated that these hours were representative of his routine while based at Port Bouvard. The skipper's work averaged around 11.75 hours per day for this period. He indicated that it was his practice to go to bed between 2000 and 2045 and rise at 0235. This meant that in the two weeks prior to the collision the skipper had had between 5 hours 50 minutes and 6 hours 35 minutes sleep each night. His last day off was on 10 January.

The skipper's work and rest routine was analysed using Fatigue Audit InterDyne (FAID) software developed in conjunction with the Centre for Sleep Research at the University of South Australia. The FAID software enables the quantitative assessment of an individual's level of fatigue at a point in time based on work hours for the previous seven days. The resultant individual fatigue 'score' may be used as a guide to indicate what effect fatigue may have had on an individual's performance.

The FAID software indicated that *Lipari*'s skipper had a fatigue score at the time of the collision of between 134 and 175. The lower limit of 134 was derived using only his hours of work based on the assumption that in any time off he had the opportunity to take rest. The upper limit of 175 was derived by entering all waking hours as work to reflect his actual documented hours of sleep. In reality the skipper's fatigue score would have been somewhere between the upper and lower limits.

Research by the Centre for Sleep Research suggests that a fatigue score of 40–80 is moderate, 80–100 is high with scores 100–120 being very high. High fatigue scores of 80–100 have been shown to produce individual performance impairment equivalent to a blood alcohol concentration over 0.05%. The skipper's fatigue score was extremely high even when considering the lower limit of 134. It is probable that on the morning of 18 January the skipper's judgement, actions and situational awareness were severely affected by chronic fatigue; if indeed he was awake and cognisant in the wheelhouse in the time leading up to the collision.

Conclusions

These conclusions identify the different factors contributing to the incident and should not be read as apportioning blame or liability to any particular organisation or individual.

The following factors are considered to have contributed to the collision between *Lipari* and *Handymariner* at approximately 0435 on 18 January 2001.

1. The look-out being maintained on *Lipari* was not adequate or effective in the time leading up to the collision.

2. The lack of a functioning VHF radio on *Lipari* on the morning of 18 January directly contributed to the collision.

3. The loud music playing in *Lipari*'s wheelhouse impaired the skipper's ability to maintain an effective look-out in the time leading up to the collision.

4. It is probable that *Lipari*'s skipper was suffering from the effects of chronic fatigue on the morning of the collision leading to his poor look-out and poor situational awareness, particularly with regard to the ship's navigation lights.

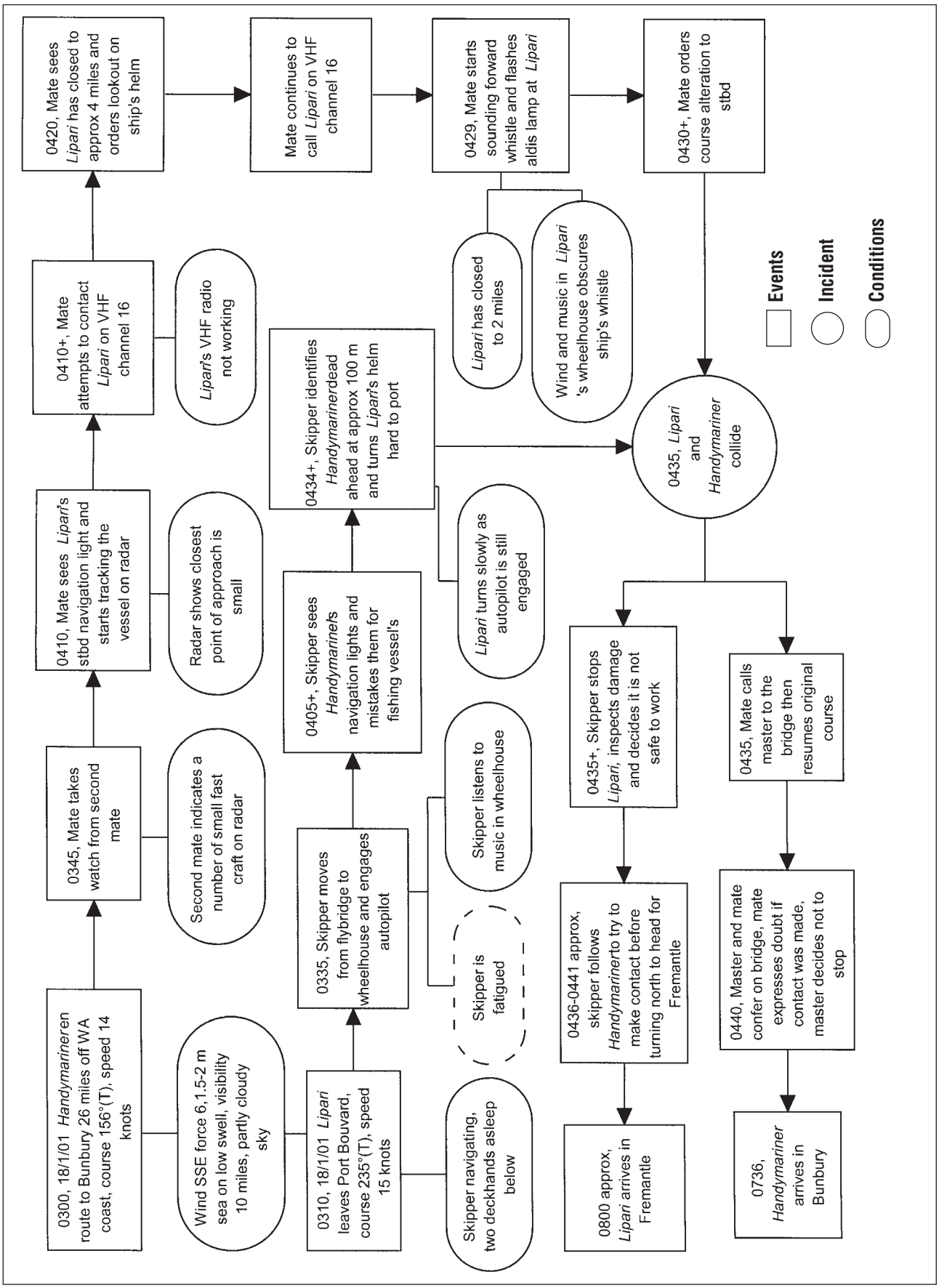
It is also considered:

5. It is unlikely that a decision to slow *Handymariner* when it became reasonably apparent that *Lipari* was not going to giveway would have been effective in preventing the collision.

6. The visual and radar look-out on *Handymariner* was effective in that a risk of collision with *Lipari* was identified 25 minutes before the collision.

7. Both vessels should have stopped and established contact as soon as possible after the collision.

FIGURE 6:
Collision: *Handymariner/Lipari* events and causal factors chart



Submissions

Under sub-regulation 16(3) of the Navigation (Marine Casualty) Regulations, 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 the relevant part of the report. Sub-regulation 16(4) provides that such a person may provide written comments or information relating to the report.

The final draft of the report was sent to the following:

The master, mate, managers and the solicitors representing the owners and master of *Handymariner*. The skipper, owners and the solicitors representing the skipper and owners of *Lipari*. The Australian Maritime Safety Authority.

A submission was received from the solicitors representing the skipper and owners of *Lipari*. The draft report was amended and submissions included where appropriate.

Recommendations

It is recommended that:

1. All State and Territory registered commercial vessels operating offshore be required to carry an operational VHF radio capable of maintaining a continuous watch on 156.8 MHz (channel 16).

2. The State and Territory marine regulatory authorities, via the National Marine Safety Committee, and in consultation with the Australian Seafood Industry Council, ensure the safety and welfare of fishing vessel crews by reviewing the minimum manning, crew certification and work practices on Australian fishing vessels with a view to establishing guidelines for the management of crew fatigue.

Handymariner

Name	*Handymariner* (formerly Durhambrook-80)
IMO No.	7702073
Flag	Hong Kong
Classification Society	Lloyds Register
Vessel type	Geared Bulk Carrier
Owner	Handymariner Shipping Corp.
Year of build	1978
Builder	Sunderland Shipbuilders Ltd, Sunderland, UK
Gross tonnage	17 677
Summer deadweight	31 200 tonnes
Length overall	181.7 m
Breadth, moulded	23.10 m
Depth	14.5 m
Draught (summer)	10.6 m
Engine	Doxford 76JS6C, 2-stroke, single acting
Engine power	8 827 kW
Service speed	15 knots
Crew	30 (Chinese and Malaysian)

Lipari

Name	*Lipari*
Registration Number	F 350
Survey Authority	Transport, Marine Safety, WA
Vessel type	Lobster fishing boat, class 3B
Owner	Tirrenia Nominees Pty Ltd, Fremantle
Year of build	1981
Builder	Marco Sobrero, Fremantle
Construction	Bondwood
Gross tonnage	21.28
Length overall	15.7 m
Beam	4.26 m
Maximum Draught	1.94 m
Engine	Detroit, 8-cylinder, 2-stroke diesel
Engine power	358 kW
Service speed	18 knots
Crew	3 (Australian)

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Lipari. 06 .2002