Departmental investigation into the grounding of the Australian flag bulk carrier IRON SPENCER at Port Hedland, Western Australia on 3 December 1998

140

MIIU

ATSB

Contents

Navigation Act 1912

Navigation (Marine Casualty) Regulations

investigation intothe grounding of the Australian flag bulk carrier

IRON SPENCER

at Port Hedland, Western Australia on 3 December 1998

Published: August 1999

ISBN 0 642 20023 8

The Investigation into marine casualties occurring within the Commonwealth's jurisdiction are conducted under the provisions of the Navigation (Marine Casualty) Regulations, made pursuant to sub section 425 (1) (ea) and 425 1 (AAA) of the Navigation Act 1912. The Regulations provide discretionary powers to the Inspector to investigate incidents as defined by the regulations. Where an investigation is undertaken the Inspector must submit a report to the Secretary of the Department. It is Departmental policy to publish such reports in full as an educational tool.

For further information please contact:

Inspector of Marine Accidents
Marine Incident Investigation Unit
P O Box 967
Civic Square ACT 2608
AUSTRALIA

Phone: +61 2 6274 7324
Fax: +61 2 6274 6699
Email: miiu@miiu.gov.au

MIIU on the INTERNET

Information relating to this report and other marine investigation reports can be located from the Marine Incident Investigation Unit's Internet homepage at our URL: http://www.miiu.gov.au.htm

Summary

The Australian bulk carrier *Iron Spencer* anchored off Port Hedland at 0736 on 27 November 1998, about 2 miles SSW of Minilya Bank. At 1246 on 3 December, the anchor was weighed and the Master started to manoeuvre the ship to the pilot boarding ground. The wind was easterly, force 6 to 7 and there was a tide setting north-westerly at about one knot.

The ship was turning to port under full rudder when Port Control called *Iron Spencer* asking the Master, amongst other things, to hold the ship in its present position. Since the anchor was aweigh the Master was unable to hold *Iron Spencer's* position in the strong wind and the prevailing tide. The turn to port continued.

At about 1312 the Master ordered full ahead manoeuvring revolutions. A few minutes later he ordered that the rudder be put amidships to allow the engine revolutions to pass through the critical range and, subsequently, to allow the pilot helicopter to lift off.

Shortly after this the rudder was put hard to port. At about 1322, with the Pilot still on the main deck, the speed on the doppler log was seen to drop from 10 knots to about 1.8 knots. A crew member on the poop saw mud and sand discolour the water. The Master contacted the engine room saying that the ship might have touched bottom, but the Chief Engineer replied that all temperatures and pressures and other machinery parameters were normal.

After the Pilot arrived on the bridge, the Master retained the con for some minutes before relinquishing the conduct of the navigation to the Pilot. The Master and Pilot completed the pre-berthing declaration and checklist and the ship proceeded to its berth.

When manoeuvring to the berth, the Chief Engineer detected unusual vibration for certain rudder movements. Suspecting there may have been some bottom contact off Minilya Bank, the Master arranged for divers to undertake an inspection of the ship's bottom. Loading of *Iron Spencer* was delayed until this was completed.

The divers reported that there was evidence that the ship had made contact with the seabed. Further investigation showed that the rudder was working normally.

Nobody was injured as a result of the contact and no pollution resulted.

Sources of information

The Master and officers of *Iron Spencer*

The Pilot, Port Hedland

The Harbour Master, Port Hedland Port Authority

The Port Marine Officer, Port Hedland

BHP Transport Pty Ltd

Acknowledgment

BHP Transport Pty Ltd

Portion of charts Aus 52 and 53 reproduced by permission of the Hydrographic Office, RAN

The Inspector acknowledges the assistance of the Bureau of Air Safety Investigation (BASI).

Iron Spencer

Iron Spencer is an Australian flag bulk carrier of 78,437 gross tonnes, (141,475 tonnes summer deadweight), with an overall length of 283.5 m, a beam of 47.07 m and summer draught of 15.274 m. The ship was built in 1981 in Japan at the IHI yard, Kure. It is owned and operated by BHP Transport Pty Ltd, Melbourne, Victoria. The vessel was designed for a triangular trade to carry coal from Australia to Japan, returning to Australia to transport iron ore between Australian ports, then returning to Japan with a cargo of coal.

The ship is of standard bulk carrier design with double bottoms and upper and lower saddle ballast tanks. The cargo is carried in 9 holds, each 24.7 m in length. Number 6 hatch cover was the designated helicopter landing area.

The ship is equipped with two radars, GPS, VHF radios and an echo sounder. When manoeuvring the engine is controlled from the bridge. There is, however, no automatic engine print out, all movements being recorded manually in the "Bridge Movement Book".

Iron Spencer is fitted with a Sulzer 6RLA90 single acting, two-stroke diesel main engine of 15005 kW. Three diesel generators provide electrical power, at 415 volts, 50 Hz, with a capacity of 790 kW each. The machinery spaces are classified as UMS (Unmanned Machinery Spaces) and the engineers carry out the tasks of the duty engineer, rotating on a daily basis.

The vessel's complement consists of the Master, three mates, four engineers, an engineering cadet and 10 ratings.

The Master had four years command experience and had visited Port Hedland on eleven occasions in command of bulk carriers, four times in command of *Iron Spencer*. The Mate has a Master Class 1 certificate. The 2nd Mate had command experience in European waters and between Australia and Papua New Guinea and presently holds a Chief Mate Class 1 certificate. The Master, Mate and 2nd Mate, at various times, had all undertaken a Bridge Resource Management Course.

Port operating procedures – ship movements

The Port Hedland Port Authority has standard operating procedures for communications between ships and the control tower (the tower). The tower is staffed by a Port Marine Officer (PMO) at all times. The duty PMO is

normally the contact point for all VHF communications relating to ship movements and helicopter operations. Vessels are required to obtain permission from the tower before entering or leaving the port or moving from place to place.

The Authority has been transferring pilots by helicopter to and from ships since 29 December 1971 and claims to be the first port in the world to initiate regular landings on hatch tops for pilot boarding. The 1998 annual report notes that 18,315 transfers have been made by this method. On average some 87 percent of all pilot transfers are by helicopter, including non-bulk carrier ships. An estimated 96 per cent of pilot transfers to bulk carriers are by helicopter. Helicopter operations can be conducted in wind speeds of up to 70 knots.

The tower procedures are based on years of experience of communicating with masters and officers whose first language is not English and who may have very limited ability in English. The Authority has found that directing communications through the tower reduces the problems of ambiguity and confusion. This procedure includes communications with helicopters transferring pilots, where the background noise of the helicopter and the fact that the helicopter pilot is fully occupied in flying often detracts from the efficiency of message transfers.

The normal procedure, when a berthing time is fixed for a ship, is for the PMO on duty to contact the ship by VHF. The ship is told the pilot boarding time, to have its helicopter landing team standing by, to have its first loading hatch open for inspection and to have its gangway rigged at deck level. Ships at anchor are instructed that when the pilot is due, they should have heaved the anchor short to two shackles.

Before a pilot embarks a ship, whether for sailing or arrival, the pilot goes to the tower to be briefed on ship movements, the berth and any other relevant information. The flight time from the helicopter pad, adjacent to the tower, to any part of the inner anchorage is not more than ten minutes. As a pilot leaves the tower he/she may then tell the PMO to advise the ship to weigh anchor but hold its position.

As the pilot boards the helicopter, the PMO contacts the ship telling it that the pilot will be boarding within ten minutes and, if instructed, to weigh anchor but maintain position. The PMO then repeats the advice concerning the hatch inspection and gangway.

The helicopter pilot contacts the tower as it becomes airborne. During daylight hours there is usually no direct communication between the helicopter and the ship. However, there is nothing to prevent the ship calling the helicopter if the need arises. At night the helicopter Pilot may contact the ship regarding wind speed or other

critical information. If taking a marine pilot to a ship, the marine pilot conducts the communications.

After arrival on board a ship in the inner anchorage, the Pilot makes a quick visual inspection of the first loading hold and then goes to the bridge and assumes the conduct of the navigation. The Pilot contacts the tower advising it of the pilot on board time, time of anchor aweigh and requesting clearance to enter.

The Port Hedland Port Authority issues a Port Information booklet, but the procedures outlined above are not specified in the information booklet. In regard to helicopters landing on ships the booklet follows the "Ship – Helicopter Transfers, Australian Code of Safe Practice" issued by the Australian Maritime Safety Authority.

The Port Information booklet at page 8, under "Radio Procedure Ship/Helicopter" states:

Before landing, the helicopter must receive clearance to land on VHF Channel 16, as follows:

'(Name of ship) this is Port Hedland Pilot Helicopter, request clearance to land'.

'Port Hedland Pilot Helicopter this is (Name of Ship), you are clear to land'.

Vessels should be ready to advise the helicopter of the relative wind across the deck.

Narrative

Events on Iron Spencer

Iron Spencer arrived off Port Hedland on 27 November 1998. There were a number of bulk carriers anchored within port limits awaiting a loading berth. *Iron Spencer's* master intended anchoring half a mile west of the pilot boarding ground but there were several other vessels anchored in that vicinity on 27 November. He therefore decided to anchor further east, south of some 9 metre patches, about 4 miles east of the pilot boarding ground. This area was clear of ships and he had anchored there on previous occasions.

The anchor was dropped at 0707 and, at 0736, the vessel was brought up with 7 shackles in the water. Beacon 26 was bearing 264° x 5.96 miles. This position was 2 miles south-south-west of Minilya Bank. The Bank has a least charted depth of 1.9 metres.

Anchor watches were set and maintained and the main engine was on 2 hours notice. A listening watch was maintained on VHF channels 12 and 16. During the vessel's stay at anchor from 27 November to 3 December, moderate to fresh winds were experienced, predominantly from a westerly direction.

Tropical cyclone "Billy" was developing about 180 miles to the north and by 0400 on 3 December, the wind had

swung around from the west and was shown in the ship's log as SExE, force 6. At 0800, the wind was logged as E'ly, force 6 to 7.

The 3rd Mate recalled that, at about 1115 on 3 December, the tower advised the ship that a pilot would be boarding that afternoon at 1400 and possibly at 1330. The ship was also advised to shorten the anchor cable to two shackles at the appropriate time and have the first loading hatch open for inspection. The 3rd Mate passed this information to the Master.

The Master decided that he would weigh anchor at 1230, in sufficient time for *Iron Spencer* to manoeuvre closer to the pilot boarding ground. At 1130 the bridge gave 1 hours notice to the engine room. The 3rd Mate completed both the arrival and departure check lists and completed testing the bridge equipment and the steering gear. The vessel's draught was estimated as being 7.39 metres forward and 8.36 metres aft.

At about 1215 the 2nd Mate took over the watch on the bridge from the 3rd Mate. The 2nd Mate asked the Master if he would like the GPS waypoint marker on the radar screen to indicate the course to the pilot station, but the Master said he did not require the marker. At 1230 the engine was put on stand by and the vessel commenced weighing anchor.

The Mate went to the bridge at 1230 to complete the cargo loading paperwork and in case he was needed to assist on the bridge. While the Mate was doing his paperwork, he overheard a VHF conversation between the Master and the tower. The tower asked the Master the wind speed and direction and the Master replied that the wind was from the East at 32 knots. The person on duty at the tower then asked the Master for the wind direction in degrees and the Mate and Master wondered whether he had any nautical knowledge.

At 1242, the cable was "up and down" and the engine was put to dead slow ahead. At 1246, the anchor was aweigh and the engine was put to half ahead. The Master, 2nd Mate and an IR helmsman formed the bridge team. The Master decided to make a turn to starboard and the south, away from what he stated were a group of ships anchored close by, and then to head for the Pilot boarding ground.

The Master maintained the turn to starboard until about 1257 when the course was steadied momentarily. The vessel then started turning to port. At 1305 the Master received a VHF call from the tower advising him to hold the vessel in its present position. The Master told the tower that the anchor had been weighed and that he was already underway.

The wind was near gale force from the east and the tide was estimated to be setting to the north-west at about 1 knot. The Master considered that he would be unable to maintain his position in the prevailing conditions. He decided to continue the turn to port passing east and north of ships anchored close to *Iron Spencer* and to approach the pilot boarding ground from the north-east. When the turn was established he dismissed the helmsman and used the autopilot. The helmsman went below for a cup of coffee.

The 2nd Mate had plotted a position on the chart, marked 1300, using radar ranges from channel beacons and informed the Master that Minilya Bank lay ahead on a bearing of 020°. He had laid off a short course line in a direction of 020° from the position to indicate that the vessel would be heading for the Bank on that course.

At 1312, the Master put the engine to full ahead. The critical revolutions alarm sounded and the Master assumed that, with port rudder, the engine revolutions were not passing through the critical range (50-62 rpm). The rudder was put amidships to reduce the load on the engine.

When full ahead revolutions were attained, the Master went to the chart table at the after end of the wheelhouse to check the ship's position on the chart. He judged by the positions of the ships at anchor, that it was time to turn to the west. He was taking care not to be set toward other anchored ships and he recalled that the time was about 1318. The only position marked on the chart was 1300, at least 15 minutes before.

The ship was on a course of about 024° and the speed was increasing. No position was plotted at this time. The Master moved to the forward part of the bridge and both the Mate and 2nd Mate heard him exclaim that the helicopter had landed without notice. There was no helicopter landing party standing by and the first hatch had yet to be opened for inspection.

The time by now was 1319. The Master sent the 2nd Mate to the deck to meet the Pilot. The 2nd Mate stated that he warned the Master for the second time that the ship was headed for shoal water. With the helicopter on deck the Master thought it necessary to maintain course, particularly in view of the near gale force wind.

The Master realised that by now *Iron Spencer* was further north than he wanted. He told the Mate to fix the ship's position by GPS. The Mate took the position from the GPS, applied the necessary corrections to the latitude and longitude and plotted the position on the chart. He thought that the position could have been obtained between 1319 and 1322, but he put the time down as 1322 on the chart. The position put the ship on the 10 m contour,

about 4 cables south-south-east of the 1.9 m patch on Minilya bank. The Mate immediately told the Master of the proximity of the bank and advised the Master to put the wheel hard over to port to avoid it.

By then the helicopter had departed. The Pilot was on board and was waiting to inspect no. 9 hatch for pre-loading inspection. The hatch was not open and the Pilot estimated that it took about ten minutes for the hatch to be opened for inspection. After he had inspected the hatch he went to the bridge accompanied by the 2nd Mate. An IR helmsman took the wheel at about this time and the wheel was switched from automatic to manual.

The Master was watching the doppler log display and, at about 1320, noticed that the log was indicating about 10 knots. Shortly after the helicopter had transferred the Pilot to the ship and while the Pilot was on deck waiting for the hatch to be opened, the log was indicating 1.8 knots. At 1328, the vessel was clear of the 5 metre contour of Minilya Bank and there was no indication as far as the Mate was concerned that the vessel might have made contact with the bottom.

At about 1330, the Master phoned the Chief Engineer in the main engine control console to ask him to watch engine temperatures. The Master was concerned that the ship might have grounded and wanted to make sure that the main engine was not overloaded and that there was no silt in the heat exchangers. The Chief Engineer, however, had not had any indication that the vessel had grounded, neither was there any problem with the main engine temperatures.

When the Pilot got to the bridge, he introduced himself to the Master and asked whether he could take charge of the navigation. The Master did not let the Pilot take control until he felt that the vessel was clear of Minilya Bank. After several requests, the Pilot took control at about 1335. The Pilot completed the safety checklist with the Master and discussed the passage and berthing plan with him. According to the 2nd Mate the officers were not included in this briefing.

The ship berthed without further incident. The Pilot was on the bridge when the Chief Engineer came up to advise the Master that he had noticed unusual vibration when the rudder was used from 5° port to 35° starboard. The Chief Engineer advised the Master that there might have been damage to the rudder. The Master told the Pilot that the vessel had passed close to the 5 metre contour of Minilya Bank and the speed had dropped from over 10 knots to 1.8 knots, but neither the Master nor the Mate had felt any vibration at that time.

The Master arranged for an underwater inspection of the vessel by divers who inspected the vessel at about

2215. This inspection revealed that there was abrasion damage leading to stripping of the paint to bare metal in the vicinity of the rudder and propeller and the bottom plating from this area forward to frame 145. The rudder was carefully examined but it turned out that the vibration that had been experienced was not related to the grounding.

Internal examination of double bottom tanks and the duct keel at a later date revealed some damage to frames and longitudinals in no. 4 starboard double bottom tank.

Events in the tower

The PMO on duty in the control tower on the 0800-1800 shift on 3 December 1998 holds a coxswain's certificate. He has 17 years experience in and around Port Hedland working in small craft and the pilot launch. After three weeks training in November 1996 he took up duties as a PMO, coordinating shipping movements and emergency services through the Port Hedland control tower.

The PMO took over the shift at 0800. A bulk carrier *Prosper Venture* was due to sail at about 1030 and the Chinese vessel, *Alis Gloria,* to berth during the morning. At 1030 the PMO briefed the pilot of *Alis Gloria* in accordance with the port's normal procedures. The outward bound *Prosper Venture* sailed on schedule. At 1053 the PMO notified *Alis Gloria* that the pilot was on his way, to have the anchor cable hove short and the first loading hatch open for inspection.

The PMO stated that, with foreign flag ships, when he suspected that they may not have fully understood the message, he would put the guard ring of the tower's radar on the vessel to monitor it. Given that *Iron Spencer* was Australian and a regular trader, he paid the ship no special attention.

When the pilot was in the helicopter on the way to *Alis Gloria,* the ship reported a problem with the main engine and advised the tower that there would be a two-hour delay. The pilot returned ashore. At 1116 *Alis Gloria* reported that the problem with the engine was more serious than had first been thought. The PMO routinely informed the pilots, the Harbour Master and BHP of the problem with *Alis Gloria*. On advice from the BHP Superintendent, the tower was informed that *Iron Spencer* would take *Alis Gloria's* berthing slot. The pilot was informed of this accordingly.

At 1128 there is an entry recording a phone call from BHP, giving a "pilot on board" time for *Iron Spencer* of 1400. The entry would indicate that this was confirmed with a number of addresses including that of the ship. The

content of the message followed the standard operating procedure:

- the pilot would board at 1400 or possibly earlier at 1330;
- the anchor to be hove short to two shackles in the water at 1330;
- the first loading hatch should be open for inspection by the pilot on boarding;
- the gangway to be turned out at deck level;
- the vessel to berth head in.

The person on *Iron Spencer's* VHF radio confirmed that he received this message and passed it to the Master.

At 1200 the wind was recorded at the tower as being from 080° at 15 knots, the barometer was at 1005.5 hPa and visibility was ten miles.

The Marine Superintendent of the port was in the tower during the day trying to calibrate the automatic weather station wind indicator on Beacon 15. He asked ships for the wind direction as accurately as possible and some ships responded. *Iron Spencer* was asked for the wind direction as well and the ship responded that the wind was from the east at 30 knots. As the Superintendent required as accurate a wind direction as possible, the Port Marine Officer, asked the ship the wind direction in degrees. He was told that the direction was 090°.

The outbound vessel was due to disembark its pilot at about 1330 at "C1" beacon. The helicopter was leaving at 1300 for "C1" and the pilot for *Iron Spencer* decided to go out with the helicopter and board the vessel early, rather than wait until the helicopter returned at about 1350. This would be an advantage as *Iron Spencer* was anchored about 4 miles east of the pilot boarding ground.

At 1301, the pilot went to the tower for a briefing and left the tower for the helicopter at 1303. Before leaving, the pilot requested that the tower instruct *Iron Spencer* to heave the anchor up and maintain position for him to board.

When these instructions were passed to the vessel at about 1305, *Iron Spencer* replied that the anchor was aweigh and the vessel was on its way to the pilot boarding ground. The PMO noticed, at this time, that *Iron*

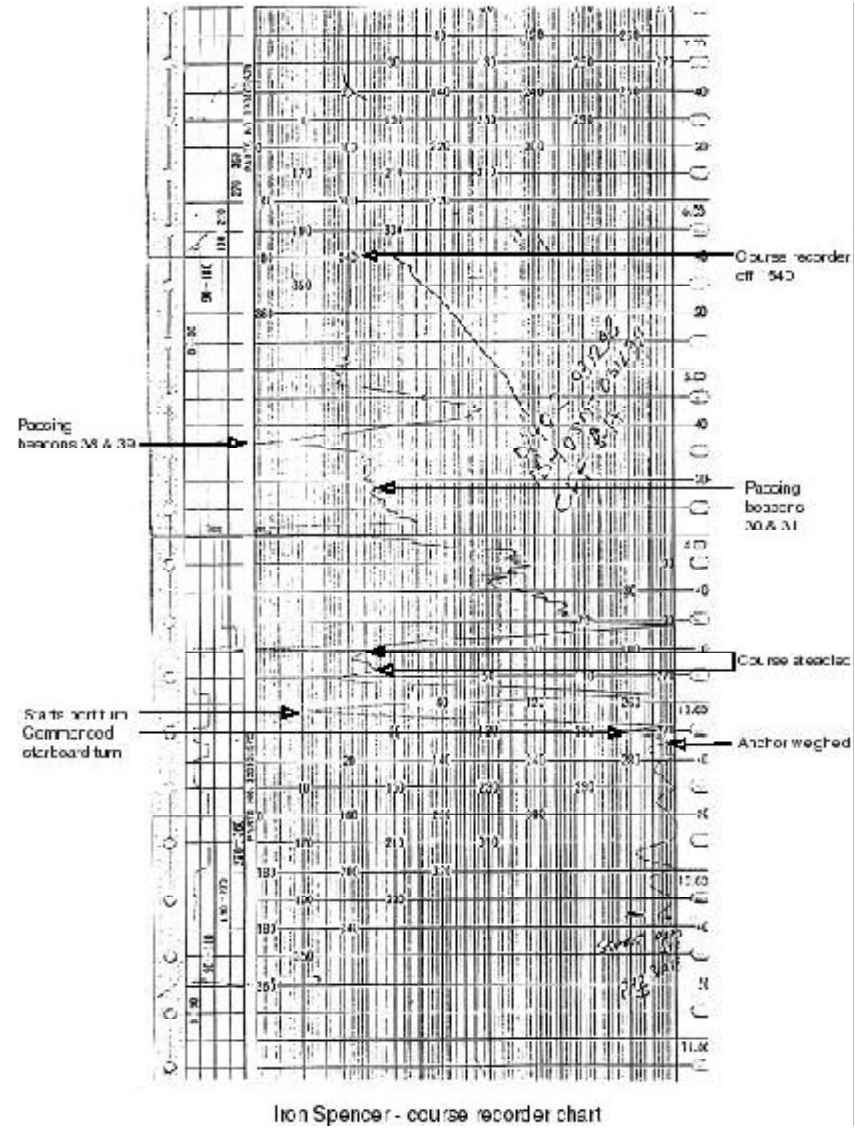
Spencer was heading away from the tower and he could see the ships transom. He estimated that *Iron Spencer* was on an approximate course of 015°.

The PMO advised the vessel once more to hold its position, reportedly adding that the pilot would be on board in about 10 minutes and that the fire party should be standing by.

At 1307, the helicopter was logged as having taken off for *Iron Spencer* and *Prosper Venture*. At 1344 the pilot on board *Iron Spencer* reported to the tower by VHF that he had boarded at 1319 and that the anchor had been weighed at 1236.

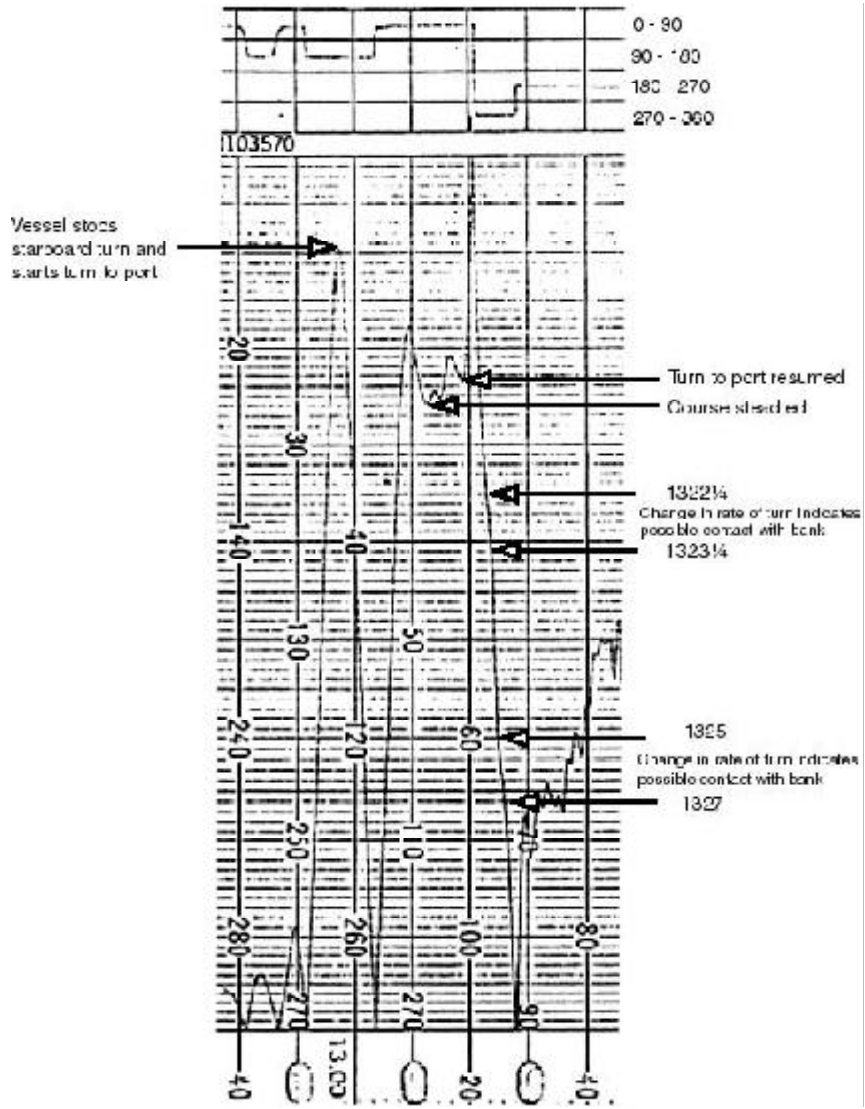
Iron Spencer berthed routinely with its first line ashore at 1510. Later, following a report by the ship's pilot to the Port Hedland Port Authority, the Harbour Master asked the PMO to write out a statement of the events surrounding the embarkation of the pilot and berthing of *Iron Spencer.*

Divers attended the ship that evening at 2215 to assess what, if any, damage had been sustained.

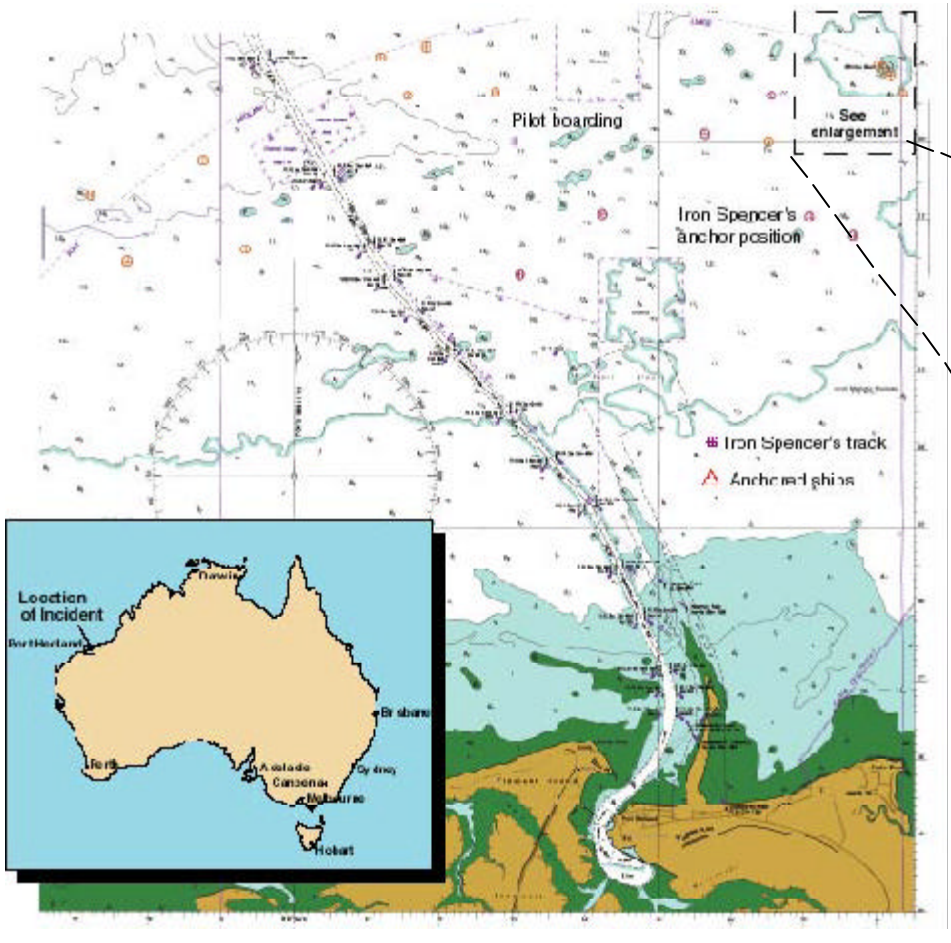


Iron Spencer - course recorder chart

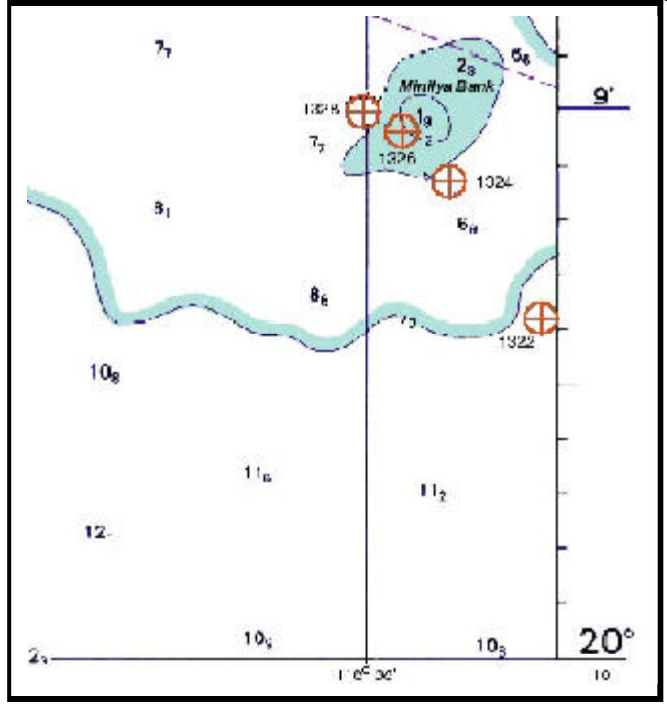
Iron Spencer course recorder chart



Enlargement of portion of course recorder chart



Portion of chart aus 53 with Iron Spencer's position at anchor and track



Portion of chart Aus 52 showing GPS positions of Iron Spencer in the vicinity of Minilya Bank

Comment and analysis

Evidence

Interviews were conducted with the Master and relevant members of the crew on *Iron Spencer*, the Pilot, the Port Marine Officer and the Harbour Master, Port Hedland.

Entries in *Iron Spencer's* deck logbook recorded the ship's anchor position every watch as well as details of weather and sea condition. The engine movements were recorded in the bridge movement (or "Bell") book. As the engine movements were under bridge control, no corresponding record was maintained in the engine room. There was no independent record of the ship's speed. *Iron Spencer* was equipped with a course recorder showing the ship's head at any given time, but it was not of a type that shows rudder angles.

The Port Authority control tower maintained a log of events, which included ship's movements, helicopter operations and records of the times of briefing pilots. The tower is equipped with a tape recorder designed to record all VHF communications transmitted or received by it. The recording equipment had not been functioning properly and on 3 and 4 December it was under repair. No independent record of the VHF traffic for 3 December was available to the investigation.

Details of the actual weather and any influence of the cyclone activity was provided by the Bureau of Meteorology.

The course recorder chart

Iron Spencer's course recorder was switched off on arrival at the anchorage on 27 November. On 3 December, it was switched on and synchronised at 1143 West Australian Standard Time for the passage from the anchorage to the berth before being switched off at 1540. The recorder chart was marked accordingly.

Given the significant variations in times recalled by the various witnesses the course recorder chart was carefully checked to assess its accuracy. Checking the trace and headings against known times such as passing between Bn.38 and Bn.39 (1434), between Bn.42 and Bn.43 (1439) and the time alongside the berth (1507), the Inspector is satisfied that the course recorder was accurate to within ± 1 minute.

After the course recorder was switched on and synchronised, the ship lay at anchor for an hour, yawing between 085° through east and 099° in near gale force winds.

The course recorder trace indicates that at 1246, when the anchor was logged as being aweigh, the heading was 092°. The initial turn to starboard is indicated as starting at about 1249 when the ship's head was 079°. The turn was made at about16°/min. Between 1256½ and 1257 the rate of turn to 7°/min and the ship reached a heading of 170° at 1257½. The ship then turned to port.

The course recorder trace indicates that, soon after 1257, the ship's head started to turn to port. Once established, the rate of turn to port was about 12°/min. At 1300 the ship's head was about 140°, at 1305 about 068°.

At 1309½ the ship reached a heading of 018°, before settling on a course of about 022° for about 9 minutes until 1319. It was during this period that the engine revolutions were increased from half ahead to manoeuvring full ahead.

At 1319 the ship resumed its turn to port and at about this time full port rudder was applied on the advice of the Mate. Between 1319 and 1320 the ship's head changed from 014° to 332°, a rate of turn of 21°/min. Examination of the course recorder trace shows that at 1322¼ the ship's head was 330° and the rate of turn slowed significantly for about 60 seconds to 7°/min. At 1323¼ the ship's heading was 323° and the rate of turn increased.

The rate of turn then accelerated to about 20°/min until 1325, when the rate reduced again to about 5°/min. From about 1327 the rate of turn increased until about 1330, when the ship steadied on a course of 255°.

When evidence from the 2nd Mate and the charted positions are considered, it is quite possible that either of, or both, the decreases in the rate of turn noted above between 1322¼ and 1323¼ and 1325 to 1327, indicate contact with the Minilya Bank. If, as reported, the ship's speed fell from 10 knots to 1.8 knots, the ship's speed would have fallen from about 310 m/min to about 56 m/min.

Bridge operations 1246-1345

Planning

While at anchor, the ship's distances by radar from beacon 26, Newman leading lights front beacon, and beacon C3 were noted in the log book each watch.

Examination of the ship's chart showed that *Iron Spencer's* anchor position had been plotted. There was also a position plotted on the chart marked 1300 stated to have been plotted on 3 December. There were GPS positions marked 1322, 1324, 1326 and 1328, in the vicinity of Minilya Bank also plotted on 3 December.

Despite the instructions from the tower, the Master decided to weigh anchor and proceed towards the designated pilot boarding ground at about 1230. The Port Guidelines (page 16) require ships intending to move within the anchorage to obtain permission from the tower. In this case, no permission was obtained.

The Master's intention after weighing anchor was to turn to starboard and to proceed slowly west till the Pilot boarded, but the course had not been plotted on the chart. After the anchor was aweigh the course was altered to starboard.

The 2nd Mate, in submission, stated that the pilotage plans were made and placed in wallets, one for the Master and one for the duty mate. However, neither the 2nd Mate nor any other officer produced any plan, or plans, for the passage from the anchorage to the berth.

Although it was possible to generate way points and a course line on the radar, and the 2nd Mate reminded the Master of this, the Master did not use this aid. This was despite the fact that no course had been laid off and no system of regular position fixing had been initiated.

The Master stated that when Port Control asked him to hold his position, he assumed that he was not required to be at the pilot boarding ground and he put the rudder over to port. He intended going north and north-west around the group of anchored ships to approach the pilot boarding ground from the north.

According to the Port Hedland Port Authority ship movement records there were five ships excluding *Iron Spencer* in the Eastern Anchorage. The closest ship was *Alis Gloria* about one mile directly north-west of *Iron*

Spencer's anchor position. *Port Hedland Maru,* the next nearest, was anchored 4.5 miles west-north-west of *Iron Spencer*, 7 cables due north of the pilot boarding ground.

In the Inspector's opinion, the Master had only a vague mental model of what he intended to do when the anchor was weighed. His approach to navigation of the vessel was casual and lacked precision. There were no course lines placed on the chart, no clearing distances from the shoal to the east of *Iron Spencer's* anchor position nor off Minilya Bank and he did not use the radar effectively. The positions of other ships were not plotted and the Master did not seem to realise that there was only one ship, *Alis Gloria,* between him and the pilot boarding ground, rather than a "group of ships".

The grounding

Just before 1257 the Master decided to abort the turn to starboard and turn to port. The reason for this decision is not clear. The Master stated that the message from the Tower to hold his position prompted the decision, but the message from the Tower was at 1305, after the turn to port was initiated. No other reason for this action was offered. There was no attempt by any of the bridge team to call the tower for clarification of messages.

No position was obtained to show where the ship was at 1257. However, the ship stopped the starboard turn and started to turn to port at 1257 (±1), as indicated on the course recorder trace.

At 1300 the 2nd Mate plotted a position on the chart. From the time that the anchor was weighed and the ship closed on Minilya bank at about 1322, this was the only position plotted. The 2nd Mate recalled that the heading on the radar at the time was 020° and he drew a course line 020° from the position and alerted the Master to Minilya Bank 2.1 miles to the north. The 2nd Mate's recollection of the ship's head is not consistent with that of the course recorder, which showed a heading of 140° at 1300, with a rate of turn of about 12°/min. The closest shoal water at this time was a sounding of 4.5 metres, 1.2 miles to the east, directly up wind. From about 1310 the vessel was on a steady course for the east side of the shoal off Minilya Bank until 1319, the time entered in the log book as the time the Pilot boarded.

The Master attributed the reason for the ship being close to Minilya Bank to the need to delay his intended turn to port, after the engine had passed through the critical revolutions, and to maintain a steady course while the helicopter was on deck. There is some dispute as to how long the helicopter was on deck. The Master estimated about 3 minutes (920 m at 10 knots), the Pilot estimated 40 seconds (200 m at 10 knots). Whatever the time, no

attempt was made to call the helicopter after it landed. Indeed there was no cause to call the helicopter as the Master did not realise that the ship was standing into shoal water until after the helicopter left

Under the circumstances at the time, the helicopter operation is one of a number of factors contributing to the grounding. The Inspector cannot accept that, whatever time the helicopter landed on deck, it was more significant than any other factor. The Master was unaware of the ship's position. Avoiding Minilya Bank would have been a matter of luck rather than a matter of pre-planning or firm knowledge on the part of the bridge team.

In the absence of the 2nd Mate, who was on the main deck, the Mate fixed the ship's position by GPS. The Mate took a reading, corrected the reading for datum error and plotted the position on the chart. The position put the ship 3.5 cables from Minilya Bank, close to the ten metre sounding contour. The position was marked 1322, but the Mate stated that it could have been taken any time after 1319. The rudder was put hard to port. The Mate then plotted the ship's position by GPS at two minute intervals.

These plots showed that the ship followed a track across the 5m contour, close to the 2m contour, finally clearing the 5m contour at 1328. At 1320 the predicted height of tide above datum was 4.5m.

The ship's position was not plotted at sufficiently regular intervals. The Master did not know where other ships were anchored and, more importantly he did not know his ship's position relative to Minilya Bank, till the 1322 position was plotted.

Although the Master, Mate and 2nd Mate had each attended a Bridge Resource Management course, no BRM principles were applied.

Communications between the tower and Iron Spencer

The PMO was instructed to make a written statement by the Harbour Master in the evening of 17 December.

The Master and officers on *Iron Spencer* supplied written accounts twelve days after the event. The accounts of radio messages and what exactly was said are not consistent in time or content and, given the lapse in time, the Inspector would not expect them to be.

According to the PMO on duty, the normal operating procedures were adhered to throughout 3 December, as

on any other day. The tower logbook contains an apparently contemporaneous record of the day's port movements. It does not contain a log of all messages transmitted or received.

The message passed by the PMO to *Iron Spencer* at 1128 was received by the 3rd Mate. There is no dispute as to the content.

At about 1230 the PMO called *Iron Spencer* explaining that they were calibrating a remote weather station. The ship replied that the wind was east at 32 knots. The calibration of the weather station required a precise direction and the PMO, thinking that the term "east" could be 10 degrees either side of east, asked for the direction in degrees. The Master and Mate heard the request for a heading and degrees. Both jumped to the conclusion that the PMO had limited competence, rather than associating the request with calibrating equipment.

Extracts from the tower log for Thursday 3 December 1998 indicate that the Pilot was briefed in relation to the berthing of *Iron Spencer* at 1303**.** Consistent with normal practice, the Pilot asked the PMO to tell *Iron Spencer* to heave the anchor and maintain position. At a time put at 1305, about 2 minutes before the helicopter was airborne, the PMO contacted the ship with the Pilot's message.

There is no dispute that the PMO told *Iron Spencer* to maintain its position, nor is there any dispute that the ship replied that it was already underway. However there is contradictory evidence relating to the content of other parts of the message.

The PMO stated that he was a little annoyed that *Iron Spencer* had disregarded the instructions passed at 1128. There were a number of ships in the anchorage and he had not been told that the ship was underway and manoeuvring. The PMO said that this alone prompted him to ensure that he strictly followed procedures. He states that he informed the ship that the Pilot was on his way, and would board the ship in about ten minutes. He also stated that he asked the ship to have the helicopter fire party standing by and to have its gangway at deck level. He also stated that he received confirmation of his message with the reply "Roger Hedland Harbour, well copied", or something similar.

When the tower called with the instruction to "hold position" the Master, Mate and 2nd Mate were on the bridge. The helmsman had been sent below some 5 minutes earlier and the ship was on automatic helm. The recollection of the message varies. The Master originally put the time of the message at 1305 stating the message was only

that the ship should hold position. The Mate, who was not paying particular attention and dealing with cargo calculations, recalled that the Master called the tower after the anchor was aweigh. He did not recall a time, but did recall that the easterly wind was about 4 points (045°) on the starboard bow. The ship reached a heading of 045° at about 1306. The 2nd Mate recalled the message and the instruction to maintain position, together with a statement that the Pilot was on his way. However, the 2nd Mate could not recall any reference to the helicopter or any other message.

As far as the ship was concerned, there was no indication that a helicopter with a pilot on board was about to land aboard the *Iron Spencer* and there was no helicopter landing party standing by. It was the first time that the Master had not had ten minutes notice that the helicopter would be landing.

In the Master's experience, the normal procedure was for the tower to advise the ship that the pilot would be boarding in ten minutes, giving time for the helicopter landing party to be readied. In his experience also, the Port Hedland helicopter pilots never asked for clearance to land, although there was a requirement to do so. Given the Master's experience in the port and understanding of the local procedures it would be reasonable to suppose that the Master would have understood that the Pilot was landing by helicopter within a predictable time frame. Failing that, there was nothing to stop any member of the bridge team from calling the tower and asking for clarification.

The fact that no such call was made by from *Iron Spencer* may well have been influenced by the Master's and Mate's perception that the PMO lacked both experience and competence.

Without the tower recording of VHF traffic for the 3 December, it is not possible to state with certainty which, if any, of the accounts are accurate. All those on the bridge are adamant that the helicopter arrived unannounced, although the 2nd Mate recalls mention of the Pilot.

The Inspector accepts the PMO's recollection that, up to the time the Pilot boarded *Iron Spencer,* he made three calls to the ship. The initial 1128 call, the call regarding wind speed and direction at probably about 1230 (though the PMO thinks it was earlier) and the call at 1305. The Inspector is satisfied the ship did not contact the tower when it weighed anchor at 1246.

As to what was actually said, there is no dispute regarding the messages of 1128 and 1230 (approx). The difference in accounts as to what passed between the tower and *Iron Spencer* at 1305 cannot be satisfactorily resolved given the adamant position of the various parties. The Inspector is satisfied that, at the least, the bridge

team was told that the Pilot was “coming”.

Neither the Pilot nor the Port Authorities were made aware of the fact that *Iron Spencer* may have momentarily grounded on the shoal off Minilya Bank. The Master stated that he believed the drop in speed he observed on the doppler log, from 10 knots to 1.8 knots, was due to the effects of shallow water. This reduction in speed in the context of the ship’s plotted positions at 1324 and 1326, would have provided reasonable grounds to suspect that the ship had contacted the shoal. The Master was sufficiently concerned to ring the engine room to ask the Chief Engineer to monitor temperatures and the 2nd Mate saw mud or sand being churned up in the vicinity of the bank after he returned to the bridge with the pilot.

Helicopter/Ship operations

The International Chamber of Shipping has published a ‘Guide to Helicopter/Ship Operations’ to advise shipping companies and ship’s staff on how to handle helicopter/ship operations. The publication warns that mariners and aviators are often not conversant with the most basic technical facets of each other’s profession and the Guide attempts to remedy this.

The aim of the publication is to specify the minimum requirements necessary to maintain standards of safety and the requirements should be adhered to at all times for routine operations.

According to the Guide, the most important factor in the successful conduct of safe helicopter operations is good communication between the ship and the helicopter.

The Australian Maritime Safety Authority published an Australian Code of Safe Practice on Ship-Helicopter Transfers in March 1995 (ref. Annex). The code applies to all routine transfers of personnel or goods by helicopter to or from ships while under way or at anchor. There are 11 sections in the code covering application of the code, definitions, site, pilot transfer, communications, authority, preparation of landing site, helicopter landing party. The last three sections deal with procedures during landing, winching operations and in emergency situations.

Two appendices deal with landing sites and winching areas and training of the helicopter landing party.

The Port Hedland helicopter procedures as practised do not follow the letter of the ICS or AMSA guidelines. The reason as outlined on pages 3 & 4 may be considered valid, based on the port’s experience. The ship can always

contact the helicopter by VHF once notification of its flight has been made.

However, the Port Hedland Port Authority handbook has a paragraph on radio procedures for ship/helicopter operations. This paragraph states “Before landing, the helicopter pilot must receive clearance to land on VHF Channel 16”.

The evidence is that the procedures practiced are at variance with the procedure in the Port Hedland guidelines. While experience may have evolved a more effective form of operation, this procedure should be formalised and reflected accurately in information to masters.

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:

Conclusions

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. The Master did not follow the directions given to the vessel at 1128 by the tower at Port Hedland.
2. The Master weighed anchor and got under way to head for the pilot boarding ground without obtaining clearance from the tower.
3. Although a passage plan was stated to have been available, it was not used by any of the ship's staff.
4. Ship's staff did not comply with Company standing orders and Master's standing orders in that positions were not plotted with the frequency required for these waters.
5. There was no effective appraisal for the change in plan at about 1257 when the Master altered course, while *Iron Spencer* was swinging to starboard, and brought the vessel around to port.
6. Lack of bridge resource management principles contributed to the grounding.
7. The Master did not take the opportunity to call the tower and seek clarification of the instructions.
8. The Master did not query the message from the tower stated to have been transmitted at 1305, neither did he inform the tower that it was not possible to maintain the ship's position.
9. Whatever the message from the tower, the bridge team did not understand that the helicopter with the marine pilot on board was about to land.
10. The helicopter landed before receiving confirmation that the vessel was prepared and that the landing party were standing by.
11. Once the helicopter had landed on board, the Master maintained course in accordance with guidelines in the

Australian Code of Safe Practice on Ship-Helicopter Transfers.

12. It is likely that maintaining the course and delaying the turn to port, was the final link in a series of factors that resulted in the vessel making contact with Minilya Bank.

13. Advice in the Port Information booklet on radio procedures between ship and helicopter and the actual procedures in force at the time of the incident are inconsistent and liable to create confusion.

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, or relevant parts thereof, was sent to the following:

The Master, *Iron Spencer*

The Mate and 2nd Mate, *Iron Spencer*

The Port Marine Officer, Port Hedland Port Authority

BHP Transport Pty Ltd

Submissions were received from the Mate and 2nd Mate and BHP Transport Pty Ltd and the report was amended as appropriate.

Annex

The Australian Code of Safe Practice, Ship-Helicopter Transfers, advises mariners in Section 5 on communications, that they should ensure they are familiar with the requirements of the particular service or port with respect to notice of arrival.

Masters are to notify the helicopter pilot through the ship's agent of the ETA and the anticipated true course and speed at stipulated times (the code points out that the stipulated times are for guidance only). The Master is also to notify the helicopter operator of VHF frequencies to be used (if different from standard frequencies). The helicopter operator is to be advised of the frequency, number and type of any locating aids on board.

Section 5c says 'when VHF contact is established between ship and helicopter, the master shall provide the helicopter pilot with the name of the ship, the true (ground-orientated) course and speed, the relative direction and speed of the wind, an update on the pitch, roll and heave conditions and his authority to commence final approach and land. VHF contact is to be maintained until the helicopter is finally clear of the ship.'

Section 5d states that if the helicopter pilot is satisfied that it is safe to do so, he will confirm that he is commencing final approach and may request the Master to alter the ship's course or speed to facilitate the approach. Once the course and speed have been agreed, these shall be maintained by the ship until the helicopter is finally clear of the ship.

Section 5e states that the Master shall advise the helicopter landing officer by portable radio when the helicopter commences final approach and this officer shall remain in radio contact with the bridge thereafter in readiness to signal the helicopter pilot to abort his approach if the master so orders.

Section 6 states that authority to commence helicopter-ship operations shall only be given by the Master and must be confirmed by the helicopter pilot. The Master remains at all times responsible for the safety of the ship and the helicopter pilot remains at all times responsible for the safety of the helicopter. Both include a general responsibility to avoid any act or omission which might endanger life or limb, property, or the marine environment.

Authority to commence helicopter-ship operations shall only be given by the Master and confirmed by the

helicopter pilot if:

(a) Helicopter VMC exists (conditions of visibility as defined in the Aeronautical Information Publication)

(b) Two-way VHF communication between ship and helicopter has been established (Initial contact normally made on channel 16)

(c) The ship is neither rolling nor pitching more than 5° either side, nor heaving more than 5 metres. Chocks should be used if the pitch and/or roll exceeds 1.5°

(d) The Helicopter landing site or winching area has been prepared as prescribed in Sec 7 and marked as prescribed in Sec 3

(e) Landing party prescribed in Sec 8 is standing by with equipment ready as prescribed in Sec 7

Details of Iron Spencer

IMO No.	7925962
Flag	Australia
Classification Society	Lloyd’s Register of Shipping
Vessel type	Bulk carrier
Owner	BHP Transport Pty Ltd
Year of build	1981
Builder	IHI yard, Kure, Japan
Gross tonnage	78,437
Summer deadweight	141,475 tonnes
Length overall	283.5m
Breadth, extreme	47.07 m
Draught (summer)	15.274m
Engine	Sulzer 6RLA90
Engine power	15005 kW
Service speed	12.5 knots
Crew	19 Australian