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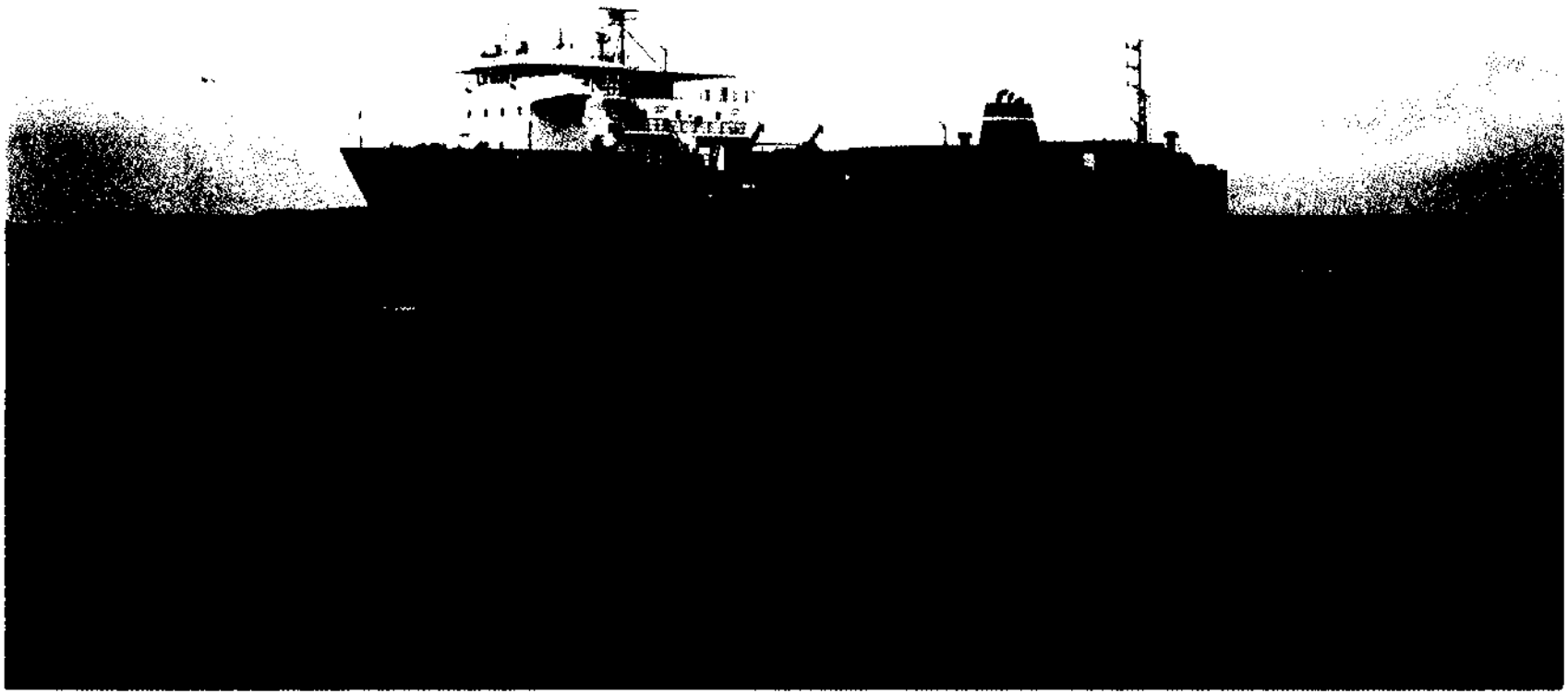
Charts



Summary

On 14 February 1994, while Searoad Mersey was sailing from Grassy Harbour and making the turn around Grassy Island, fog obscured the leading marks which when in line indicate the centre line of the main channel. The Master continued his manoeuvre onto the correct course, but the ship made contact with the northern end of Omagh Reef.

Although the hull was penetrated in way of three ballast tanks, once the situation had been stabilised the ship was able to continue its voyage to Melbourne.

The Master had been appointed to the ship at short notice and had little experience of the port, where masters have to do their own pilotage. With the leading marks obscured, there were no other visual aids to indicate the ship's location with respect to the centre of the 150m wide channel.

Information sources

Master, Mate and Helmsman of Searoad Mersey

Captain Con Eliades

King Island Marine Board

Bureau of Meteorology, Hobart Office.

The Inspector is grateful to ASP Ship Management for providing the opportunity for the investigating officer to make the voyage aboard Searoad Mersey.

Plan of Grassy Harbour [Chart Aus 789] reproduced by permission of the Hydrographic Office, RAN.

The incident

Searoad Mersey is a 5925 gross tonnage roll-on/roll-off cargo vessel, having an overall length of 91.5m and a loaded summer draught of 5.71m, engaged in the Bass Strait trade, serving the ports of Melbourne, Devonport and Grassy Harbour, King Island. The ship is powered by two Wartsila diesel engines, producing 5576 kW, driving two variable pitch propellers, and is fitted with twin Becker rudders and a bow thruster.

The ship is operated by two crews, who work a four weeks on, four weeks off "swing" system.

On Sunday 13 February 1994, the ship departed Devonport, Tasmania at 1630 and proceeded to King Island, to make the weekly scheduled call at Grassy Harbour on the Monday. The majority of the officers and ratings were regular crew members, but the Master had only been on the ship for two weeks, having been appointed to the ship at short notice, due to unforseen circumstances. The Master had completed two familiarisation trips on the ship to Grassy Harbour, as a supernumerary, in February and May 1992, and had taken the ship into and out of Grassy Harbour on the scheduled run the previous week.

After sailing from Devonport, the Master stood the watch on the bridge for the Mate from 1800 to 2000. Before going down to his cabin at the end of the watch, he wrote up his night orders advising the watch officers that fog was forecast.

Having gone to bed about 2200, the Master was called to the bridge by the Second Mate at 0200 on 14 February, the ship having run into fog. The Master remained on the bridge until 0330, at which time the visibility improved.

The Mate took over the bridge watch at 0400 and at 0600 called the Master, as instructed in "Night Orders". The ship arrived off Grassy Harbour at 0730, but as another vessel, HMAS Geraldton, was sailing, the Master stood off until that vessel had cleared. The wind was light, easterly, the visibility about one mile in patchy fog.

The Master approached the harbour using radar parallel indexing procedures, initially Sandblow Point 3.5 cables (to port) and then Grassy Island 1.1 cables (to starboard). The entrance leads were picked up when the ship was one mile off Grassy Island.

Entering on the leads (310°), when Grassy Island came abeam to starboard, course was altered to starboard, to 054°, to head for a white painted boulder on the breakwater. (The boulder had been painted by the Mate to provide a heading marker). The Master turned the ship around to port, in the turning basin off the berth, and the ship was all fast alongside at 0818.

The Master spent the rest of the morning reading the ship's operating manuals, getting to know more about the ship. After lunch, he kept an eye

on the visibility as there were still fog patches around, reducing visibility to about four cables. However, by sailing time, with the wind easterly force four (11 - 16 knots), he considered the visibility to be sufficient for departure.

Gears and controls were tested at 1304, preparatory to sailing, at which time both radars were switched on. The draught for departure was recorded as being 5.4m forward and 5.44m aft.

For departure, following standard practice, the Mate went to the bridge to assist the Master, relaying orders by VHF radio to the Second Mate aft and monitoring the rudder angle indicator for correct response by the helmsman. Control of propeller pitch and bow thruster were switched to the starboard bridgewing control, and the Master and Mate stationed themselves on the starboard bridgewing, which was also standard practice.

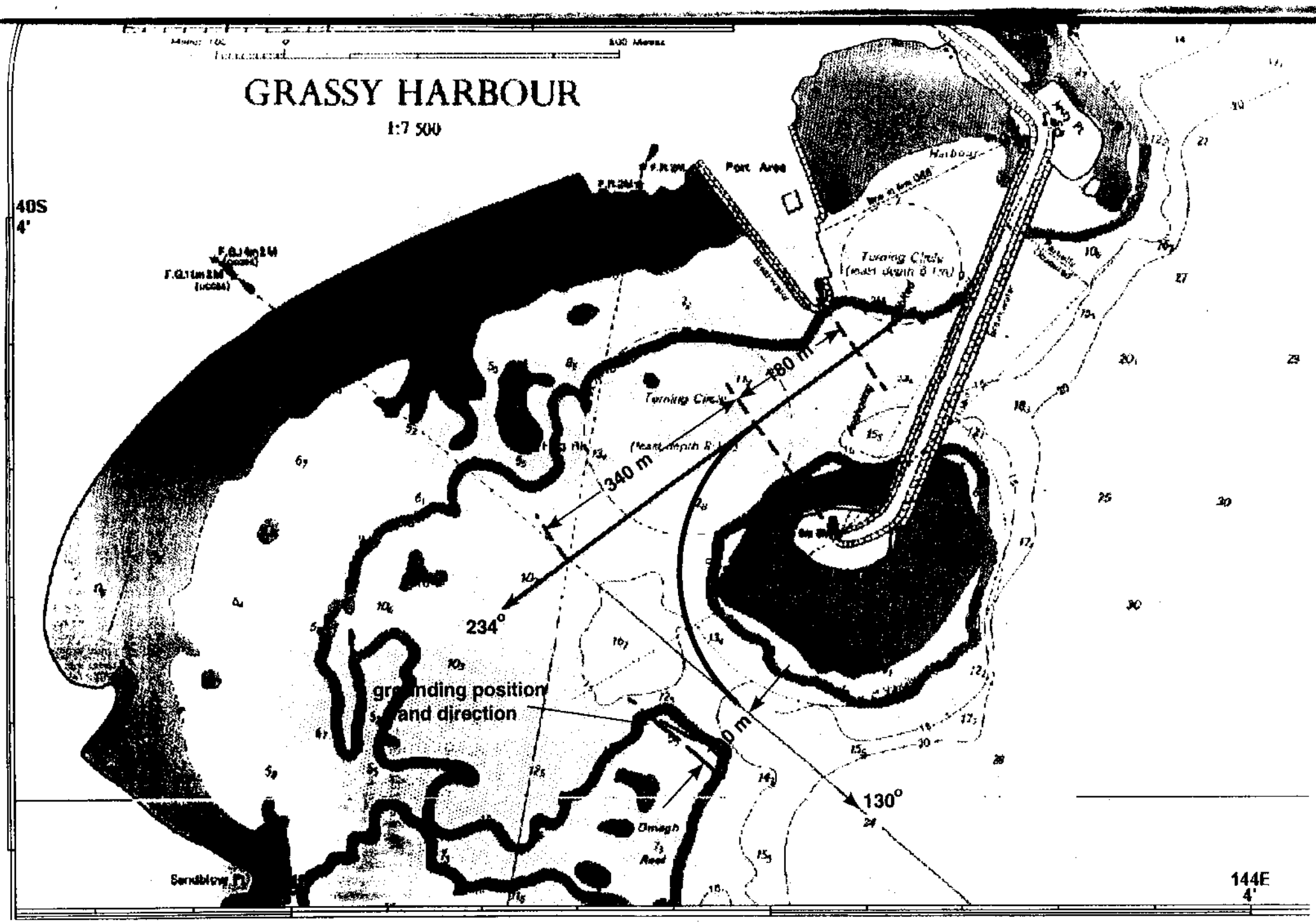
The telegraph was put to "stand by" at 1442 and the ship cleared from the berth at 1449. With the propeller pitch at 40 percent (slow ahead) the Master manoeuvred the ship around the end of the berth, to a heading of 234°, towards a conspicuous sand patch on Sandblow Point. Although the Mate had difficulty seeing the leads with the naked eye, the fog being thicker along the beach than on Sandblow Point, the Master was able to see them using binoculars.

Grassy Island light was passed abeam to port and, after a few seconds, the Master ordered "Port 10", to start the turn to port, and then "Port 20". Very soon afterwards, the fog obscured the leads, which at this time were well abaft the starboard beam and still open eastwards [rear lead to the right of the front lead]. The Master maintained the turn, watching the bridgewing gyro compass repeater. When the heading was 150°, he gave the order to the helmsman to "steady" and increased the propeller pitch to 60 percent (half ahead). The ship steadied on a heading of 140°, so the Master ordered "Port 5", then "Port 20", to regain the swing and to bring the ship to the required heading of 130°. The Mate looked over the side and saw the bottom, but before he could say anything to the Master, the ship gave a lurch and heeled to port, but maintained way. Grassy Island at this time was on the port beam and the time was noted as 1454.

The Master immediately reduced the propeller pitch to 20 percent (dead slow ahead) and the Mate went down to the ballast control room, to check the ballast tank soundings. The Master passed a message through Grassy Harbour, requesting the agent to contact the ship on private UHF channel 6. Alerted by the ship's motion, the Second Mate went to the bridge, to assist the Master.

After leaving the bridge, the Mate encountered the Second Engineer, who he briefed on what had happened, and the two men went down to the vehicle deck checking the various spaces on the way. They found no signs of water ingress.

The Mate went on down to the ballast room, by which time the ship had developed a starboard list of about five degrees, indicating the hull had been breached. Checking the gauges, he


GRASSY HARBOUR
1:7 500
40S
4'
144E
4'
Port Area
Harbour
Turning Circle
(mean depth 8.1m)
180 m
340 m
234°
130°
grounding position
and direction
Omagh
Rock
Sandblow

immediately saw that No.3 starboard double bottom tank was indicated as being full, when it should have been empty, and he passed this information to the Master.

The Chief Integrated Rating and the Third Mate checked the forward compartments, finding them clear, and the Chief Engineer reported to the Master that no water was entering the engine room. The Mate then reported to the Master that No.7 tank gauge was also indicating full, whereas the tank had only been ballasted to 75 percent. The Mate proceeded to adjust ballast in other tanks to bring the ship upright.

The Master assessed the information provided to him, decided that the position had stabilised and that the ship was not in immediate danger of sinking and, at 1512, decided it would be safe to proceed northwards. He advised the agent, the Maritime Rescue Co-ordination Centre, Canberra and the owners, and determined that Sea Elephant Bay, 10 miles to the north, would provide a good refuge, should one prove to be necessary.

The Mate marked the water levels on all the tank gauges and when satisfied there was no further water ingress, went to the bridge to take over the watch. The Master reassessed the situation as the vessel passed off Sea Elephant Bay and decided it would be safe to continue the voyage to Melbourne.

During the 4-8 watch, the duty Integrated Rating frequently checked the tank gauges, which remained steady, but the Mate noticed a gradual, increasing list to starboard. At the end of his watch, the Mate checked the ship's drawings and concluded that the only likely cause of the increasing list was water entering No.4 starboard void space, having a capacity of 230 tonnes and located immediately above No.3 starboard double bottom tank. This tank was not fitted with a remote gauging system and therefore the Mate had to climb under cargo cassettes on the vehicle deck to gain access to the sounding pipe. He obtained a sounding of 2.4m, in what should have been an empty tank, indicating that water was entering from No.3 starboard double bottom tank. Not wanting to pump in too much ballast, the Mate put the ballast pump on to discharge from the void space, which stabilised at about 0200 on 15 February, at a sounding of 2.8m.

The ship entered Port Phillip Bay at 2248 on 14 February, being met off the Heads by a launch of the Melbourne Water Police, and berthed at Webb Dock at 0212 hours on 15 February. After the ship was safely alongside the berth, the Mate stopped the ballast pump and the void space filled completely to a sounding of 4m.

An underwater inspection by divers at Webb Dock on 15 February revealed considerable damage to the ship's bottom plating on the starboard side between frames 77 and 97. The ship was holed in No.3 starboard double bottom tank, No.7 starboard wing tank and No.10A starboard stabilising tank.

After completion of cargo discharge, the ship proceeded to Williamstown on the afternoon of 16 February and entered drydock for repairs.

Inspection of Omagh Reef by divers, on behalf of King Island Marine Board, indicated that Searoad Mersey had grounded on the Reef immediately north and east of the 5.5m sounding depicted on the plan of Grassy Harbour (Chart Aus 789), which lies 100m south-west of the line of the leads.

Comment

Grassy Harbour

Grassy Harbour is situated between Bold Head and Sandblow Point, on the south-east coast of King Island. The harbour is formed by two breakwaters, the main, or outer, which joins Grassy Island to Jetty Point, and the inner. The port area and berth are situated on reclaimed land on the eastern side of the inner breakwater.

Omagh Reef, with minimum depths of less than 5m, lies roughly midway between Grassy Island and Sandblow Point. Shoal water extends 133m to the south-west of Grassy Island, the main entrance channel lying between this shoal water and Omagh Reef with a width of about 150m.

Navigation aids consist of a small light beacon at the centre of Grassy Island, leading marks for the main (310°) and western channels (011°) and a light beacon on the southern end of the inner breakwater.

For entering harbour, approaching from well to seaward, there is ample time to line up on the leads for safe passage through the narrow channel. For departure, the turn rounding Grassy Island has to be judged so that the ship is on the line of the leads, for safe transit of the channel on completion of the turn.

There is no pilot at Grassy Harbour, masters conducting their own pilotage.

Weather - fog frequency

No weather records are kept at Grassy Harbour, but the experience of those working there is that sea fogs occur in the area of Grassy Harbour during the months of February and March, with easterly winds. Fog banks generally form off-shore, but can move inshore rapidly. They are generally dispersed by the sun as the day progresses.

Advice on fog frequency was sought from the Bureau of Meteorology. However, the statistical records were based on data collected at Currie Post Office, which were not relevant to the sea fogs experienced at Grassy Harbour.

The experience of the regular masters and mates of Searoad Mersey is that mist has been encountered occasionally, but not fog. However, the master who joined the ship on 3 February 1994 not only encountered fog on 14 February, but also on 7 February, when he delayed entry. On 7 February the fog had fully cleared by departure time.

Tides

Although the tides in the area are strong, these run across and to seaward of the harbour entrance. When a ship is departing, the effect of the tides is not generally experienced until after the ship has cleared the entrance channel.

Tidal range is about 1m.

Operational practice

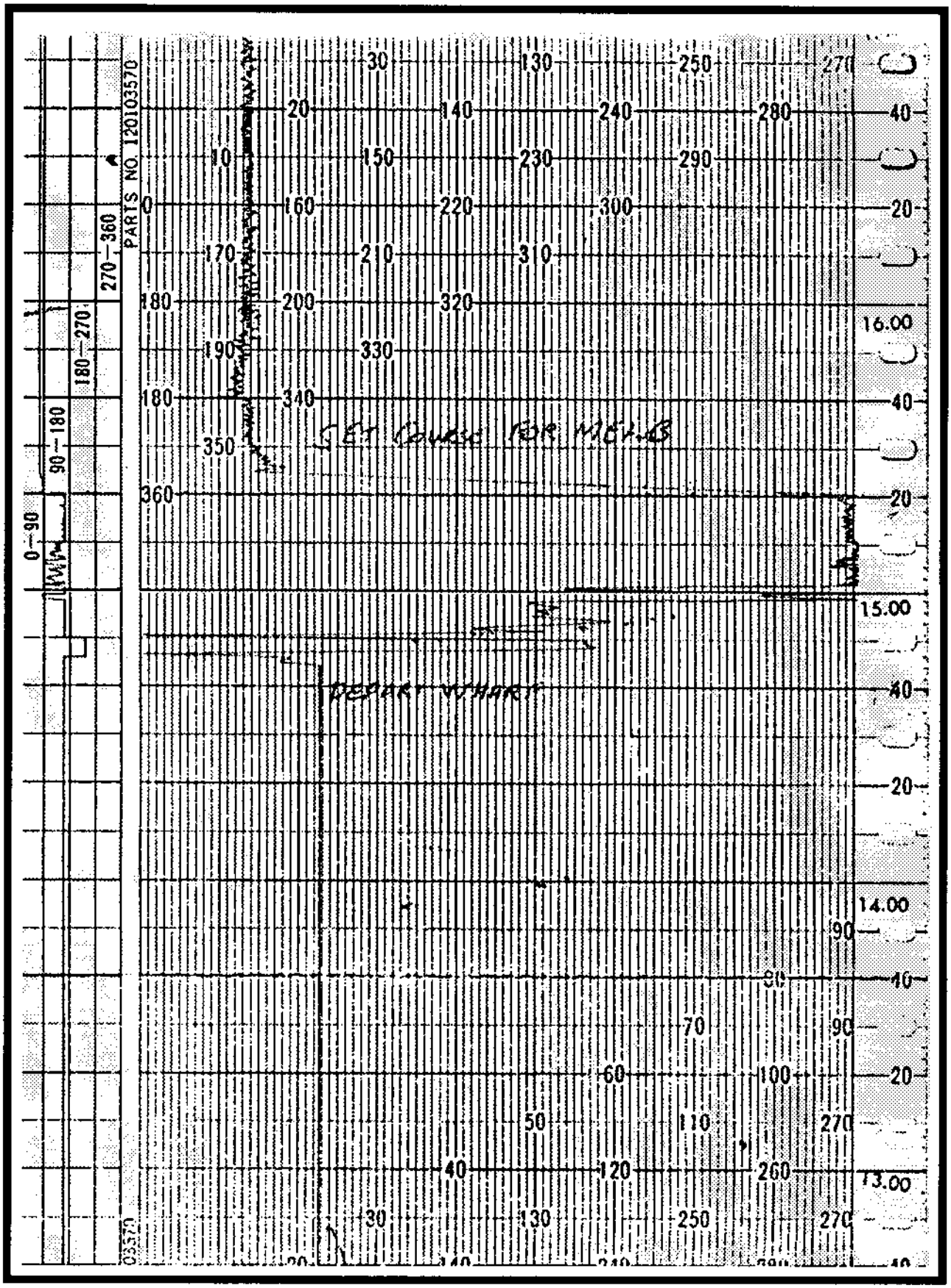
When leaving harbour, it is the practice aboard Searoad Mersey, on clearing the berth, to bring the ship around to starboard, through 77 degrees to a heading of 234°. This is done in a distance of about 100m, just over one ship's length. The distance then to Grassy Island light being abeam to port is 180m, just two ship's lengths. At this point the ship is 330m from the line of the leads and needs to be turned through 104 degrees to port. The turn is judged by watching the leads over the starboard quarter and then right astern. Because of the presence of the 4.2m sounding off Grassy Island, there is a natural tendancy for masters aboard Searoad Mersey to err towards an overshoot of the leads, rather than making too tight a turn.

Being high sided, Searoad Mersey is prone to wind drift even in moderate winds. At Grassy Harbour, the wind can have a marked effect on the turn around Grassy Island - easterly winds tend to cause an overshoot during departure, while westerly winds cause a tighter turn. Thus local knowledge/ experience is essential, as every departure is likely to be different.

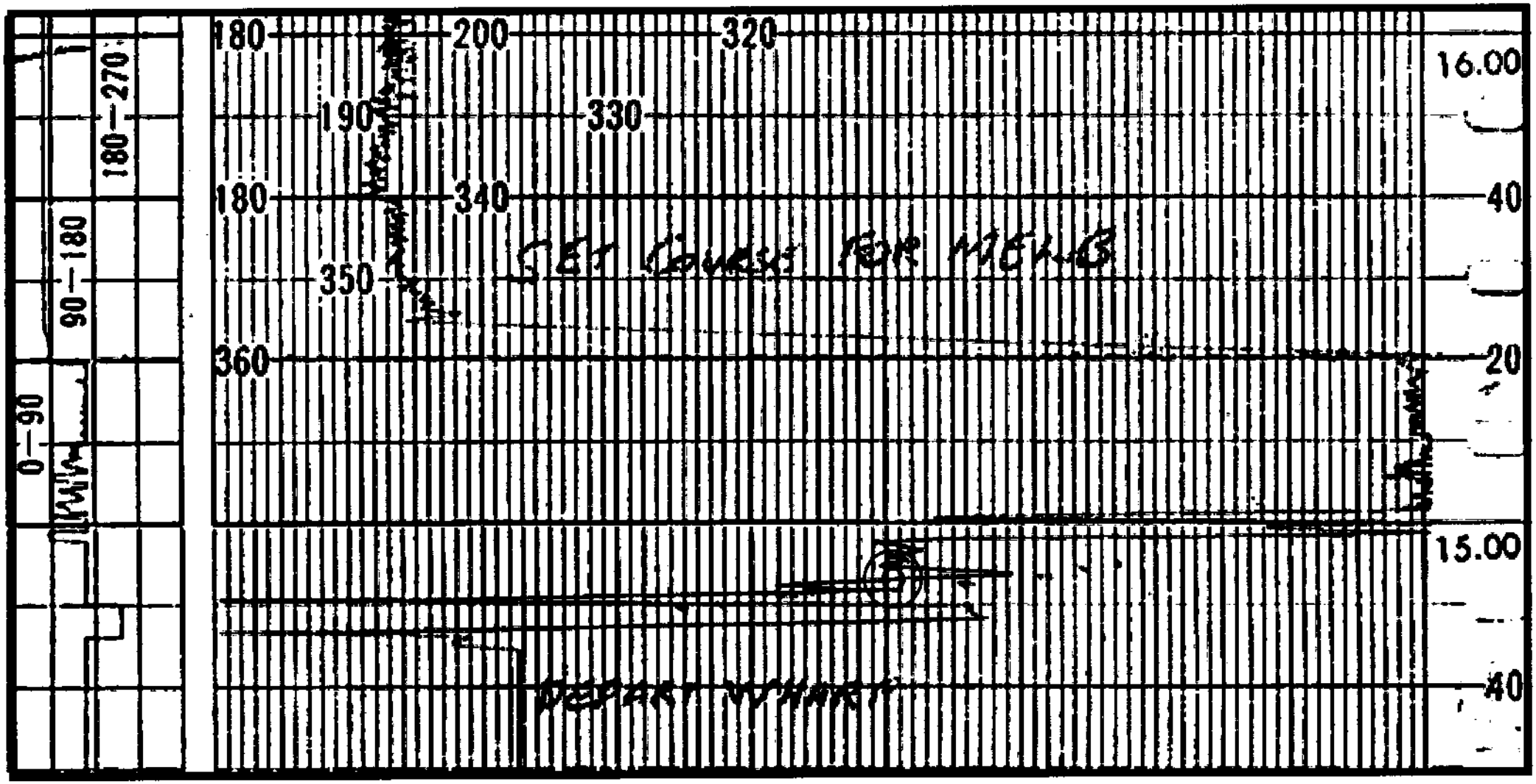
Course Recorder trace

From the course recorder chart, Searoad Mersey took two minutes (from 1446 to 1448) to make the turn to starboard after coming off the berth, to a heading of 234°. The ship maintained this heading for a further two minutes, after which the turn to port, rounding Grassy Island, was commenced at 1450. The ship reached a heading of 129° at 1451-42, then swung back to starboard to a heading of 142° at 1452-20, followed by a swing back to port to 121° at 1453-40, settling on a course of 129° at 1454-30. The course of 129° was maintained for about three minutes (to clear the entrance) and then the ship came around to a heading of 090° (to stand off the entrance, while damage was assessed).

The time of impact was recorded on board as being 1454. However, a slight "step" in the trace on a heading of 130° at 1453, during a swing to port, indicates the possible time of initial impact. The direction of the contact marks on Omagh Reef, as reported by the divers who conducted the underwater inspection for the King Island Marine Board, are consistent with Searoad Mersey travelling in a direction of less than 130°.



Section of course Recorder chart for period of Incident



Enlargement of portion of the course recorder chart

Analysis

The Master had conducted the manoeuvre at 40 percent propeller pitch on both propellers, not increasing to 60 percent until the turn was almost completed. Even had Searoad Mersey worked up to the full 8 kts (4.12m/sec), to overshoot the turn by 100m would have required a delay in starting the turn of about 25 seconds, whereas the Master stated he waited "a few seconds". However, at the slow speed, the turn would have been slower and wider than if he had increased the pitch earlier.

The investigating officer visited Grassy Harbour and sailed aboard Searoad Mersey from Grassy Harbour to Melbourne. At the time of departure from Grassy Harbour the wind was westerly at 15-20 knots. On that occasion the ship's Master used 50 percent propeller pitch to make the turn off the berth and commenced the second turn as Grassy Island light came abeam to port, increasing the propeller pitch to 70 percent as he did so. The turn was completed in one minute, just 4mins 20secs after all lines had been let go from the berth.

It is considered that on 14 February Searoad Mersey overshot the turn as a result of the combination of the slight delay in commencing the turn, the propeller pitch being maintained at 40 percent and the drift effect of the 15kt easterly wind.

The Master had ordered the helmsman to "steady" as the ship's head passed through a heading of 150° and although the ship actually swung to the correct course of 130°, the helmsman brought the ship back to a heading of 140°, necessitating corrective action. It is considered that it would have been more appropriate for the Master to give the order to the helmsman to "steady on 130°".

Searoad Mersey is very manoeuvrable and has a marked tendency to heel during turns. With a beam of 18.52m, the increase in draught per degree of heel is 16cm, thus a heel of 5° will increase the draught by 80cm, a heel of 10° by 1.6m.

At the time of the contact with Omagh Reef, the height of tide above datum was +1.32m, providing a depth of water at the position of contact of 6.82m. Making no allowance for height difference due to sea/swell conditions, at the draught of 5.4m a heel of 8.9° would have been required to cause Searoad Mersey to touch bottom.

Master's experience

The operators of Searoad Mersey have a policy that, before appointing a master to the ship, the master designate undergoes two familiarisation voyages, into and out of Grassy Harbour, as an observer with one of the ship's regular masters.

The Master of Searoad Mersey had been a master for almost four and a half years and held pilotage exemptions for a number of ports, including Melbourne and Devonport.

In accordance with company policy, he had undergone two Grassy Harbour familiarisation voyages aboard Searoad Mersey. However, these had been conducted on 10 February and 11 May 1992, 24 and 21 months before his appointment to the ship.

Although the Master had satisfactorily conducted the ship in and out of Grassy Harbour one week prior to the grounding, it is considered that his inexperience of the port was a contributing factor to the contact with the reef. This inexperience would have led to a natural caution, which resulted in a slower engine speed than used by the regular masters for the turn and a slight delay in commencing the turn.

In Victoria, the maximum time lapse between port visits for a pilot exempt master is six months, while in Tasmania the time limit is 12 months. If these time limits are exceeded, the master must reapply for pilotage exemption.

In this instance, the time lapse between the Master's familiarisation voyages and his appointment to the vessel was 21 months. The Inspector considers this time lapse to be excessive, having the effect of nullifying the familiarisation voyages. The Inspector appreciates the short notice at which a relief master was needed, but this time lapse was an important issue which should have been taken into consideration and which should have precluded that particular master from selection.

Navigational aids

The ship that served King Island before Searoad Mersey was the small ro/ro ship Straitsman, which had a gross tonnage of 727, an overall length of 62.59m, a load summer draught of 3.83m, and a normal operational draught of around 12 feet (3.66m). Although Grassy Harbour berth was modernised to accommodate the larger Searoad Mersey, the adequacy of the existing navigation aids does not seem to have been fully evaluated.

The concealment of the leads by fog removes the only visual indication on where a ship is in relation to the entrance channel.

Ideally, both the 4.2m sounding off Grassy Island and the 5.5m sounding at the northern extremity of Omagh Reef should be marked with beacons, indicating the safe width of the channel. However, a single beacon on the 4.2m sounding would provide an immediate reference point on the inside of the turn around Grassy Island. Also, a beacon at that location would not only provide a lead with Frog Rock, indicating the northern limit of the channel, but it would not be lost to sight in other than quite thick fog.

Pilotage methods

Searoad Mersey enters and departs from Grassy Harbour during daylight hours only. The operational procedure carried out by all the masters for departure is to conduct the con from the starboard bridgewing, from where the leads can be observed during the whole procedure.

Although the parallel indexing method of radar navigation had been used for approaching the port, the changing shore line caused by the rise and fall of tide makes this method difficult to use for departure. Even had Sandblow Point been used as a point for parallel indexing for departure, due to the very short time factor involved in the turn and the time that it would take to change and adjust from a visual con to a radar con, it is a matter of conjecture whether the outcome would have been different.

Blind pilotage techniques can provide effective and safe navigation when a vessel runs into reduced visibility with little warning. However, the technique must be practised regularly and procedures refined during clear weather passages, against the time reduced visibility is experienced. With a beacon located off Grassy Island, such techniques should be possible at Grassy Harbour.

Conclusions

It is considered that the contact with Omagh Reef was brought about by a combination of a number of factors, the most important being:

1. The obscuring by fog of the Grassy Harbour front and rear lead marks, these being the only visual aid to indicate a ship's position relative to the centre of the departure channel.

2. The Master's lack of experience of the port.

3. The Master's conservative use of propeller pitch, giving a reduced rate of turn, together with the delay in the commencement of the turn and wind drift due to the easterly wind, resulted in the turn being too wide.

It is further considered that:

4. The long period between the Master's familiarisation voyages and his appointment to the ship nullified the value of the familiarisation voyages.

5. A beacon located on the 4.2m sounding off Grassy Island would provide a point of reference, other than the leads, for making the tight turn around Grassy Island.

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 resonable to do so, give the person a copy of the report or the relevant part of the report. Sub-regulation 16(4) provides that any such person may provide written comments or information relating to the report.

The report was sent to the Managers, Master and Mate of Searoad Mersey and to the King Island Marine Board.

The Managers provided a submission in which they explained the reason for the appointment of the Master at short notice.

Action

Since the grounding, feasibility studies into the installation of navigation beacons have been conducted by King Island Marine Board. These studies looked at installing a beacon on Omagh Reef and on the shoal water immediately west of Grassy Island. Discussions between the Marine Board, ANL and ASP Ship Management have resulted in the decision to install a navigation beacon on the 4.2m sounding to the west of Grassy Island.

Details of vessel

Name	Searoad Mersey
Flag	Australian
Lloyd's Number	8914831
Owners	ANL Limited
Managers	ASP Ship Management
Type	Roll-on/roll-off cargo
Builder	Singmarine (Pte) Ltd
Classification	Det Norske Veritas
Length overall	91.5m
Breadth	18.52m
Summer draught	5.712m
Gross tonnage	5925
Nett tonnage	1778
Summer deadweight	3287 tonnes
Capacity	120 teus
Engines	Two, Wartsila 8R32E, eight cylinder diesel
Engine power	5576kW
Propellers	Two variable pitch
Crew	15