



Australian Government  
Australian Transport Safety Bureau

*Safe Transport*

MARINE SAFETY INVESTIGATION  
No. 196

Independent investigation into the collision involving  
the Maltese registered bulk carrier

# Lancelot

and the Australian fishing vessel

# Jenabar



14 nautical miles east of Diamond Head, New South Wales,  
21 August 2003



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## Media Release

### SHIP AND FISHING BOAT COLLISIONS CONTINUE

Failure to keep a proper lookout by either vessel has been identified as the immediate cause of the ninth collision in five years between a fishing vessel and a ship off the Australian coast.

In the early hours of 21 August 2003, the fishing vessel *Jenabar* collided with the bulk carrier *Lancelot* off Diamond Head on the New South Wales coast. The report on the collision by the Australian Transport Safety Bureau (ATSB) also identifies that over-reliance on board *Lancelot* on information from the automatic radar plotting aid contributed to the collision.

On this occasion nobody was hurt, though the fishing boat sustained damage and had to return to Forster, where it arrived safely.

The collision occurred while *Jenabar*, in company with three other fishing vessels, was heading for fishing grounds to the north of Forster. On board *Jenabar*, the deckhand on watch was seated at a table in the wheelhouse.

The mate on the bulk carrier, which was southbound for Newcastle, was using the automatic radar plotting aid (ARPA). Despite indications from the ARPA that the fishing vessels were passing clear, they were in fact on collision or near-collision courses.

After the collision, the ship turned around to assist the fishing vessel but, on learning that assistance was not required, resumed its passage to Newcastle.

Since July 1999, the ATSB has released eight reports on similar collisions. It has also released two safety bulletins for crews of ships and fishing vessels with advice on the avoidance of collisions. The reports and safety bulletins have emphasised the need for a proper lookout and the limitations of radar, and the report on this latest collision concludes that:

- The mate on *Lancelot* did not check the compass bearings of the approaching vessels to assess the risk of collision;
- The moderate seas and the size and construction of *Jenabar* would have had an adverse effect on its radar detectability; and,
- The deckhand on watch on *Jenabar* at the time of the collision was not keeping an adequate or effective lookout.

The report's recommendations include the need for:

- Vessels to keep a proper lookout at all times;
- The National Marine Safety Committee (NMSC) and State and Territory marine authorities to review the minimum qualifications for watchkeepers on fishing vessels;
- NMSC and State and Territory marine authorities to ensure that guidance on procedures for watchkeeping and safety of navigation applies to all vessels.

Copies of the report can be downloaded from the internet site at [www.atsb.gov.au](http://www.atsb.gov.au), or obtained from the ATSB by telephoning (02) 6274 6478 or 1800 020 616

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# 1 SUMMARY

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At 0400 on 21 August 2003, the Maltese flag bulk carrier *Lancelot* was off Diamond Head, on the New South Wales coast, heading south to Newcastle. The visibility was good and the second mate had earlier sighted the lights of a group of four fishing vessels to starboard. He used the automatic radar plotting aid (ARPA) to assess their movements. When the mate took over the watch, he too used the ARPA to plot the movements of the approaching fishing vessels.

The ARPA indicated that the nearest fishing vessel was on a reciprocal course and that its closest point of approach (CPA) was more than 1½ miles<sup>1</sup> to starboard. Soon afterwards, however, the mate noticed that it was crossing from starboard to port. He altered the ship's course to starboard, clearing the other vessel, before ordering the original course resumed.

The mate then realised that the second fishing vessel was on a collision course and he ordered the helm 'hard to port', attempting to steer away from it. However, the fishing vessel continued to close with the ship and, when the mate realised that a collision was imminent, he ordered full starboard rudder to minimise the angle of impact. At 0427 the two vessels collided.

The four fishing vessels had sailed from Forster earlier that night. At 0230, on board *Jenabar*, the second vessel in the group, the skipper, who had kept the initial watch, handed over to one of the deckhands. The watch changed again at 0330 when a second deckhand took over. The vessel, on autopilot on a north-easterly course, was heading for an area off Port Macquarie with the other fishing vessels. At 0425 the deckhand, who was seated at a table in the wheelhouse, said that he had checked the radar and had seen no sign of a ship. However, a minute or so later, when he looked out, he saw the dark shape of a ship, extremely close, on the starboard bow. Before he could get to the helm and disengage the autopilot, the fishing vessel had collided with the ship.

Though the fishing vessel was extensively damaged above the water line, none of its crew of four was injured. The ship turned to assist but, after being informed by *Jenabar*'s skipper that assistance was not required, resumed its voyage to Newcastle. *Jenabar* returned to Forster to have the damage surveyed and to organise repairs.

This report concludes that:

- There was no evidence that *Jenabar* had made any significant change of course in the hour before the collision
- The mate on *Lancelot* did not check compass bearings of the approaching fishing vessels to assess the risk of collision nor were his alterations of course to port to prevent the collision at about 0420, and again at 0423, appropriate
- The moderate seas and the size and construction of *Jenabar* would have adversely affected its radar detectability
- The bright deck lights on the fishing vessels obscured their navigation lights

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<sup>1</sup> Miles refers to nautical miles. One nautical mile = 1852 metres.

- The deckhand on watch on *Jenabar* at the time of the collision was not keeping an adequate or effective lookout and, as a result, only noticed the ship moments before the collision.

The report recommends that:

- Ship owners, operators, managers and masters, fishing vessel owners, operators and skippers should ensure that the requirements for watchkeepers to keep a proper lookout, visually and by radar are understood and complied with
- The National Marine Safety Committee (NMSC) and State and Territory marine authorities should review the minimum qualifications for watchkeepers on fishing vessels
- The NMSC and State and Territory marine authorities should ensure that guidance on procedures for watchkeeping and safety of navigation applies to all vessels
- Radar manufacturers' operating manuals should contain explicit instructions for setting up ARPA for collision avoidance.

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## 2 SOURCES OF INFORMATION

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The master and crew of *Lancelot*

The skipper and crew of *Jenabar*

Australian Federal Police (AFP)

Australian Maritime Safety Authority (AMSA)

A volunteer radio operator at Lake Macquarie

Rescue Coordination Centre, Australia

Newcastle Water Police

CSIRO, Hobart

### **Acknowledgements**

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The use of the computer program, FAID 330E, provided by InterDynamics Pty Ltd ([www.interdynamics.com](http://www.interdynamics.com)) for the fatigue analysis in this investigation is gratefully acknowledged

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## 3 NARRATIVE

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### ***Lancelot***

*Lancelot* is a Maltese flag gearless bulk carrier of 61 883 deadweight tonnes at a summer draught of 13.02 m. It has an overall length of 222.68 m, a moulded breadth of 32.2 m and a moulded depth of 17.5 m. The vessel, powered by a single, seven-cylinder B&W diesel engine of 9 636 kW driving a single fixed-pitch propeller, has a service speed of 12.5 knots.

The vessel was built in 1982 at the Koyo Dockyard at Mihara in Japan and is classed with Bureau Veritas. At the time of the incident, it was owned by Purple Maritime and was managed by Brave Maritime Corp both of Athens, Greece. Since January 2003, the vessel had been on time charter to ETA Chartering of Dubai, UAE.

*Lancelot* has seven cargo holds forward of the engine room and its accommodation superstructure located aft.

The vessel is equipped with a range of navigation equipment consistent with SOLAS<sup>2</sup> requirements, including two radars. The radar in use at the time of the collision was a 3 cm Kelvin Hughes 'Nucleus 2' 6000 radar fitted with ARPA.

At the time of the incident, the ship had a complement of 21. The master was from Greece, the officers and crew were from Romania, Yugoslavia and the Philippines.

The master had been at sea since 1965 on various ship types. He held a master's licence and had sailed as master since 1987 on container ships and bulk carriers. He

**FIGURE 1:**  
***Lancelot* anchored off Newcastle**



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<sup>2</sup> The International Convention for the Safety of Life at Sea 1974 as amended, Chapter 5.

had completed two previous contracts with the managers of *Lancelot* and had joined the ship three months before the incident.

The mate had been at sea since 1983. He, too, held a master's licence and had sailed as mate for twelve years. He also held radar and ARPA certificates. He had worked for the managers of *Lancelot* since May 2000.

The second mate had been at sea since 1982. He had a second mate's licence and had sailed as second mate for ten years.

The AB (able-bodied seaman) on watch with the mate had been at sea since 1988. He had served on *Lancelot* for almost ten months and kept watches with the mate while the ship was at sea.

While at sea, the mates shared watches on the basis of four hours on, eight hours off.

### ***Lancelot* – the incident**

On 8 August 2003, *Lancelot* had sailed from Kaohsiung, Taiwan, to load a cargo of coal at Newcastle, New South Wales (NSW). On the night of 20 August, the vessel was off the NSW coast on a course of 196° (T), at a speed of 12.5 knots.

The master had written his night orders during the third mate's watch, instructing the officers to keep a good lookout for fishing vessels and to keep a 'wide' distance from them. He went back to the bridge from about 0100 until 0130, then went below. At the time, the visibility was very good. It was a partly cloudy night and the moon, in the last quarter, had risen at 0056. The wind was from the south-south-west at about 10-15 knots and a southerly swell was estimated, by the master, at about 3-4 metres.

At about 0330, the second mate noticed the bright white lights of a group of fishing vessels about a point<sup>3</sup> or so on the starboard bow, more than twelve miles from the ship. He then had to make some course alterations to avoid other ships. Later, using the ARPA to plot the fishing vessels, he noted that the vectors indicating their courses and speeds were not steady though the indications were that the fishing vessels were passing clear to starboard. By 0400, however, the ARPA, on the 12 mile range, indicated that the closest point of approach (CPA) of the nearest fishing vessel was more than a mile to starboard and that all four vessels were on reciprocal or near-reciprocal courses to that of the ship.

At about 0405, when the second mate handed over the watch to the mate, he informed him of the presence of the fishing vessels, the nearest of which, he recalled, was about 15° on the starboard bow, about 4 miles off. At that time, the second mate was able to see only the deck lights of the fishing vessels. He could not see any sidelights or masthead lights.

The AB on duty with the mate was at the helm, steering 196° by gyrocompass. The compass error was negligible. The mate intended to keep the AB at the wheel until the ship had cleared the fishing vessels.

Although the mate used binoculars, he too was unable to see any sidelights or masthead lights on the fishing vessels, so, at about 0410, he checked each vessel using the ARPA. The display was set to a range of 12 miles, course up and the mate was using true vectors. The nearest vessel, about 2 miles north east of the other three

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<sup>3</sup> One point = 11¼°

vessels, appeared to be on a reciprocal course to that of the ship. It appeared to the mate that its CPA was more than 1½ miles to starboard. The ARPA indicated that the course for the next vessel was between 016° and 025°. Its CPA was also more than 1½ miles to starboard and the CPA's for the remaining vessels were even greater.

Shortly afterwards, from the wheelhouse windows, the mate saw that the nearest vessel appeared to have altered its course to starboard and was crossing from starboard to port. At this time, about 0415, the mate altered course to port, for a few minutes, to 189°. He then ordered starboard rudder. The ship reached a heading of 205° and had cleared the crossing vessel before he ordered the original course of 196° resumed.

Moments later, he noticed from the ARPA that the CPA of the second fishing vessel was reducing and that this vessel also appeared to have altered its course to starboard. He called the fishing vessel on the VHF ('very high frequency' radio) on channel 16 to enquire as to its intention, but there was no answer. By 0422, the ship was back on a course of 196°.

The distance between the two vessels was closing rapidly, the ARPA now indicating that the fishing vessel's course was 050°. At about 0423, the mate ordered 20° of port rudder. However, by the time that the ship's heading was about 175°, he realised that the fishing vessel was still on a collision course. He then ordered the rudder put 'hard to port' to steer away from the vessel, but realised that a collision was imminent.

When the fishing vessel was about two cables off to starboard, he was able to see its port sidelight. By then, he had ordered the rudder 'hard to starboard', to reduce the angle of any impact and, if possible, to enable the other vessel to pass under the stern of the ship. However, at 0427, the fishing vessel collided with the starboard side of the ship, abreast of number six hatch. The position for the collision as logged by the ship was 31° 46.6' S, 153° 04.5' E (see fig 2).

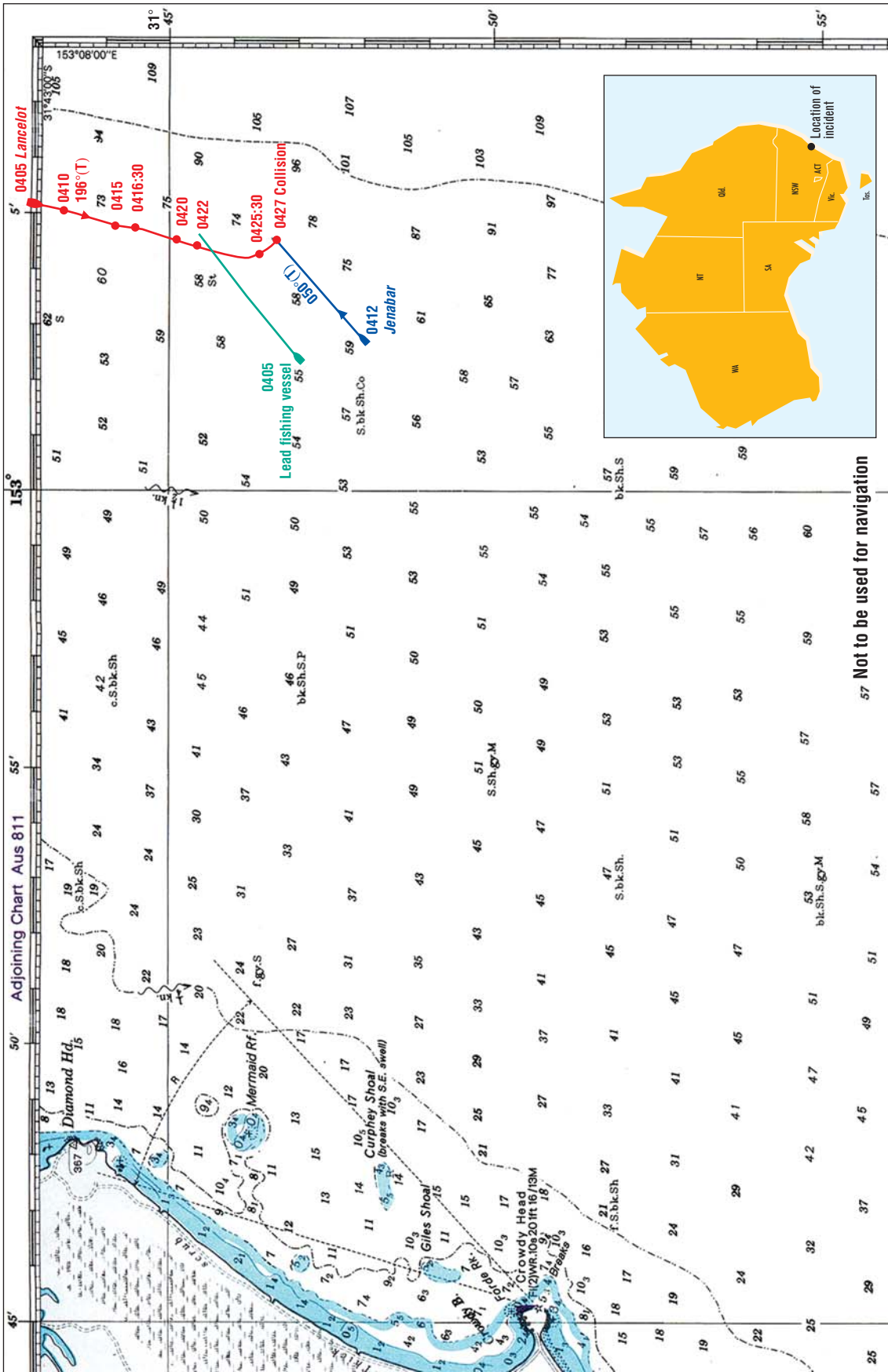
From the starboard bridge wing, the mate saw that the fishing vessel was afloat. He informed the master of the collision and plotted a position on the chart from the GPS (global positioning system), indicating where the collision had occurred. He attempted to contact the fishing vessel, using channel 16 on VHF, but there was no reply. He also attempted, without success, to contact a shore station on VHF on the same channel.

The master sounded the general alarm and alerted the emergency response team. Shortly after 0450, the ship's speed was reduced and its course altered to return to the position of the collision. An attempt by the ship to alert the Rescue Coordination Centre (RCC) Australia to the collision using DSC (Digital Selective Calling) on 2187.5 kHz was unsuccessful as that frequency is not monitored by the Network Control Centre for the RCC.

About eight minutes later, the ship had returned to the position of the collision and, at 0500, using VHF channel 10, contact was made with *Jenabar*, the fishing vessel that had been involved in the collision. *Jenabar* informed the ship that it did not require any assistance and that its crew were safe.

Meanwhile, at 0455, the RCC had been informed of the collision by Sydney Water Police. Shortly afterwards, the RCC was advised by Sydney Water Police that the fishing vessel did not require assistance. The RCC contacted the ship at 0523 to pass

**FIGURE 2:**  
**Portion of chart Aus 810 showing tracks of ship and fishing vessels**



**FIGURE 3:**  
Steering and control console of *Jenabar*



that information to it. At about 0535, *Lancelot* resumed its passage to Newcastle, anchoring on arrival there at 1500 the same day.

### ***Jenabar***

The long-line fishing vessel *Jenabar*, built in 1983, is registered as a Class 3B commercial vessel with the Waterways Authority, NSW, limited to operating within 100 miles to seaward of the NSW coast. The vessel's home port is Ulladulla, NSW.

*Jenabar* has a length of 17.1 m, a moulded breadth of 4.3 m and a moulded depth of 1.47 m. The hull and upperworks are constructed of fibreglass.

*Jenabar* is fitted with twin 112 kW Caterpillar engines, which drive fixed-pitch propellers to give the vessel a maximum speed of about 10 knots. The vessel has a raked stem and a transom stern. The wheelhouse is located at the forward end of the vessel and the sleeping quarters are forward of, and below, the wheelhouse.

Navigational equipment on board includes a Furuno radar, a fish finder/echo sounder, GPS and an electronic chart plotter. Radio equipment includes a radio telephone (R/T) installation and VHF (very high frequency) radio. The vessel is also equipped with a 'watchguard' vigilance system to alert watchkeepers by sounding an alarm at predetermined times.

The engine and other controls and the helm are mounted on a console on the port side of the wheelhouse (see fig. 3). Immediately to starboard of the console are steps leading down to the sleeping quarters. The radar is mounted on a console at the starboard side of the wheelhouse. Behind the radar console is a table with seating against the starboard side of the wheelhouse as well as aft of the table (see fig. 4).

At the time of the incident, the vessel was not fitted with a radar reflector.

A large work deck, aft of the wheelhouse, is illuminated when necessary by a deck light of about 1500 watts, on a boom. A floodlight, on the port side above the wheelhouse, is used during fishing operations.

The vessel was manned at the time of the incident by a skipper and three deckhands who shared watches.

The skipper of *Jenabar* had been at sea on fishing vessels for about 22 years, the last 12 years as skipper. He had a master class 4 certificate of competency and a marine engine driver class 2 certificate (MED 2) and had skippered *Jenabar* for the previous six years.

One of the deckhands had a master class 5 certificate, but the deckhand on watch at the time of the collision held no marine qualifications although he said that he had completed some units for a master class 5 certificate. He had worked aboard *Jenabar* for three years.

### ***Jenabar* – the incident**

At about 0010 on 21 August, *Jenabar* sailed from Forster in company with three other fishing vessels for fishing grounds off Port Macquarie, NSW, about 55 miles to the north.

The deckhands were asleep and the skipper was at the wheel when the vessel sailed. The navigation and deck lights were on and the radar was set to a range of 3 miles. The skipper did not set guard rings on the radar as the other fishing vessels in the group would have continually activated the guard ring alarm. He was using the electronic chart plotter, with the vessel's position fed to it from the GPS, to navigate. The VHF radio was on, monitoring channel 10. The 'watchguard' was not switched on.

When *Jenabar* had cleared the harbour, the skipper set a course of 050° (T) and engaged the autopilot. The lead fishing vessel in the group was about two miles north-north-east of *Jenabar*. The other two fishing vessels were about 1¼ miles astern, roughly abreast of each other.

The skipper recalled that it was a cloudy night with the moon in the last quarter. The wind was astern, from the south-west at about 10–12 knots and the skipper estimated that the swell, also from astern, was about 1–1½ metres in height.

At about 0230, before going below to sleep, the skipper handed over the watch to a deckhand, instructing him that the deckhands were to keep one hour watches. At 0330 the watch changed again.

The deckhand now on watch checked the radar, the chart plotter and the gauges for the engines' revolutions and temperatures. He checked that the navigation lights were on before he sat behind the table in the wheelhouse, looking out and watching the fishing vessel ahead. The engine controls and helm were approximately two metres from where he was seated.

The visibility, according to his evidence, was not good. The sky was overcast, there were no stars or moon and it was too dark to see the horizon. Although the course of the fishing vessel had not altered, his recollection was that the course was about 080° (T).

**FIGURE 4:**  
Table, aft of radar, at which deckhand was seated



**FIGURE 5:**  
*Jenabar* at Forster



At about 0425, he said that he had looked at the plotter and the radar. He noted, from the GPS, that *Jenabar's* speed was 8.8 knots. There was clutter on the radar, but no echo of any approaching ship and he sat down again. When, a minute or so later, he looked up, he noticed the dark hull of a ship, extremely close to the starboard bow. He attempted to get to the helm to disengage the autopilot and alter course, but before he could do so, *Jenabar* collided with the ship. The time was about 0427.

The skipper and the other deckhands immediately awoke. The skipper took the engines out of gear and opened the engine room hatch to check the space for damage or leaks. There appeared to be smoke inside, but he soon realised that it was, in fact, fumes from the fixed fire fighting system that had been activated by the collision. The skipper shut the hatch, then shut down the engines and checked the damage to the bow.

Although the fishing vessel's bow was badly damaged, the damage was above the waterline and there was no ingress of water (see fig. 5). The other fishing boats had come to *Jenabar's* assistance, but the skipper informed them that none was needed. After VHF contact was established with the ship, it was also advised that assistance was not required.

*Jenabar* returned to Forster at 1645 that day to have the damage inspected and to arrange repairs.

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## 4 COMMENT AND ANALYSIS

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### Evidence

On 22 August 2003, the morning after the collision, the skipper and deckhands of *Jenabar* were interviewed by the ATSB at Forster. Copies of relevant documents were obtained.

On 23 August, the master of *Lancelot*, the mate, second mate and the seaman on watch with the mate were interviewed by the ATSB while the vessel was at anchor at Newcastle. Copies were made of the ship's course recorder chart, which was established to be 10 minutes slow of ship's time. Other documents copied included sketches by the mate, log books and various procedures.

VHF recordings at the time of the collision were obtained from a volunteer radio operator in Port Macquarie.

Details of the weather at the time of the collision were obtained from the ship and the fishing vessel. Information from the ship, corroborated by evidence from both the fishing vessel and the Bureau of Meteorology, was that the wind was from the south-west at 10-15 knots. Information on the swell from the Bureau of Meteorology was that, off Smoky Cape, about 50 miles north of the incident, it was from the south-east, between two and four metres in height.

The deckhand on *Jenabar* recalled that the visibility was 'not good'. This is not consistent with other evidence which suggests the contrary. The second mate of *Lancelot* had sighted the glow from the lights of the fishing vessels at about 0330 while the fishing boats were over the horizon at a distance of about 20 miles.

### Overview

The collision occurred on a clear night about 14 miles from the coast. From the ship, the fishing vessels had been visible to the naked eye for about an hour. The closing speed of *Lancelot* and *Jenabar* was about 20 knots, or about 1/3 of a mile every minute.

The two vessels experienced the same environmental conditions and each vessel would have experienced the same southward current of about a knot.

The evidence is that *Lancelot* was exhibiting the navigation lights required under the International Regulations for Preventing Collisions at Sea, 1972, as amended (the Colregs).

The fishing vessels were 'not engaged in fishing'. Therefore, under the provisions of the Colregs, they were considered to be power driven vessels underway. As such, *Jenabar* was obliged, under Rule 26 of the Colregs, to carry the appropriate lights for a vessel of her length and other lights that could have been mistaken for steaming lights or that could impair their visibility or distinctive characteristics, should not have been shown.

In addition to a masthead light, sidelights and a stern light, *Jenabar* was exhibiting bright working lights. Such working lights almost invariably obscure navigation lights, particularly at a distance. When closer, binoculars are necessary to identify the red and, more particularly the green, sidelight.

Under Rule 15 of the Colregs, notwithstanding any confusion or ambiguity created by the lights aboard the fishing vessels, *Lancelot*, as the give-way vessel, was obliged to keep out of the way of the approaching vessels regardless of whether or not they were engaged in fishing. The mate on watch was experienced and would have encountered numerous similar lighting ambiguities during his career at sea. Had he established that the risk of collision existed, he was obliged, by Rule 16 of the Colregs, so far as was possible, to take early and substantial action to keep well clear.

When the mate assumed responsibility for the watch, he was faced with four fishing vessels on the starboard side, the nearest of which was about a point on the bow, about 7 miles off. He had a duty to ensure that he knew how they were heading.

However, while *Lancelot* was obliged to keep out of the way of the fishing vessels, *Jenabar* was also obliged, under Rule 17 of the Colregs, to take such action as would best serve to avoid the collision.

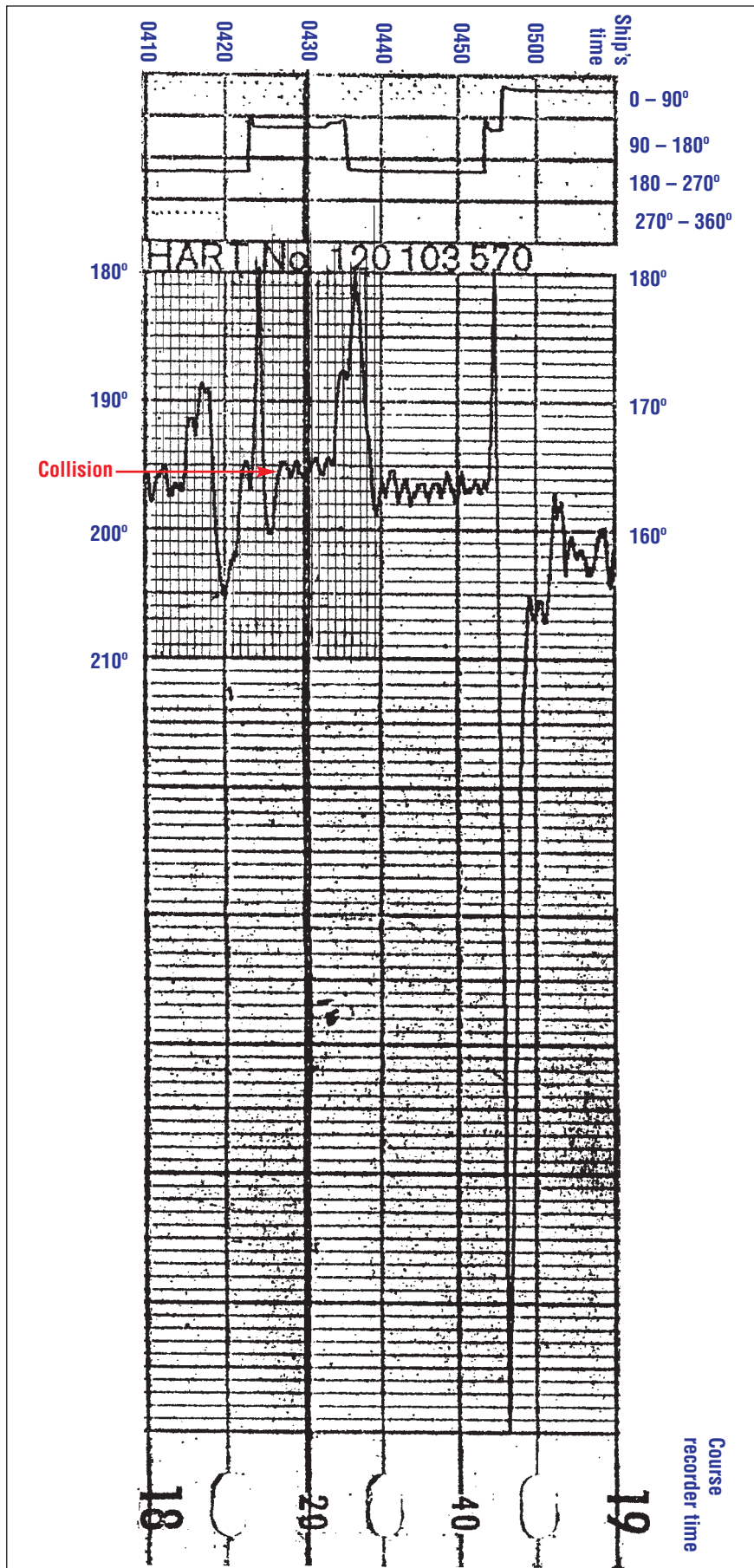
The fishing vessels were travelling in company, three of them effectively 'following the leader'. Other than the mate's observation, there is no evidence to suggest that the collision resulted from any alteration of course by *Jenabar*. The probability is that none of the fishing vessels made any significant course adjustments in the hour leading to the collision.

### **Course recorder trace**

The course recorder trace, 10 minutes slow on ship's time, indicates that between 0410 and 0427 the mate initiated four significant adjustments of course. Apart from steadying the ship twice for periods up to 30 seconds, *Lancelot* was under the influence of either port or starboard rudder.

The initial adjustment, at 0414½, over a period of almost four minutes, was to port, from 196° to 189°. The ship had hardly steadied on 189° when the mate ordered a 16° alteration to starboard to give way to the first of the fishing vessels. *Lancelot* reached a course of 205° at 0420, before counter helm was applied. At 0422, for about a minute, the ship returned to a course of 196°. At about 0423, port helm was applied to avoid *Jenabar* and the ship was turned rapidly to port to a heading of 160°, after which the course was altered to starboard, to 164½°.

FIGURE 6:  
Portion of course recorder trace from *Lancelot*



**Table 1:**  
Table indicating *Lancelot's* course alterations

<i>Ship's time</i>	<i>Course</i>
0410	196° – en route to Newcastle
0414½	Course altered to port
About 0415	Steadied on 192° for about a minute, then altered to port again
About 0416½	Course steadied on 189°
About 0418	Course altered to starboard
0420	205°
0422	Original course, 196°, resumed
About 0423¼	Course altered rapidly to port, port rudder then full port rudder
About 0425 ½	160°
About 0426	Course altered to starboard, full starboard rudder
0427	Course 164½°, collision occurs
0433½	Course altered from 164½° to starboard
0440	196° – Original course resumed
0453	Course altered to port, to 023° to assist <i>Jenabar</i> if necessary
0535	Passage for Newcastle resumed – Course 196°

The mate did not provide an explanation for the initial alteration to port of 7° (from 196° to 189°) at about 0415. At about 0410, according to evidence from the mate, the CPA of the nearest fishing vessel was more than 1½ miles to starboard. However, in the absence of any other explanation, it is possible that the alteration to port at 0414½ was to increase the ship's passing distance from the fishing vessels.

## Watchkeeping

An important part of keeping a navigation watch consists of maintaining a proper look-out.

A proper look-out is to be kept 'by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions'. There are two primary means of maintaining a lookout in clear weather, visual look-out and radar. Rule 7 of the Colregs states that if there is any doubt, risk of collision shall be deemed to exist and that assumptions shall not be made on the basis of scanty information, particularly scanty radar information.

A recent ATSB report, no. 177, of the investigation into the collision involving the ship *Forum Samoa II* and the fishing vessel *Seabreeze II* notes that:

Neither vessel was keeping an adequate lookout before the collision and this report, as do many previous reports of collisions, emphasises the need for all vessels to maintain a proper lookout at all times.

*Jenabar's* VHF was being used on channel 10 which is favoured by some coastal and fishing vessels for general communication. This however restricts the potential for ships, which maintain a mandatory radio watch on channel 16, being able to contact fishing vessels. As ships call and communicate on channel 16, it would be reasonable to expect that this channel would, for safety, be the preferred channel for fishing and coastal vessels, or for dual watches to be maintained where possible.

## The ship

On board *Lancelot*, the mate was sufficiently concerned about the presence of the fishing vessels to place the look-out at the wheel. There was, therefore, no loss of time in the execution of course alterations and the mate was able to maintain a look-out

The mate, with many years experience, was relying on the ARPA to track the fishing vessels. While his evidence was that the ARPA initially indicated that that the fishing vessels were passing clear to starboard, he eventually realised that the first and second vessels were crossing from starboard to port.

There is no evidence to suggest that *Jenabar* had altered course after the fishing vessels were first sighted by the second mate at about 0330. It was only at about 0423, four minutes before the collision, that the mate noticed, from the ARPA, that *Jenabar* was crossing from starboard to port on a course of 050°. At this time, *Jenabar* would have been about 1¼ miles off.

The mate did not check the compass bearings of the approaching vessels though company standing orders stated that:

The officer of the watch should, when encountering closing vessels, take frequent and accurate compass bearings and/or radar and ARPA bearings/target fixes, in order to determine the risk of collision in ample time.

If the mate had checked the compass bearings of the leading fishing vessels, he would have realised that they were on steady or nearly steady bearings. Under such circumstances, a collision is inevitable if no action is taken by the vessels involved.

There was ample time for the mate to confirm, using compass bearings, that the fishing vessels were on collision or near-collision courses and to alter course to starboard to clear the group.

Under Rule 15 of the Colregs, *Lancelot* was obliged, if possible, to avoid altering course to port to cross ahead of *Jenabar*. However, when the mate made the alteration to port, despite the proximity of *Jenabar*, he did not use the ship's whistle, in accordance with Rule 34, to indicate that alteration. The use of the whistle may have alerted the deckhand on the fishing vessel to the presence of the ship, giving him the opportunity to take action to prevent the collision.

The mate did attempt to contact the fishing vessel on VHF channel 16, but, as the fishing vessel was not monitoring that channel, his calls went unheard.

The mate did not take early and substantial action to avoid the fishing vessels. He only realised, at about 0422, that collision with the second fishing vessel was imminent. Having cleared the first fishing vessel with an alteration of the ship's course to starboard, his subsequent alterations of course to port were ineffective in avoiding the collision with *Jenabar*.

## ARPA

Automatic Radar Plotting Aids or ARPAs are computer-assisted radar data processing systems which generate vectors indicating the courses and speeds of targets as well as other ship movement information.

The primary function of ARPAs is to improve the standard of collision avoidance at sea and to reduce the workload of observers, enabling them to perform as well with multiple targets as they can by manually plotting a single target.

A typical ARPA gives a presentation of the current situation and uses software to predict future situations. It enables an operator to assess the risk of collision and to examine proposed manoeuvres to avoid collisions.

The following functions are usually provided:

- True or relative motion radar presentation.
- Automatic or manual acquisition of targets.
- Digital read-out of acquired targets which provides their course, speed, range, bearing, closest point of approach, CPA, and time to CPA (TCPA).
- The ability to display collision assessment information directly on the radar screen, using vectors (true or relative) or a graphical Predicted Area of Danger (PAD) display.
- The ability to perform trial manoeuvres, including course changes, speed changes, or combined course and speed changes.
- Ground stabilization for navigation purposes.

While ARPAs process radar information far more rapidly than conventional radar, they are subject to the same limitations and ARPA data is only as accurate as the data from inputs such as the gyrocompass and speed log.

### **The collision**

*Lancelot's* mate reported that, at about 0410, the indications on the ship's ARPA were that the four fishing vessels were on reciprocal or near-reciprocal courses of about 016° to 025° and that he thought they would pass clear to starboard.

However, after an initial alteration of course at 0414½ of about seven degrees to port, the mate then observed, visually, that the first fishing vessel was crossing from starboard to port. He altered the ship's course to starboard to pass astern of it and, when it was clear, resumed the original course of 196° at 0422. He then noticed that the ARPA now indicated that the next fishing vessel's course was 050°. This vessel, *Jenabar*, was on a collision course.

According to the mate, at about 0423, the true vector information of *Jenabar's* course had altered by about 25-30°, when, in fact, the fishing vessel had maintained a steady course.

It is possible that the mate's recall of the CPA's and other ARPA information was not accurate. It is also possible that the fishing vessels were initially at such distances from the ship that ARPA information on their courses and speeds was not accurate until they were much closer.

From a 40 000 tonne ship, average radar detection values for 11 metre GRP (glass reinforced plastic) vessels vary between four miles and a mile in moderate to rough sea conditions<sup>4</sup>. *Jenabar*, of fibreglass construction, was 17 metres in length. In the prevailing moderate seas, under normal radar propagation conditions, it is

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<sup>4</sup> See 'Radar Detectability and Collision Risk' by S W Bell and Capt A P Starling Lark in the Supplement to the January 1994 edition of *Seaways*, The Journal of The Nautical Institute, for average values of radar detection of small vessels.

considered unlikely that *Jenabar* would have been detected as a constant echo, required by the ARPA for tracking, until it was relatively close to the ship.

### **Use of ARPA on *Lancelot***

ARPA may be used in one of two different configurations, sea or ground stabilised. For collision avoidance, ARPA operators should use a sea stabilised presentation. The inputs for a sea stabilised presentation are course and speed through the water, whereas for ground stabilised ARPA the inputs are course and speed over the ground.

With a sea stabilised ARPA, true vectors of other vessels indicate their courses and speeds through the water, the same or nearly the same as would be observed visually. However, if the ARPA is ground stabilised, true vectors of vessels would indicate their courses and speeds over the ground. With the latter mode, the visual aspect of a vessel being tracked may be different from the ARPA's true vector aspect. This can be misleading when evaluating the traffic scenario and could affect the action to be taken.

The course input to *Lancelot's* ARPA was from the gyro compass, but the speed was input from the GPS, hence was speed over the ground. *Lancelot's* ARPA was therefore neither sea stabilised nor ground stabilised. In this instance these inputs would have led to an incorrect presentation of the target data.

However, the ARPA inputs do not explain the 25-30° shift of the fishing vessel's vector reported by the mate of *Lancelot*. The investigator compared reconstructions of the ARPA plot using the GPS speed of *Lancelot* and its speed through the water as inputs and determined that this would have resulted in a shift of the fishing vessel's vector of between three and six degrees.

This is considerably less than the 25-30° shift noticed by the mate which apparently led him to believe that *Jenabar* had altered course to starboard.

### **The fishing vessel**

The deckhand maintaining a watch on *Jenabar* held no certificate of competency, although he was working towards obtaining a master class 5 certificate of competency. He was approaching the end of a one hour watch when he said that he had first sighted the dark hull of the bulk carrier, in close proximity to the fishing vessel.

The value of his statements to the investigation is questionable. His opinion was that the visibility was 'not good' and he was unaware of the course his vessel was steering.

He had not maintained a proper visual lookout, but was seated at a table about two metres from the wheelhouse front. The lights of the leading fishing vessel would probably have been visible, giving him a point of reference for his own vessel's course. From where he was seated, however, it would have been difficult for him to see the horizon and the reflection from instruments and the glare from his vessel's own lights would have made a visual look-out difficult without the use of binoculars.

*Jenabar's* radar was operating on the three mile range. Given the closing speed of the two vessels, *Lancelot* would have only been on the fishing vessel's radar for about nine minutes prior to the collision. It is also possible that, at some time, the bulk carrier's

echo would have been lost in the radar clutter as the distance between the two vessels reduced.

Rule 7 of the Colregs on the proper use of radar mentions long-range scanning to obtain early warning of risk of collision. However, the radar on *Jenabar* was only used on the three mile range.

The 'watchguard' vigilance alarm, which would have been useful in maintaining the alertness of the deckhand, was not being used.

With respect to maintaining radio watches, for *Jenabar*, Clause 23 of the NSW Commercial Vessels (Equipment) Regulation 1986 requires that, if the radio installation carried by the vessel is a VHF, a radio watch shall, as far as practicable, be maintained on the international distress, safety and calling frequency of 156.8 MHz (channel 16).

The deckhand had the VHF radio set to channel 10. Had he been monitoring channel 16, he might have been alerted, by the call from the mate of *Lancelot*, to the impending collision.

The lookout being maintained by the deckhand was inadequate and ineffective.

### **Fishing vessel manning**

In accordance with the conditions on *Jenabar's* certificate of survey, the owner was obliged to ensure that all crew mentioned in the manning certificate had sufficient training in the operation of the vessel and were able to safely and efficiently operate it at all times and in all conditions.

Under the provisions of the NSW Commercial Vessels Act 1979, for operations out to 100 nautical miles, *Jenabar* was required to be crewed by:

A master	Skipper Grade Three
An engineer	Marine Engine Driver Grade Three (MED 3)
Other	One General Purpose Hand (GP) who met all the requirements of Clause 35 of the Commercial Vessels (Certificate of Competency and Safety Manning Regulation) 1986

Attached to one of the appendices of the certificate of survey was a note stating that 'if the master holds the required engineering qualification, an additional GP must be carried in place of the engineer'.

The skipper of *Jenabar* held a master class 4 certificate and an MED 2, which satisfied the requirement for an engineer. One of the deckhands held a master class 5 certificate, equivalent to a skipper grade 3. However, under the provisions of the safety crewing certificate, as there was no engineer on board and as the other deckhands were uncertificated, the vessel was required to carry an additional GP.

Neither NSW legislation nor the USL Code define watchkeeping or specify who may be in charge of a watch at sea, nor is there any legislative requirement that such a person should have basic radar training and knowledge of the Colregs. There is no

requirement for any sea service for certification as a GP. Candidates are only required to complete certain short courses including one on elementary seamanship. The approved course for a GP does not cover watchkeeping, the collision regulations or the use of radar.

On *Jenabar*, there were two certificated individuals, the skipper and a deckhand, who could have maintained a watch and watch about routine if required. However on a similar vessel with only a skipper, an engineer and a GP on board, the onus would be on the skipper to attend to fishing operations and keep watch at all times or to monitor the GP while the latter was on watch.

### **Fatigue – time of day effect**

The hours between 0400 and 0600 mark the low point or period of reduced alertness in human circadian rhythms. As such, the possibility that the performances of the watchkeepers on the ship and fishing vessel might have been affected was checked.

*Lancelot's* mate had kept sea watches from 0400–0800 and 1600–2000 since 8 August, when the ship had sailed from Taiwan. He had had every opportunity to manage his hours to prevent fatigue and said that he was well rested when he went on watch on the morning of the collision. There was no evidence to suggest that he might have been fatigued at the time of the collision.

The deckhand's hours of work for the week leading to the collision were analysed, using the FAID<sup>5</sup> programme, for the possibility that he might have been fatigued. Based only on his hours of work, the FAID analysis did not suggest that he would have been fatigued during his watch on the morning of the collision.

However, in the evening before the collision, the deckhand had been out for a meal and he returned to the fishing vessel at midnight. At most, he would have had about three hours of sleep before being awakened for his watch. Given the time of day and the deckhand's uncertain schedule before he returned to the fishing vessel when it sailed from Forster, fatigue at some level was probably present during his watch.

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<sup>5</sup> Fatigue Audit InterDyne – a computer programme for assessing the possibility of fatigue.



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## 5 CONCLUSIONS

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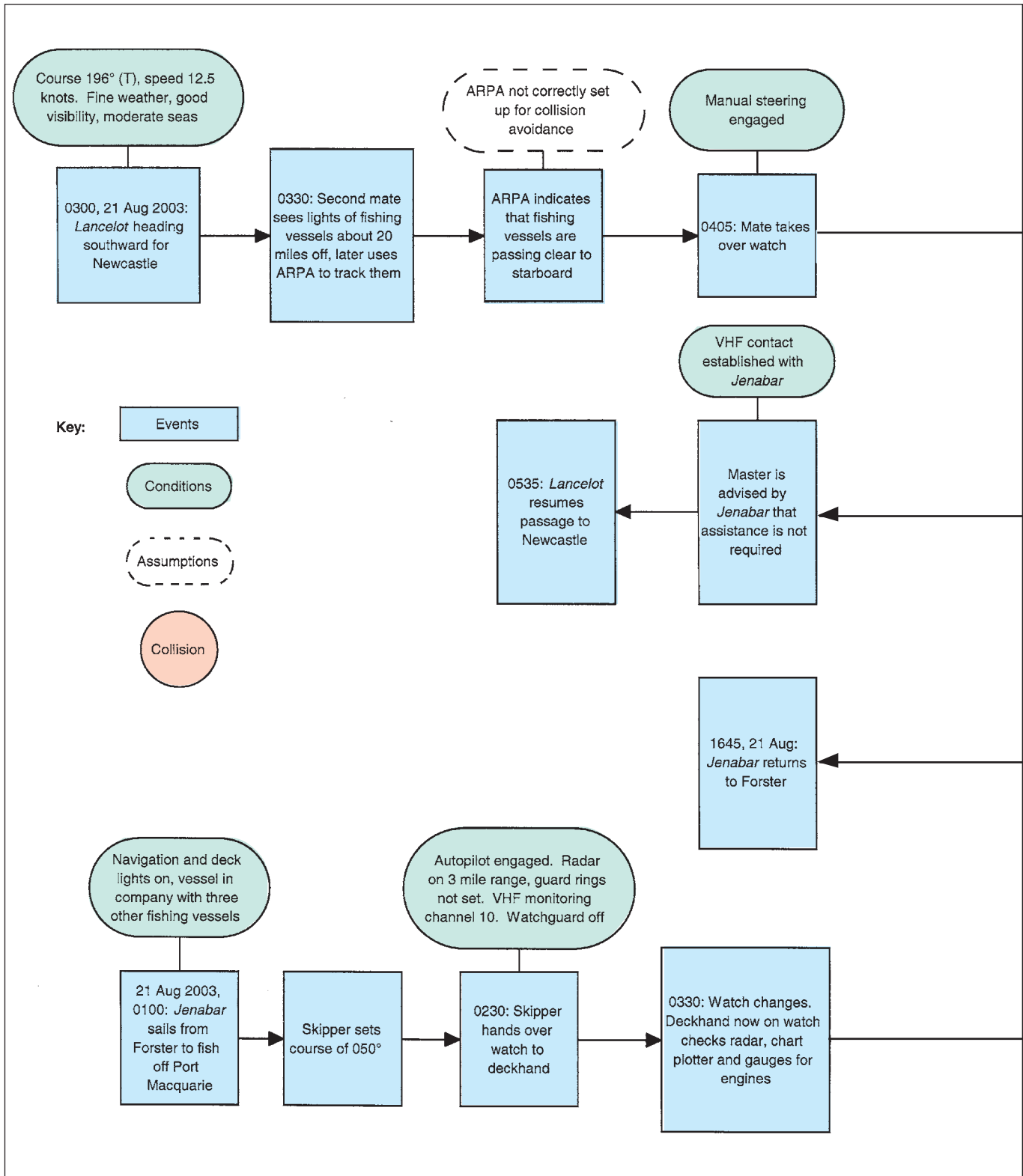
These conclusions identify the different factors contributing to the incident and should not be read as apportioning blame or liability to any particular individual or organisation.

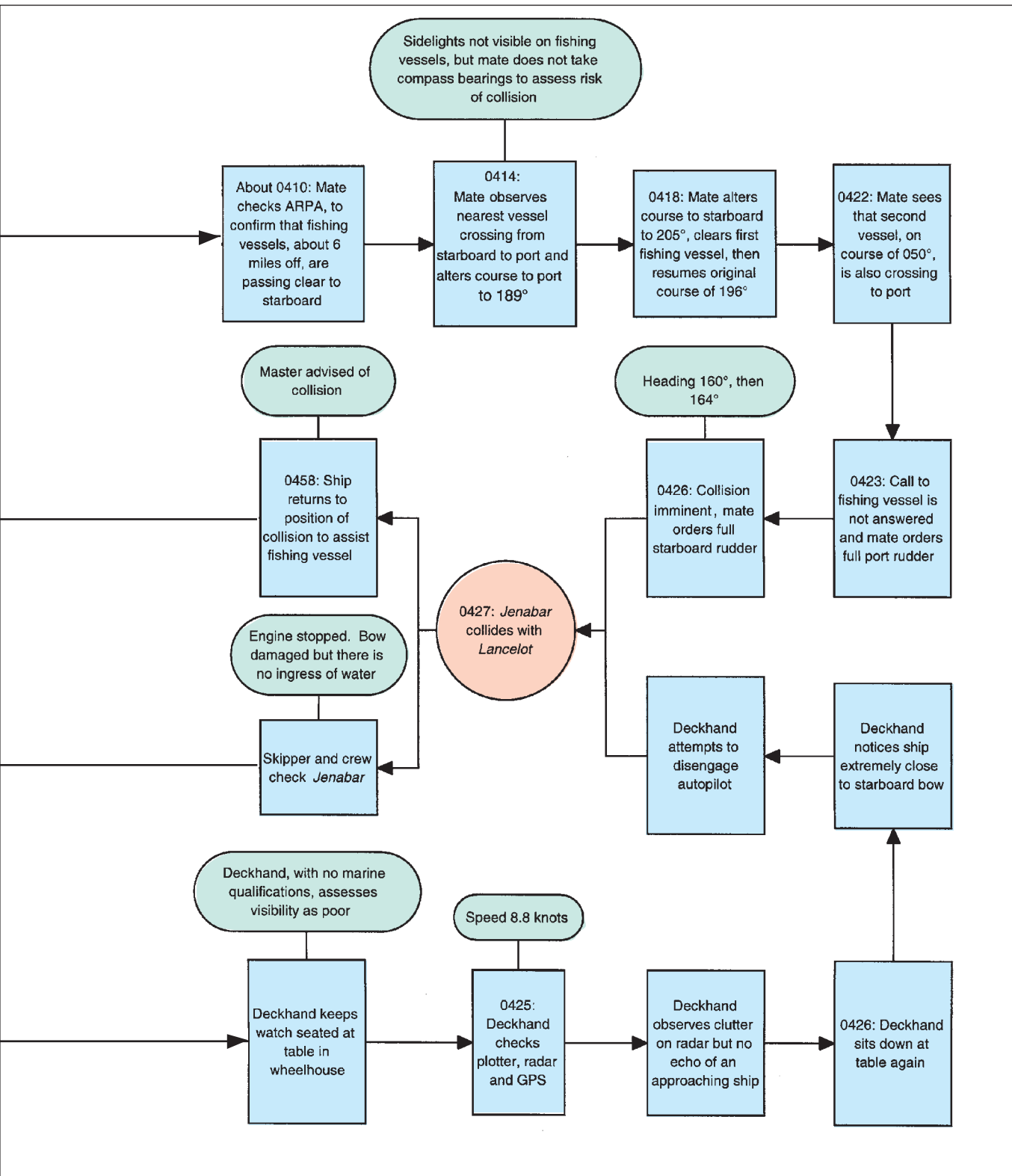
Based on the evidence available, the following factors are considered to have contributed to the incident:

1. There was no evidence that *Jenabar* had made any significant change of course in the hour before the collision.
2. The mate on *Lancelot* did not check compass bearings of the approaching fishing vessels to assess the risk of collision.
3. The mate's alterations of course to port at about 0420 and again at 0423 to prevent the collision were not appropriate.
4. The moderate seas and the size and construction of *Jenabar* would have adversely affected its radar detectability.
5. The bright deck lights on the fishing vessels obscured their navigation lights.
6. The deckhand on watch on *Jenabar* at the time of the collision was not keeping an adequate or effective lookout and, as a result, only noticed the ship moments before the collision.
7. The deckhand was not maintaining a listening watch on VHF channel 16.

While it is not considered to be a factor in the collision, the ARPA on the ship, neither sea nor ground stabilised, was not correctly set up for collision avoidance.

**FIGURE 7:**  
**Lancelot/Jenabar. Events and causal factors chart**







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## **6 RECOMMENDATIONS**

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### **MR20040026**

Ship owners, operators, managers and masters, fishing vessel owners, operators and skippers should ensure that the requirements for watchkeepers to keep a proper lookout, visually and by radar are understood and complied with.

### **MR20040027**

The National Marine Safety Committee and State and Territory marine authorities should review the minimum qualifications for watchkeepers on fishing vessels.

### **MR20040028**

The National Marine Safety Committee and State and Territory marine authorities should ensure that guidance on procedures for watchkeeping and safety of navigation applies to all vessels.

### **MR20040029**

Fishing vessels equipped with VHF radio should maintain a watch on channel 16.

### **MR20040030**

Radar manufacturers' operating manuals should contain explicit instructions for setting up ARPAs for collision avoidance.



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## 7 SUBMISSIONS

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Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003*, the Executive Director may provide a draft report, on a confidential basis, to any person whom the Executive Director considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the Executive Director about the draft report.

The draft report was sent to:

The master, mate and owners of *Lancelot*;

The skipper and deckhand of *Jenabar*;

The Simulation Manager, Australian Maritime College;

The National Marine Safety Committee (NMSC);

The Australian Maritime Safety Authority;

Waterways Authority of NSW; and,

Kelvin Hughes, UK.

Submissions were received from Waterways Authority of NSW and NMSC.

The submission from the National Marine Safety Committee read in part:

Radar reflectors are required on vessels less than 150GT under SOLAS Chapter V, however there is no such requirement in the current version of the USL Code. As part of its ongoing development of the National Standard for Commercial Vessels (NSCV), the NMSC has agreed that the USL Code Miscellaneous Equipment Section will be reviewed taking into account the latest version of SOLAS Chapter V. However, a starting date for this project has yet to be determined.

The comments regarding the use of radar, qualifications of watchkeepers and radio watches are relevant. The draft Part E Operational Requirements of the NSCV provides guidance on procedures for watchkeeping (B6.3) and safety of navigation for vessels (B7) required to have a safety management system (SMS). However, under the proposed standard, a SMS would not be mandatory under the standard on a Class 3B vessel that carries 12 or less berthed persons.

Where appropriate, the text of this report has been changed to reflect the submissions.

Kelvin Hughes stated that they had no comments to make regarding the conclusions of the draft report and its recommendations.



## Collision Regulations

Rule 5 on look-out states that:

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 of the risk of collision.

With respect to assessing the risk of collision, Rule 7 states, in part:

...such risk shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change...

Rule 15 states:

When two power-driven 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 states:

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 clear.

Rule 17 (b), on action by the stand on vessel states:

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.

Rule 26 (e) states:

A vessel when not engaged in fishing shall not exhibit the lights or shapes prescribed in this Rule, but only those prescribed for a vessel of her length.

Rule 34 (a) states:

When vessels are in sight of one another, a power-driven vessel underway, when manoeuvring as authorized or required by these Rules, shall indicate that manoeuvre by the following signals on her whistle:

- one short blast to mean 'I am altering my course to starboard';
- two short blasts to mean 'I am altering my course to port';
- three short blasts to mean 'I am operating astern propulsion'.



IMO number	8018089
Flag	Malta
Classification Society	Bureau Veritas
Ship type	Bulk carrier
Builder	Koyo Dockyard, Mihara, Japan
Year built	1982
Owner	Purple Maritime, Athens, Greece
Ship manager	Brave Maritime Corp, Athens, Greece
Gross tonnage	34 518
Net tonnage	19 514
Deadweight (summer)	61 883 tonnes
Summer draught	13.02 m
Length overall	222.68 m
Breadth moulded	32.2 m
Moulded depth	17.5 m
Main engine	B&W 7L67GFC
Total power	9 636 kW
Crew	21



Flag	Australian
Port	Ulladulla, NSW
Ship type	Fishing Vessel, Commercial, Class 3B
Year built	1983
Owner	Vincenzo Basile, Ulladulla, NSW
Length overall	17.1 m
Breadth moulded	4.3 m
Moulded depth	1.47 m
Engines	2 Caterpillar diesel
Total power	224 kW
Hull Material	Fibreglass
Crew	4



**Independent investigation into the collision involving the Maltese registered bulk carrier  
*Lancelot* and the Australian fishing vessel *Jenabar*  
14 nautical miles east of Diamond Head, New South Wales, 21 August 2003**

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