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Iron Baron stranded on Hebe Reef 12 July 1995

Summary

On the morning of 10 July 1995, the Australian operated 37,557 tonnes deadweight bulk carrier Iron Baron arrived and anchored off the entrance to the River Tamar, Northern Tasmania. The ship was bound for the TEMCO terminal at Bell Bay, where it was to discharge 23,896 tonnes of manganese ore. The Master was advised that the Pilot would board at 1930.

When the crew went to stations to weigh anchor at 1900, the wind was from the north-west at 20 to 25 knots. The anchor was aweigh at 1913 and, after turning the vessel around, the Master manoeuvred the ship, at minimum manoeuvring pitch on the propeller, towards the pilot boarding position. So as to maintain a lee on the port side for the pilot launch, he adjusted the heading from south-south-west to south-west.

The Pilot boarded at 1933 and as soon as the launch was clear of the ship's side, the Master, aware that he had overshot the boarding position, ordered the wheel hard to port and the telegraph dead slow ahead, to bring the ship around on to the leads.

After an exchange of information with the Master, the Pilot ordered full ahead, to increase the rate of swing, and went to the port bridgewing, to

check the lie of the leads. Using binoculars, he saw that the ship was too far to the south and likely to run aground on the eastern end of Hebe Reef. He therefore ordered hard to starboard, hoping to clear the northern edge of the reef. However, after turning through about 40°, the ship grounded at a speed of about five knots, in a position 1.8 cables (333 metres) north of Hebe Reef beacon.

Attempts were made to refloat the ship, initially by going full astern and later with the aid of a tug, but these were unsuccessful. With the tide ebbing and the weather deteriorating, the movement of the ship became violent and extending damage to the bottom plating became evident, with a number of tanks being ruptured.

When fuel oil was seen in the water, the Master mustered the crew and ordered the disembarkation of some of them, eventually ordering the disembarkation of the remainder at about 0645 on 11 July.

Iron Baron was eventually refloated by salvors on 16 July. After extensive inspection of the vessel, both internally and externally by divers, and discussions with the Launceston Port Authority, the decision was made that Iron Baron should be scuttled. The vessel was towed to the position 39° 37' S 149° 25' E, 60 miles east-north-east of Flinders Island, where it was scuttled in 4000 metres of water on 30 July 1995.

Sources of Information

Iron Baron - Master, Mate, 2nd Mate, 3rd Mate, Chief Engineer, Second Engineer, Third Engineer, Chief IR, Watch IR, Trainee IRs, Supernumerary, records and documentation.

Pilot

Pilot launch - coxswain and crewman

Tug Gawler - skipper

Harbour Master, Port of Launceston Authority

BHP Transport - Ship Management

United Salvage Company

Bureau of Meteorology, Hobart, Climate and Consultancy Section

A number of submissions were also received from the public.

Acknowledgment

Portion of charts Aus 167, Aus 799 and the hydrographic survey chart, adjusted to tide, reproduced by permission of the Hydrographic Office, RAN.

Note:

Times, unless otherwise stated, are given in Australian Eastern Standard Time (AEST).

Narrative

General information

Iron Baron was a standard five hold, geared bulk carrier, with accommodation and bridge located aft, built in 1985 at the Kurushima Dockyard at Onishi, Japan. The vessel was owned by Wallaby Shipping SA of Panama and operated under a five year demise charter by BHP Transport Pty Ltd.

The vessel had an overall length of 188.02 metres, a beam of 28.01 metres and a summer deadweight of 37,557 tonnes at a draught of 10.88 metres. The distance from the bridge front to the bow was 150 metres. It was equipped with four cargo cranes, located on the centre line between the cargo hatches. The vessel was powered by a Sumitomo Sulzer six cylinder diesel engine, developing 6803 kW, driving a single shaft and controllable pitch propeller.

The vessel's navigation equipment included two radars: a Kelvin Hughes Nautilus 6000 with ARPA, and an Anritsu ARG.56.SA-1013 10 cm, fitted with a reflector plotter for collision avoidance and coastal navigation purposes.

In common with the majority of bulk carriers, Iron Baron carried most of the heavy fuel oil bunkers in double bottom tanks located beneath the cargo holds. On Iron Baron the fuel oil tanks were nos. 2 and 4 centre double bottom tanks, either side of the duct keel. In addition, heavy fuel oil was carried in

no. 6 starboard double bottom tank in the engine room. Diesel oil bunkers were carried in no. 5 centre double bottom tank starboard (no. 1 diesel oil tank) and in no. 6 port double bottom tank (no. 2 diesel oil tank) in the engine room.

The vessel was in possession of valid international safety certificates. Between 16 March and 23 June 1994, Nippon Kaiji Kyokai carried out an enhanced special survey, which included extensive structural thickness testing and after which a number of frames were renewed during drydocking in Hong Kong in June 1994. In June 1995, Det Norske Veritas carried out a 'Class Entry' survey at Newcastle, NSW, for acceptance for classification and certification by that society, and which included some structural thickness testing. The vessel had also undergone an annual survey of safety equipment by the Australian Maritime Safety Authority (AMSA) in January 1995.

The vessel was normally manned by an Australian crew of 18, comprised of a master, three mates, four engineers, seven integrated ratings (IR's) and three catering staff.

The Master, in command on 10 July 1995, was appointed to the vessel as a newly promoted master at Port Kembla on 5 May 1995. He had previously served one six-week tour of duty on the vessel, as Mate, towards the latter end of 1994. The call at Bell Bay on 10 July was to be his first visit to the port for a number of years.

The Mate joined Iron Baron at Port Kembla on 8 July 1995, his first

appointment to the vessel. He had visited the port of Bell Bay on a number of occasions, as Mate on vessels, most recently on his previous ship.

In June 1995, two trainee integrated ratings, who had just completed the 19-weeks induction course at the Australian Maritime College, were appointed to the vessel and, on 8 July 1995, a member of the BHP Transport office staff joined the vessel at Port Kembla, as a supernumerary, for a shipboard familiarisation voyage.

The incident

Iron Baron had loaded a cargo of manganese ore at Groote Eylandt, in the Gulf of Carpentaria, for discharge at Port Kembla and Bell Bay. The vessel sailed from Port Kembla, after discharging the cargo from nos. 1 and 4 holds, at 2030 on 8 July. In accordance with normal on board practice, the 2nd Mate had prepared a passage plan for the voyage 'pilot to pilot'.

The vessel arrived and anchored off the River Tamar, in a position with Hebe Reef beacon bearing 216° at 1.7 miles, at 1057 on 10 July 1995, ready to discharge the remaining cargo of 23,896 tonnes, contained in holds 2, 3 and 5. The draught was calculated as being 9.09 metres forward and 10.00 metres aft. The Master was advised by Port Control that the Pilot would board at 1930, to berth the vessel at the TEMCO terminal, Bell Bay, on the evening high tide.

The predicted time of high water at Georgetown was 2057, with a

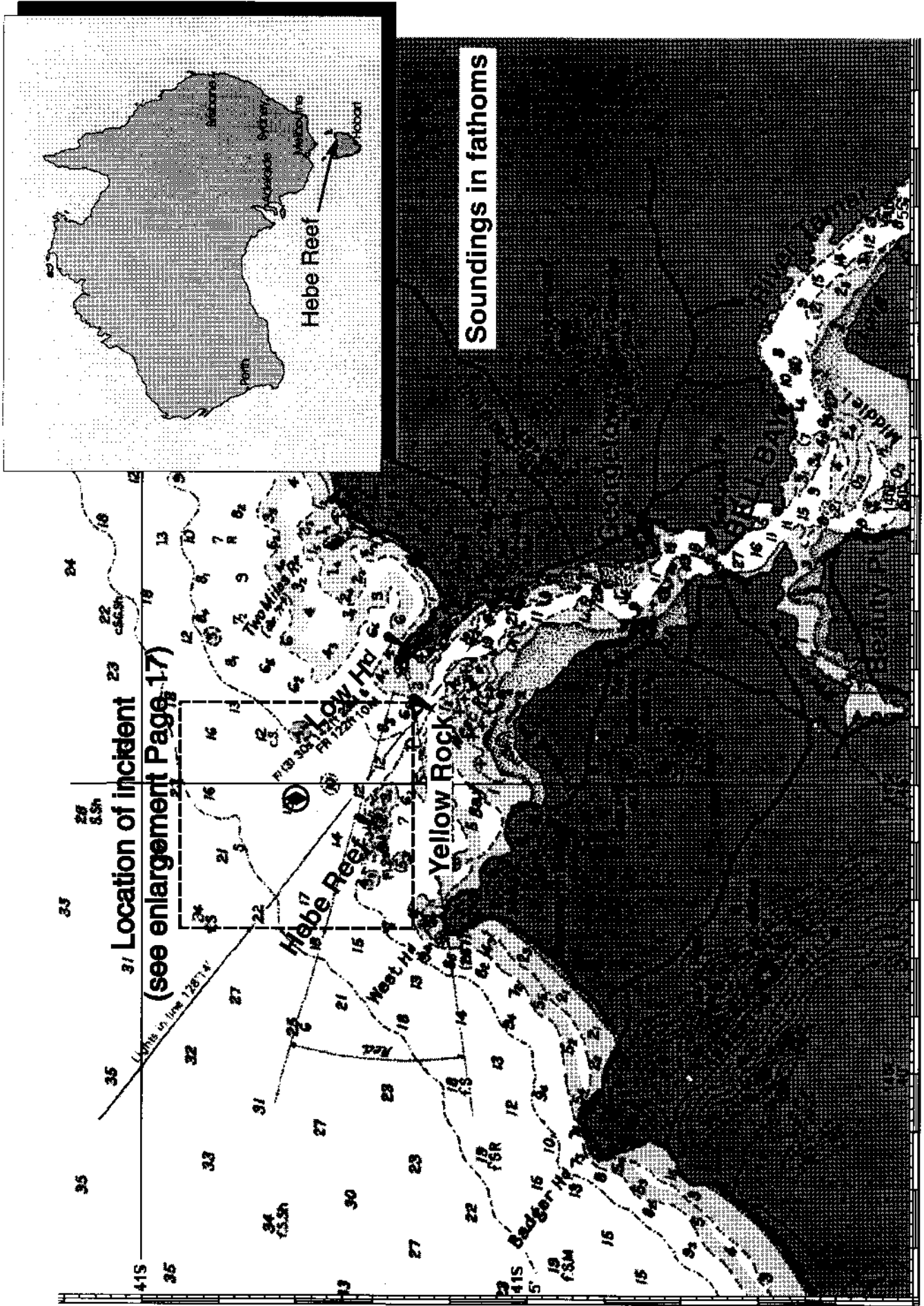
predicted height of 3.5 metres above datum. The rate of flood at the entrance to the river reaches its maximum at half tide. Because during its first call at Bell Bay in March 1990, Iron Baron exhibited a pronounced sluggishness in steering at deep draught in shallow water with a following tide, the vessel was restricted by the Port Authority to entering the river during the last hour and a half of the flood tide.

The vessel had on board 543 tonnes of heavy fuel oil and 53.5 tonnes of diesel oil (See Attachment 1).

Normal sea watches were maintained whilst the vessel was at anchor, the vessel lying quietly to the north-westerly wind, which freshened slightly, from force 4 (11 to 16 knots) to force 5 (17 to 21 knots), during the afternoon. The day was overcast, but fine with good visibility, although showers developed during the early evening.

Sunset that evening was at 1700. Sometime later, a heavy rain squall passed through, which obscured a large inbound vessel both visually and on the radar. After the rain had cleared the Mate was unable to identify any echo of the inbound vessel on the radar, although Hebe Reef beacon and other targets were displayed.

Systems and controls were tested at 1800, in preparation for getting under way at 1900, the 3rd Mate going to the bridge to assist the Mate. The variable pitch propeller control, the steering gear and echo sounder were all tested, clocks were synchronised and the course recorder switched on and



Section of chart Aus 799 – showing entrance to River Tamar

aligned. The inboard of the two radar sets, the Anritsu, was checked, having been switched on and in use all the while the vessel had been at anchor, but the Kelvin Hughes radar set was not operational, necessary spares being awaited from the UK. The engineers test-ran the main engine. Also, contact was made with Port Control to confirm the time of the pilot boarding.

The anchor party, comprised of the 3rd Mate, the Chief IR and one of the trainee IRs, went forward shortly before 1900, going first into the forecabin space to switch on the motors for the windlass. On the bridge were the Master, the Mate, the watch IR and the other trainee IR. The Mate stationed himself at the main control console, to starboard of the centre line, to operate the propeller pitch control, while the trainee IR's duty was to write up the bridge note book. The Supernumerary also went to the bridge, to observe.

At this time the wind was from the north-north-west at 20 to 25 knots and there were frequent rain showers.

Instructions were given to the anchor party to start heaving at 1859; the anchor cable was leading out on the starboard bow, with only moderate weight, and came in easily. At 1905, the Pilot Station called on VHF to see if Iron Baron was under way and to inform the Master that the Pilot was on his way. The Master advised the Pilot station that the vessel was not yet under way, that they were heaving on the anchor and that the pilot ladder would be on the port side.

The engine was put on stand-by at 1906 and the anchor was aweigh at

1913. As soon as the anchor was aweigh the Master ordered slow ahead and hard a'port, and brought the ship around to head towards the pilot boarding position, lining up on Hebe Reef beacon. Once lined up on the beacon, on a heading of 200°, he changed the radar from the 6-mile to the 3-mile range, noted the distance of Hebe Reef beacon as being 2.6 miles, giving a distance of 1.5 miles to the pilot boarding position, and reduced speed to dead slow ahead.

The Master manoeuvred the ship towards a position one mile from Hebe Reef beacon, adjusting the course to starboard, first to 205°, then to 210°, to improve the lee on the port side for the pilot launch. He ordered 'stop' at 1927, but because the bow fell away to starboard, even though the helmsman had the wheel hard to port, he asked for minimum steerage pitch. Despite this, the bow continued to fall away to starboard, which fact was reported to the Master by the helmsman.

As the pilot launch made its final approach, the Master looked at the main entrance leads and saw that they were still open to the north (rear lead light to the left of the front lead light) and, as the Pilot climbed the ladder, he checked the radar distance off the beacon, using the variable range marker (VRM) and noted that it was 8 cables. Although inside the one mile distance off the beacon that he had aimed for, he felt this was not a problem. The Pilot was on board (on the deck) at 1933 and as soon as the launch was clear of the ship's side the Master ordered 'dead slow ahead and hard a'port', to bring Iron Baron around onto the leads, which at that time he observed as being just open to

the north. Hebe Reef beacon, at this time concealed from the Mate at the control console by the cargo cranes, was about two points on the port bow with the ship's head on about 235°.

Climbing aboard, the Pilot had considered that Hebe Reef beacon light seemed very close. He was met at the top of the ladder by the 2nd Mate and taken to the bridge, where the Master informed him the vessel was closer to the beacon than he would have liked, that the wheel was hard to port and the speed at dead slow ahead. The Pilot sensed that the vessel 'was not swinging very quickly' and checked the rudder angle indicator, which confirmed the rudder was hard to port. He told the Master that the vessel was too close, that they needed to turn the vessel faster. He then went to the port bridge wing to visually assess the position, calling for full ahead as he went. The Master immediately countermanded this with half ahead, at 1935, followed by full ahead, at 1936, this being the onboard procedure for increasing from slow to full speed.

Unable to see the main entry leads, obscured by rain, the Pilot collected some binoculars from the wheelhouse. With these he was able to make out the leads and saw that they were open to the south (rear lead to the right of the front lead), with the front lead just to the west (to the right) of Yellow Rock beacon. He remarked that the vessel was too close to Hebe Reef beacon. Although Iron Baron was turning to port, Hebe Reef beacon was still on the port bow and the Pilot felt that the vessel would ground in the shallows on the east side of the reef. He had no time to fully assess the situation, but

felt that there was a better chance in turning to starboard and ordered 'hard a'starboard', going to glance at the Anritsu radar as he did so, but this appeared to be on stand-by. The order for 'hard a'starboard' was given between those given by the Master for half ahead and full ahead.

The Pilot's order of 'hard a'starboard' took the Master by surprise, but he accepted the Pilot's experience, and went to look at the radar, which indicated the distance off Hebe Reef beacon as being 5 cables. The speed indicator on the bridgefront bulkhead showed a speed of five knots. With the rudder hard to starboard and with increased propeller thrust the swing to port stopped, at which time Hebe Reef beacon was right ahead, or just fine on the starboard bow.

Iron Baron swung quickly to starboard, but then there was a slight bump. The Master advised the Pilot that the vessel had touched bottom and the Pilot asked the helmsman if the vessel was still swinging, and received confirmation that it was. There was then a second, grating, bump and the Master remarked to the Pilot that Iron Baron was aground. The Master stated he then heard the Pilot remark: 'I was disoriented and because of the blackness I thought the light was further away than it was.' The Master stopped the engine, first putting the propeller pitch control to slow ahead, at 1938, and then to stop at 1939. While reducing the propeller pitch, the Master asked the Pilot to advise the Port Authority and to request tug assistance. The Port Control radio log showed the time of the Pilot's call as being at 1939. Hearing the report, the

pilot launch coxswain turned the launch about and proceeded back to the vessel, to stand by in case the launch was needed.

Iron Baron had grounded on a heading of 265° in a position 1.8 cables (333 metres) north of Hebe Reef beacon.

As soon as the Pilot was on board, the anchor party had gone down to the forecastle space to switch off the windlass motors, having hove the anchor home and having put it on the brake ready for letting go. As they started back to the forecastle deck there was a sudden rumbling sound, which sounded to them as though one of the anchors was running out. They ran up to the forecastle head, found that the anchors were still secure, and realised that the vessel had run aground.

Looking over the bow, the 3rd Mate noticed that the top of the bulbous bow was much higher out of the water than it should have been. He called the bridge on his UHF radio and the Mate confirmed that Iron Baron was aground.

Almost immediately, air was heard whistling in the forepeak tank air pipes. As the forepeak tank had been full of water ballast, this indicated to them that the ballast was running out and drawing air in, showing that the tank had been holed. However, this information was not passed to the bridge. A few minutes after arriving back on the forecastle from switching off the windlass motors, and at a time recorded on the bridge as 1943, they received the order to let go the starboard anchor. Although the brake was fully opened, the anchor ran to just one shackle. Sometime later, the 3rd

Mate was asked to read the forward draught and, with the aid of his torch, he was able to ascertain the draught as being 8.2 metres.

The 2nd Mate, after escorting the Pilot to the bridge, had gone to his cabin before going on deck to supervise the restowage of the pilot ladder. While in his cabin he had felt the ship shudder, as if hit by a large swell, and this was followed by another such shudder. He went down to the pilot ladder, adjacent to no. 4 cargo hatch, and could hear grating sounds. He immediately notified the bridge by UHF radio and instructed the IRs, who were on deck to stow the pilot ladder, to collect sounding rods and to sound nos. 3, 4 and 5 double bottom tanks, port and starboard.

Although no alarms sounded, the engineers were alerted by an unusual roll of the vessel, an increase in the engine load and the dropping of the engine speed to just above the critical area.

Both the Master and the Mate were of the opinion that Iron Baron had grounded more towards the after end, abaft mid length, rather than forward. The Master advised the engineers that the vessel was aground and attempted to refloat the vessel by going astern, there still being an hour and a half before high water. He went astern in easy stages, the first attempt being at dead slow astern between 1942 and 1944.

The Chief Engineer, mindful of the centre double bottom fuel oil tanks, detailed the 4th Engineer to check the bunker tank soundings. These checks

indicated that no. 2 port and starboard and no. 4 port fuel oil double bottom tanks were all taking in water.

In accordance with company standing instructions, the Master made contact with the BHP Transport's Incident Management Team in Melbourne.

About 10 minutes after the 2nd Mate and IRs started checking the ballast tank soundings, air was heard venting from no. 4 port double bottom tank and a check sounding confirmed that tank to be filling with water. To counteract the loss of buoyancy due to the bilging of no. 4 port double bottom tank, the dump valves were opened on no. 4 upper wing tanks, to drop the ballast water from those tanks. Some time later, air was heard venting from no. 3 port double bottom tank, and then air and some oil started flowing from the bunker tank air vent pipes between nos. 3 and 4 hatches. The 2nd Mate organised the IRs in collecting absorbent material to soak up and retain the oil. When they had done this task they received instructions to make the tug fast aft.

The tugs York Town and Gawler arrived on the scene at about 2030, by which time the wind had increased to 30 knots, gusting to 45 knots from the north-north-west. York Town, a twin screw tug with a 40 tonnes bollard pull, was made fast aft at 2048, using the tug's own towing rope. The skipper of Gawler, a single screw, single rudder tug with a bollard pull of 19 tonnes, but which did not have a towing rope, manoeuvred that tug stern first to the starboard bow to take a bow line from the vessel. The three metre to four metre swell made manoeuvring

the tug difficult and caused the tug to pitch heavily; the deckhands were lifted off the deck as they held on to Iron Baron's line and the tug almost broached-to, so the skipper had to abort the first attempt to pick up the line. Before Gawler moved in for a second attempt, the Iron Baron forecandle party flaked 60 metres of line on deck, before lowering the eye to the water.

At this time, oil was noted on the port side of the vessel. The Master asked the Pilot to notify the Port Authority, while he advised the BHP Transport's Incident Management Team, the latter taking responsibility for informing the Maritime Rescue Coordination Centre (MRCC), Canberra. The Master then discussed the pollution situation with the Chief Engineer and the Mate, to consider if the fuel oil could be transferred from the ruptured tanks, but it was decided that only seawater would be pumped. The Chief Engineer considered breaking the seals on no. 4 double bottom fuel oil tank lids, and so allow the fuel oil to seep into no. 4 hold, but from previous experience of removing tank lids in no. 2 hold, decided that it would take too long and so did not discuss or pursue this idea.

Gawler successfully picked up the forward line at 2107 but, because of the heavy pitching, before the weight could be taken on the line it snagged on top of the tug's rudder and could not be freed, with the result that the Chief IR was instructed to cut the line at the bitts. Gawler then had to proceed to its base at Beauty Point for the line to be cleared, and so could no longer assist Iron Baron.

MRCC Canberra received notification of the incident at 2135.

Attempts to refloat Iron Baron continued, using full astern pitch and York Town pulling under full power. However, the tug's tow line parted twice and after the second occasion, at about 2145, because the tide was by that time on the ebb, it was decided to cease the attempts to refloat the vessel.

The Master then ordered the lifeboats to be lowered to the embarkation level and, when this was done, he sounded the general muster alarm to assemble the crew at the after end of 'C' deck. Conditions on board were becoming uncomfortable, the waves breaking against the vessel's side causing it to jolt and shudder.

At about 2230, the Master decided to disembark the two trainee IRs and the Supernumerary to the pilot launch. While the pilot ladder was being rigged the 2nd Mate heard air blowing from no. 5 port double bottom tank vent pipes, which indicated that that tank, too, had been breached. The two trainees and Supernumerary were disembarked at 2239, followed by the Chief Steward, Chief Cook and Crew Attendant at 2258.

The engineers had made preparations in case the engine room became flooded. A connection was made to allow the main generators to be cooled using the emergency fire pump and a fire hose, the connection being placed in the control room, ready for use. The easing gear on the boiler safety valves was 'tied down' to release the steam pressure and the firing unit switched

off, but later, after discussion with the salvors, the boiler was put back into operation, to keep the main engine fuel oil at the required operating temperature. The main engine was left in the 'ready to start' condition for later use, should it be required.

With the falling tide and increasing wind and sea conditions, the movement of the vessel became increasingly violent and there were fears that the signal mast would topple after the two starboard stays parted. The remaining crew were therefore moved to the main deck, on the port side forward of the bridge. Shortly after midnight, the Master decided to disembark the IRs, the 3rd Mate and the 3rd and 4th Engineers. He told the Pilot that he could disembark too, but asked him to stay, to assist with communications with the Port Authority, and the Pilot agreed to remain on board.

Three representatives of United Salvage Company boarded the vessel at 0045 on 11 July and, after discussions with the Master and after assessing the situation, asked for the 3rd Engineer, the Chief IR and two other IRs to return aboard to assist with soundings and other tasks. The 3rd Engineer, the Chief IR and two other volunteers reboarded at 0123.

The motion of the vessel became really violent, with movement about the vessel difficult, personnel being thrown across the wheelhouse and the engine control room. The salvage company representatives asked for the vessel to be ballasted down, to settle it firmly on the reef, and ballasting of the upper wing tanks commenced at 0200, at

which time the duct keel was found to be flooded.

Although waves were breaking over the starboard side, the 2nd Mate, accompanied by the Chief IR, continued to check soundings on the port side of the deck. The cargo holds, at this stage, remained free of water. The time of predicted low water was at 0347, with a height of 0.5 metres above datum, a drop of 3 metres and, firmly aground, the vessel racked and shuddered violently.

Shortly after 0600, the 2nd Mate and one of the salvage company representatives, while closing the upper wing ballast tank valves on completion of ballasting, discovered fractures and buckled plating between the cargo hatches.

Fearing that Iron Baron was starting to break up, the Master ordered the vessel to be abandoned. All those remaining on board - the Master, Mate, Second Mate, Chief Engineer, 2nd Engineer, 3rd Engineer, Chief IR, the two IRs, the Pilot and the three salvage company representatives – were taken off safely by the crew of the pilot launch by 0719 on 11 July 1995.

Salvage

Iron Baron was eventually refloated by the salvors on 16 July 1995 and towed to an anchorage position north of Low Head. At the anchorage, the main engine, all auxiliaries, the steering gear

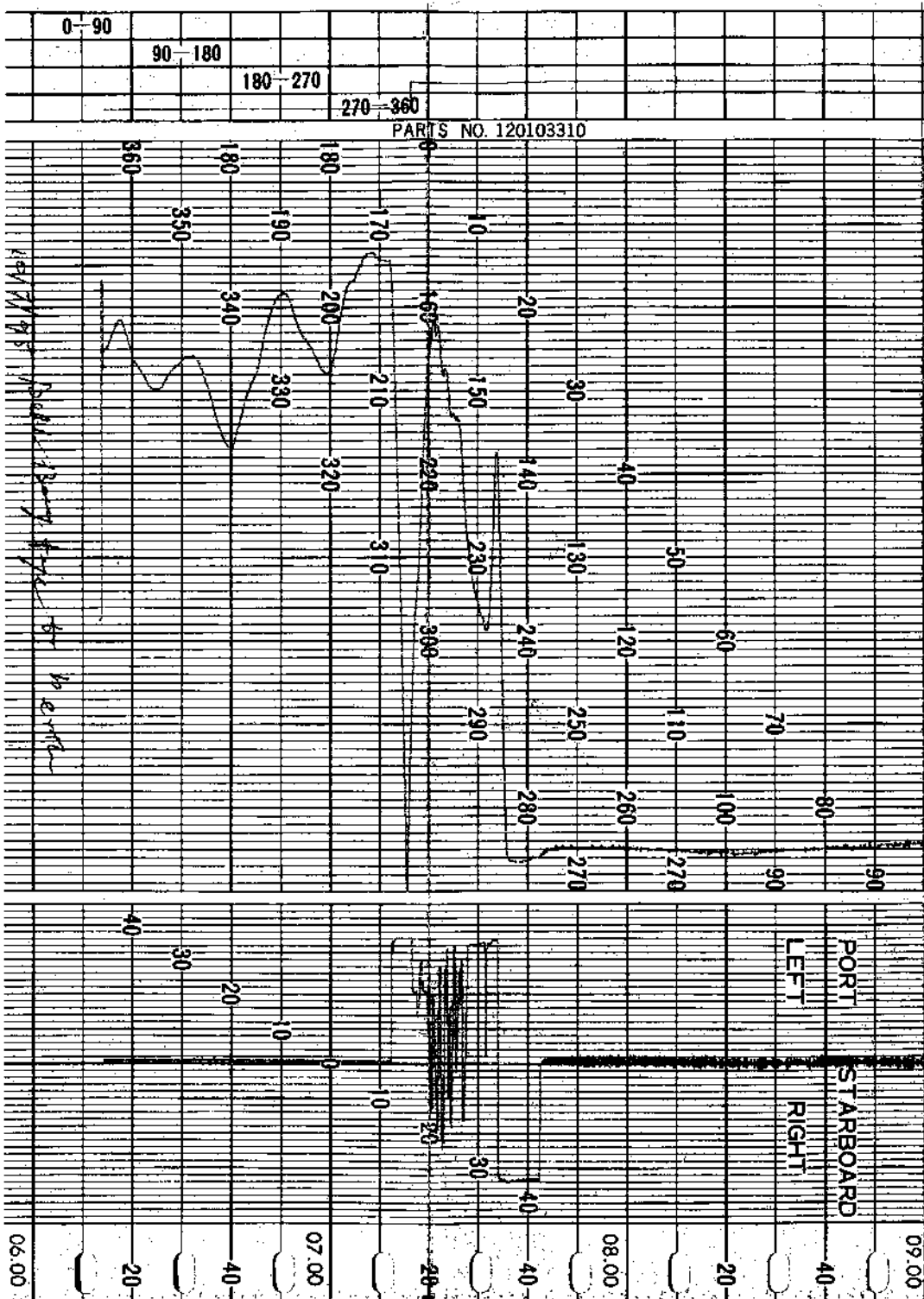
and all system controls were tested and found fully operational.

Thorough inspection by divers revealed that all of the vessels double bottom tanks, the fore peak and the duct keel had all been ruptured and flooded. No.4 hold had also been flooded, through damaged bilge suction hat boxes.

Although most of the vessel's 543 tonnes of heavy fuel oil and 53.5 tonnes of diesel oil had escaped, it was estimated that about 70 tonnes of heavy fuel oil still remained in the damaged double bottom tanks, about 40 tonnes of which were recovered.

Due to the severe damage to the vessel and because of the perceived possibility of the vessel breaking in two and blocking the port, and the possibility of further oil pollution, the Port of Launceston Authority refused entry for the vessel to enable the cargo to be discharged at Bell Bay.

With port entry denied and the impracticalities of discharging the cargo to another vessel in an open anchorage, the conclusion was reached that the only remaining option was to scuttle the vessel, with its cargo, in deep water. With permission to scuttle the vessel granted by the Commonwealth Department of the Environment, Sport and Territories, Iron Baron was scuttled in 4000 metres of water 60 miles east-north-east of Flinders Island on 30 July 1995.



Comment and Analysis

General

From the time of weighing anchor to the time of the grounding, the steering system, the main engine, the power supply system and the propeller pitch control all operated normally, there was no mechanical or systems failure that either caused, or contributed to the grounding.

Comparison of the course recorder chart times with those recorded in the bridge note book indicate that the course recorder times are 1.5 minutes behind actual time. This has been allowed for in the analysis.

The time of the actual grounding was not recorded in the bridge note book. However, the time recorded for the reduction from full to half ahead, after the grounding, was 1938, indicating the grounding occurred shortly before 1938.

The only positions for Iron Baron recorded and plotted on the chart are the anchorage position (Hebe Reef beacon bearing 217° at 1.6 miles) and the grounding position (Hebe Reef beacon bearing 179° at 1.8 cables).

When the Pilot ordered the wheel to be put hard to starboard, at 1935¼, Hebe Reef beacon, very fine on the port bow, would have been bearing approximately 217°.

In the absence of any further positions, the events leading to the grounding have been reconstructed from the course recorder, the bridge note book and the evidence and submissions of those involved.

Analysis of the course recorder chart

Analysis of the course recorder chart shows that the wheel was ordered hard to port at 1913½, after the anchor was aweigh, and the vessel started to swing to port from a heading of 345°. Nine minutes later, at 1922½, the vessel steadied on a heading of 202°. After a further minute course was adjusted to 208° and then to 213°, then remained on that heading for two minutes. From 1927¾, the heading changed steadily to starboard to 239° at 1933, the time the Pilot boarded, when the wheel was ordered hard to port.

The vessel then turned to port, at a rate of 9¾ degrees/min, to a heading of 217° at 1935¼. At this time the wheel was ordered hard to starboard and the vessel started to turn to starboard at a rate of 24½ degrees/min. A sudden decrease in the rate of turn at 1937¼ indicates the possible time of the initial bottom contact and a cessation of turn at 1937¾ indicates the time of grounding.

Evidence of the pilot launch coxswain

The coxswain of the pilot launch stated that the operation to put the Pilot aboard, once the launch had arrived at Iron Baron, took between two and three minutes, as it took two attempts

to get alongside. On this point, the Pilot stated that he considered the time factor to be between one and two minutes.

While manoeuvring to the pilot ladder, the coxswain said that he looked at his log, which indicated the speed as being 7.6 knots, although at that point he may have been 'catching up'.

He also stated, that once clear of Iron Baron, after putting the Pilot aboard, he lined up between the entrance beacons, but at first was unable to pick out the leads. When he did pick out the leads, they were well open to the west (rear lead to the right of the front lead) and west of Yellow Rock beacon.

Consideration of the Master's account

When the anchor was aweigh, at 1913, the Master ordered the wheel to be put hard to port and the engine to slow ahead. He then brought the ship around from a heading of 345° to one of 202° at 1922½, at which time, according to the Master, Hebe Reef beacon was right ahead at a distance of 2.6 miles by radar, giving him 1.5 miles to go to the pilot boarding point depicted on the chart.

However, the position 2.6 miles 022° from Hebe Reef beacon is 1.1 miles due north of the vessel's anchorage position. The vessel's manoeuvring information indicates that in calm conditions, the advance during a wheel hard over manoeuvre at slow speed is 2.48 cables (460 metres). From a standing start and turning hard to port at slow ahead, with the wind from the

north at 25 knots and the tide on the flood, it is considered that Iron Baron could not have arrived at such a position on a heading of 202°. To have done so would have required a different manoeuvre and an average speed in excess of 10 knots. Also, from that position, it would have required an average speed of 10.87 knots to arrive at the position where the Pilot ordered the wheel hard to starboard.

It is considered more likely that either the distance off the beacon was 1.6 miles, or the distance taken off the radar was the distance off the land, which would have been showing on the radar right ahead at about that distance, giving a distance off the beacon of 1.3 miles.

According to the Master, when the Pilot was on the pilot ladder, just before 1933, the distance off Hebe Reef beacon by radar was eight cables and when the Pilot ordered hard to starboard the distance was five cables at the minimum. On the track most probably being made good by Iron Baron, as the result of the northerly wind and flood tide, the speed required between those two points is a little over seven knots. However, the average speed then required from the latter point to the grounding position is a little over 10 knots.

The speed, as indicated by the log, at the time the Pilot ordered hard to starboard was said to be five knots. The wind at this time was still west of north at about 25 knots and therefore there would still be a driving effect to the south. The direction of the flood tide close north of Hebe Reef is not

known, but may be similar to that south of the reef, that is westerly.

It is considered probable that the point at which the Master noted the distance off the beacon as being eight cables was when the pilot launch made its initial approach, rather than when the Pilot arrived on deck about three minutes later, that being the point at which the beacon was a minimum five cables off.

With Iron Baron in a position five cables from Hebe Reef beacon, the lead lights would have been barely open, with the rear lead light immediately to the right of the front lead light and well to the left of Yellow Rock beacon light.

Consideration of the Pilot's account

When the Pilot arrived on the bridge he spent little time in introductions and confirming that the rudder was hard over to port and that the vessel was swinging to port, before proceeding to the port bridge wing to ascertain the vessel's position relative to the leading lights.

At 1935¹/₄, when he viewed the main leads, they were open to the south (rear lead to the right of the front lead) with the front lead just to the west of Yellow Rock beacon. This provides a bearing of 124³/₄° and places the bridge of Iron Baron 3.3 cables from Hebe Reef beacon, at that time bearing about 217°. The distance from this point to the grounding position, an advance of 1.9 cables (352 metres) and a transfer of 1.2 cables (222 metres) is 2.1 cables

(389 metres), requiring an average speed of 5.04 knots.

It is considered that the position of Iron Baron at 1935¹/₄ was as stated by the Pilot.

Attributed 'statements'

There is dissension over what was said by the Pilot after taking the con and immediately after the grounding.

The Master submitted that the statements attributed to the Pilot, after boarding, about the closeness to Hebe Reef were not correct. At no stage during the incident was he more than one metre away from the Pilot and had such statements been made he would have shown more urgency in regard to any decisions. For example, he would not have gone to full ahead in two stages, but would have gone straight to full ahead.

In his submission, the Pilot categorically denied ever saying he was disoriented. After the grounding he did reflect that the ship may have been closer to the reef when he boarded than was his initial impression, but could not recall whether or not he spoke his thoughts to the Master. However, he was never disoriented and would never have suggested that he was.

The Pilot's comment about closeness to Hebe Reef, on first taking the con, was substantiated by a third person on the bridge. But there was no substantiating evidence in support of any comment by the Pilot, after the grounding, about his being disoriented.

Reconstruction

Apart from the anchorage position and the grounding position, the only other position that can be readily identified with any degree of accuracy is the position at 1935¼.

The Master was insistent that the leads were still open to the north when the Pilot boarded. The distance from the line of the leads to the position where the Pilot ordered hard to starboard is 2.1 cables, requiring a speed of 5.6 knots within the time frame of 2¼ minutes, whereas at a speed of 7.6 knots, as noted by the launch coxswain, the vessel would have been 0.6 cables (111 metres) north of the leads. It is considered that the bridge of Iron Baron was still north of the leads when the Pilot boarded, but only marginally so, while the bow was probably close to being on the line of the leads. At this time the vessel was heading across the line of the leads at an angle greater than 90° (111°), towards the north-western point of Hebe Reef.

When the Master steadied the vessel on Hebe Reef beacon, after the turn to port from the anchorage position, he reduced to dead slow ahead, at 1922, then ordered stop at 1927, followed by the order for 'minimum steerage pitch'. At five knots, Iron Baron would have travelled 3.75 cables between 1922½ and 1927, then at four knots (minimum steerage speed) would have travelled a further four cables to the time the Pilot boarded at 1933.

Detailed information of the tidal rates is not available, but the rate for spring flood tides is noted on the chart as

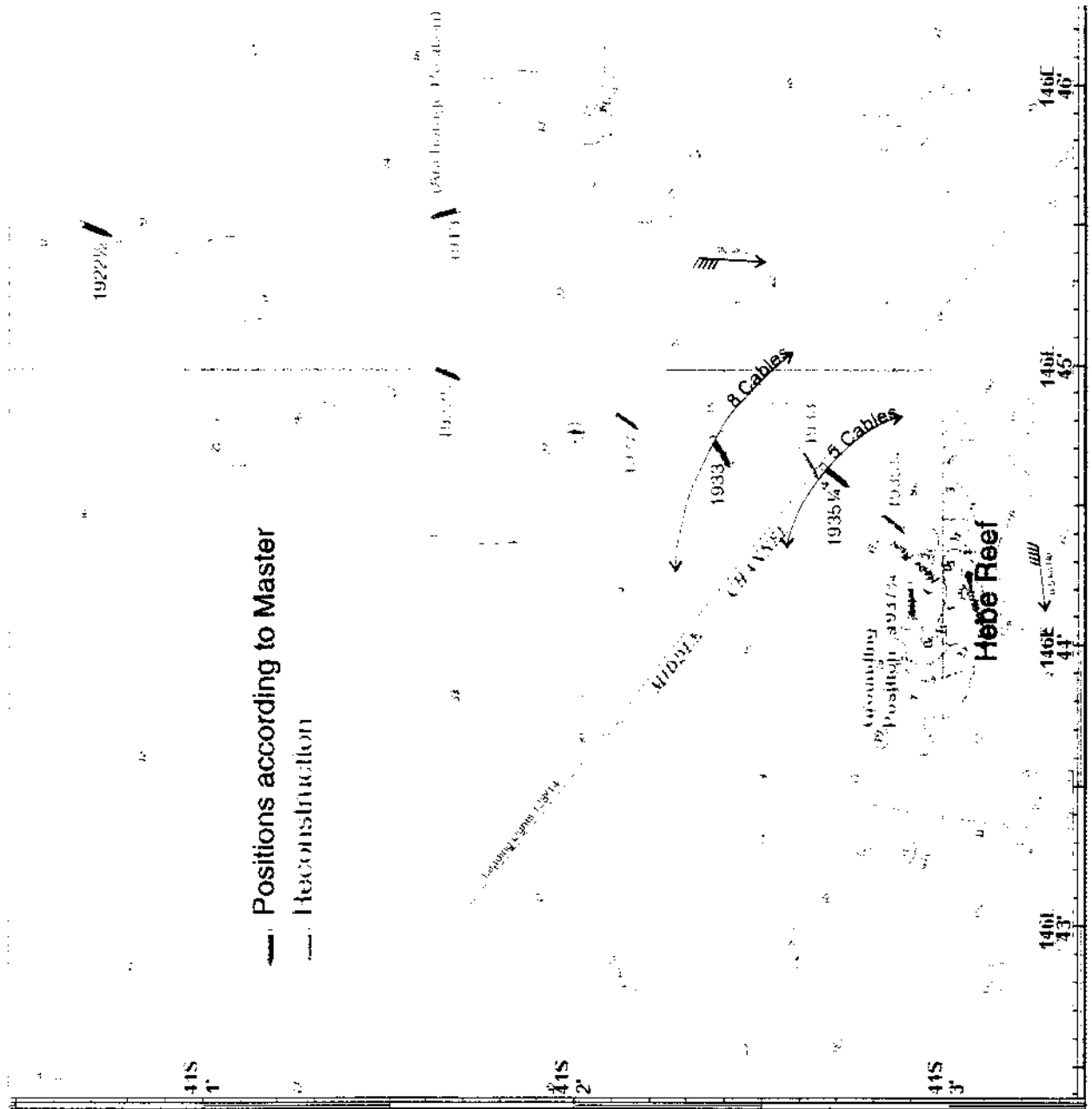
being one knot, running south. The effect of the 25 knots northerly wind would have varied, increasing as Iron Baron presented a broader aspect. An estimation of the combined effect of the wind and tide of 3 cables during the 10½ minute period is probably reasonable. This provides for a distance travelled by Iron Baron between 1922½ and 1933 of 10.75 cables and equates to an average speed of 6.14 knots and to a distance off Hebe Reef beacon at 1922½ of 1.6 miles.

From the reconstruction, Iron Baron was at the pilot boarding position at 1926 and moving in a southerly direction at the rate of one cable (185 metres, or one ship's length) every minute. Thus the vessel advanced about four cables between the time of arriving at the pilot boarding position and the time of the pilot launch arriving, and a further two to three cables while the Pilot was boarding.

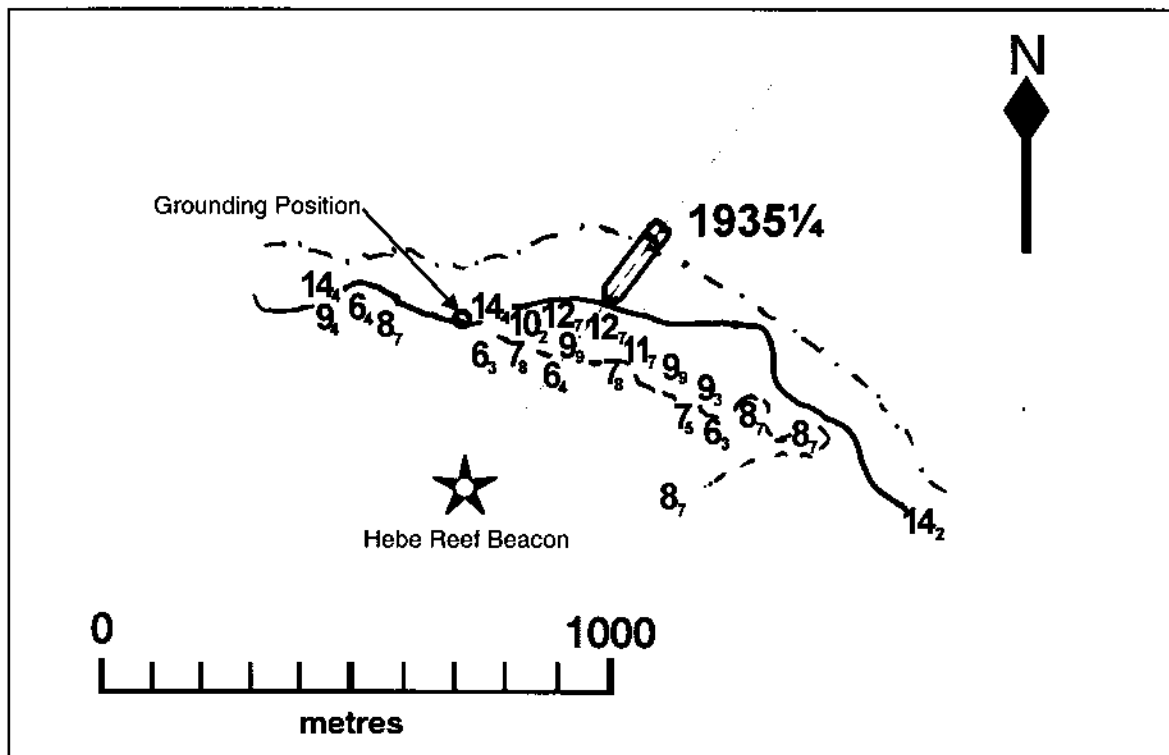
Consideration of the Pilot's actions

To get to the bridge from the pilot ladder position on the main deck, the Pilot had to walk some 75 metres, pass through three doors and ascend four flights of stairs. The Pilot stated that the time taken to reach the bridge was between one and two minutes and an allowance of 1½ minutes is probably reasonable, in which time Iron Baron would have advanced a further one and a half cables and which provides a time frame of only ¾ minute for introductions and assessment.

When the Pilot arrived on the bridge of Iron Baron, he was concerned at the



Part of chart Aus 167 -- reconstruction of incident



**Water depths at the time of the grounding
(based on the RAN survey chart of 1966)**

vessel's close proximity to Hebe Reef beacon and ordered full ahead, to increase the rate of swing to port. When he saw that the main leads were open to the south and just to the west of Yellow Rock beacon, he feared that the vessel would ground in the shallows to the east of Hebe Reef beacon, but was confident that he could clear the reef by going to starboard.

From previous pilotage experience of Iron Baron (he had piloted the vessel on a number of the vessel's previous 15 calls at the port) and the time required to attain astern pitch, the Pilot did not believe ordering full astern and the use of anchors to be an option open to him and dismissed the idea instantly.

At 1935¼, the bow of Iron Baron was only a matter of metres from the 10-metre depth contour on the north

side of Hebe Reef, however, at this time the tide was 3.2 metres above datum. Had the swing to port been maintained, Iron Baron would most probably have grounded, bow on, within one minute, on a heading of about 210°.

It is considered that the Pilot had been placed in an invidious position and, without time to check the vessel's position on the chart, reacted to the situation as he thought fit.

In glancing at the radar, the Pilot had gained the impression that it was on stand-by. With the reflector plotter illuminated, viewed from an angle, the radar could appear to be on stand-by, as the radar screen itself would not be readily visible.

A submission was received suggesting that the Pilot should have realised that

Iron Baron was closing the Hebe Reef and standing into danger. Given that the Pilot was sitting in a small launch that was pitching and rolling heavily and was not himself looking at the radar, which has only a small screen, this suggestion is not considered to be reasonable. As for the coxswain, he steers for the accommodation lights of a vessel, only referring to the radar in poor visibility conditions, or to locate a vessel that has not yet arrived at the boarding position.

Consideration of the bridge procedures

Following the normal on board procedure, one which would appear to be not uncommon in the BHP fleet, the 2nd Mate had prepared the passage plan, primarily as a course and distance table, for the voyage on the 'pilot to pilot' basis. Even so, there was no plan drawn up detailing safety, or limiting distances to be marked on the radar reflector plotter for when picking up the Pilot, such as 1.15 miles from Hebe Reef beacon, 2.45 miles from West Head Peninsular and 2.25 miles from Low Head, or limiting bearings, such as Low Head 127°, the latter providing an ideal indication of when a vessel has reached the pilot boarding point from the north and east.

No plan was drawn up for the move from the anchorage to the pilot boarding point, just 6.75 cables to the south-west, nor was a discussion held to consider the appropriate action to adopt and the appropriate side for the pilot ladder, taking into consideration the wind and tide conditions and the

close proximity of Hebe Reef to leeward.

Before the anchor was aweigh, the Master advised the Pilot Station that the pilot ladder would be on the port side. As the wind was from the north-north-west, this committed him to a south-westerly heading in order to provide a reasonable lee for the pilot launch.

When Iron Baron had been brought around to head towards the pilot boarding point, the Master changed the radar range from the six to the three miles range and checked the distance off Hebe Reef beacon as being 2.6 miles. Based on this, he was under the impression that Iron Baron was 1.5 miles from the boarding point, whereas the distance was no more than 4.5 cables and, from the reconstruction, the vessel arrived at that point at 1926.

Had the manoeuvre been planned, and had appropriate safety distances and bearings been marked on the radar reflector plotter, the Master would have realised that a distance to go to the boarding point of 1.5 miles was too great.

The normal bridge team comprised the Master, the Mate and the helmsman. The Mate's responsibilities under such circumstances normally include checking the vessel's position, adjusting the propeller pitch to the Master's orders, writing up the bridge note book, monitoring for correct response by the helmsman and monitoring the Master's, and later the

Pilot's, actions. On this occasion a trainee IR joined the team, his job being to write up the bridge note book, overseen by the Mate.

The Mate remained by the propeller pitch control, at no time did he move across behind the helmsman to look at the radar, or go to the port bridge wing to take bearings to plot the vessel's position. At no time did he monitor the Master's actions, to ensure they were safe.

As the distance to the pilot boarding point was relatively short, the Master did not think it necessary for the Mate to plot the vessel's position on the chart, and although he did not specifically direct him so, he left him free to instruct and oversee the trainee. He relied purely on the radar for conning the vessel, but did not use the radar to best advantage and, in confined waters, overlooked the distance of the bow from the bridge.

The British Admiralty Sailing Directions state: 'A vessel should wait in the offing, about ½ mile E of the outer leads.' A check position by the Mate, obtained by visual bearings, as soon as Iron Baron had been brought around to the 202° heading at 1922½, would have shown that the vessel was only about 4.5 cables, just over four ship's lengths, from the boarding position.

Hebe Reef beacon is located on the south side of the reef and shoal water extends 2.5 cables to the north-east and 3.5 cables to the east-north-east of the beacon. Even at a radar distance of five cables from the beacon, Iron

Baron's bow would have been only 1.69 cables, or 313 metres, under two ship's lengths, from shoal water. The Master's reliance upon the radar and the variable range marker in particular, in an unplanned approach in darkness, resulted in Iron Baron becoming much closer to the reef than he realised.

When the investigating officers boarded the vessel on 12 July, it was considered unsafe to run the radar scanner in order to test the radar, after the violent shaking the mast had undergone during the night of 10/11 July. However, the Anritsu radar was serviced by a licensed service engineer at Groote Eylandt on 28 June 1995 and was used during the transit of the inner two-way route of the Great Barrier Reef on the passage to Port Kembla. No error in the variable range marker was evident during the passage.

When, at 1935, the Pilot ordered full ahead to increase the rate of turn, this was countermanded by the Master with an intermediate half ahead.

The procedure for adjusting the variable pitch propeller adopted by those on board was to 'stage' increases and decreases between slow and full speed settings through the half speed setting. The reason for this procedure was variously explained immediately after the incident as preventing a stall of the engine and as a precaution against cracking the engine cylinder liners.

The engine is designed to accommodate increases in propeller pitch from slow to full manoeuvring settings and stalling as a result of such

adjustment is improbable. Four years earlier, five cylinder liners had cracked over a six month period, but this was due to a design fault, not to manoeuvring conditions. In January 1995, there was another case of a cylinder liner cracking, which gave rise to the Chief Engineer introducing the procedure. However, according to management, this failure had been anticipated, the engine having six cylinders, and was also due to the initial design fault. Increased loadings on an engine due to changes in propeller pitch during manoeuvring should not be sufficient to cause such damage.

The on board procedure for manoeuvring is considered to have been unnecessary and had the adverse effect of increasing response time to pilots' requirements. It is apparent that, generally, pilots were not advised of the procedure, which was an important omission from the requisite exchange of information.

In this instance, Iron Baron was so close to Hebe Reef that even had the propeller been set immediately at full ahead setting, it is doubtful whether the vessel would have been manoeuvred clear. Although the rate of turn would have been increased, so too would the advance.

Experience and training

The Master had obtained his Master Class 1 certificate of competency, issued by the Australian Department of Transport, in 1985 and had revalidated the certificate as required under Marine Orders part 3. In 1985, he had also

attended an Automated Radar Plotting Aid (ARPA) course.

From early 1986, he served as mate aboard a number of the BHP Transport vessels and was promoted to master and appointed to Iron Baron on 5 May 1995. During his period in command of Iron Baron, the vessel had called at a number of Australian ports and Bell Bay was to be the eleventh and final port arrival before he went on leave. When the vessel had called at Ardrossan, he had conducted the berthing himself, without the assistance of a pilot.

The Mate had obtained his Mate Foreign Going certificate of competency, issued by the Australian Department of Transport, in 1978 and had revalidated the certificate as required. He sailed as mate from 1980 to 1985, however, when he joined BHP Transport in 1986 he had had to revert to sailing as 3rd mate, but was promoted to mate with BHP in 1991. He had sailed on a number of BHP vessels, but this was his first appointment to Iron Baron.

Both the Master and the Mate were appropriately qualified for the positions they held. However, neither had attended a ship simulator course as part of their training and up-dating of knowledge.

Alcohol and fatigue

The BHP Transport 'Alcohol and other drug policy' calls for the strict control of alcohol aboard the BHP vessels, prohibiting the consumption of spirits

and limiting beer supply to four cans per person per day.

The Master was virtually a teetotaler, very rarely consuming alcoholic drinks and he had not done so during his tour of duty aboard Iron Baron. The Mate had spent most of his off-watch period on the bridge, working at, and familiarising himself with the vessel's computer system. The Pilot had spent the morning tending to office duties and had piloted the tanker Australian Spirit outwards in the afternoon.

There is no evidence to suggest that those having responsibility for the safe conduct of the vessel had consumed alcohol during the afternoon of 10 July 1995 and the investigators are satisfied that consumption of alcohol was not a contributing factor to the grounding.

The passage from Groote Eylandt via Port Kembla had been uneventful, with everyone including the Master able to get their normal sleep and rest periods. The Mate had joined the vessel at Port Kembla after a full leave period. On 10 July 1995, the Pilot had commenced duty at 0830, after a weekend off and was well rested. It is therefore considered that fatigue was not a contributing factor to the grounding.

BHP Transport company operational procedure and policy

BHP Transport provides each of their ships with a general Vessel Operations Management Manual and a ship-specific operations manual. The 'organisation' part of the Vessel Operations Management Manual

describes the responsibilities of the master and all other officers in separate sections.

Instructions on 'voyage planning' are contained in both the 'master's responsibilities' section and the 'safe navigation' section of the 'quality, safety and environment protection management' part of the manual, but do not define a 'voyage' for the purpose of planning. In addition, each ship is provided with a copy of the International Chamber of Shipping's 'Bridge Procedures Guide', which devotes a section to 'Passage Planning', and current Marine Notices issued by AMSA, in particular no. 7/1994 – 'Bridge Resource Management (BRM) and Navigational Practice'. The latter, in reference to voyage planning, states:

'It is emphasised that in this context, the term voyage includes the pilotage phases.'

The importance of this statement cannot be over emphasised. The ICS 'Bridge Procedures Guide', the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, and Marine Orders Part 28 all fail to be specific on this point.

The publication 'A Guide to the Planning and Conduct of Sea Passages' (HMSO, London, 1980), in the section on planning states:

'22. ... The detailed plan should embrace the whole passage, from berth to berth, and include all waters where a Pilot will be on board.'

*25. It is unlikely that every detail of a passage will have been anticipated, particularly in pilotage waters. Much of what will have been planned may have to be changed after embarking the Pilot. This in no way detracts from the real value of the plan, which is to mark out in advance where the ship must **not** go and the precautions which must be taken to achieve that end, or to give initial warning that the ship is standing into danger.'*

This publication is specifically referenced in the ICS 'Bridge Procedures Guide'.

It is considered that ship owners should be specific on this point in their operations manuals and also audit shipboard operations for compliance, in accordance with the new International Ship Management Code.

Launceston Port Control and Navigation Aids

Launceston Port Control is purely a radio communications facility. It is not equipped with radar with which to monitor vessels' movements.

The visual navigational aids for vessels approaching the Port of Launceston from the north are Low Head lighthouse, which exhibits a white light with a characteristic group flash three every 30 seconds and visible at a nominal range of 23 miles, and Hebe Reef beacon, which exhibits a white light flashing every two seconds and visible at a nominal range of six miles. Low Head light also exhibits a red light westward, over Hebe Reef, visible from between 082° and 108°.

She-Oak Point fixed red leading lights provide a lead for the main entrance channel on a bearing of 128¼°, visible at a nominal range of nine miles.

The designated pilot boarding area is only 9.1 cables north of the shoal waters of Hebe Reef, thus vessels embarking a pilot during strong northerly winds are very close to a lee shore. None of the existing lights provide, other than by observation of the bearing, instant visual indication that a vessel has moved south of the waiting area described in the Admiralty Sailing Directions. This makes proper planning and a complete understanding of the characteristics of a vessel essential.

The navigational aids are currently under review by the Port Authority with a number of proposals for sectorised leads from a more southerly direction, which should help prevent vessels straying too close to Hebe Reef, and the installation of a racon beacon.

Reporting of the incident

Although the Master requested the Pilot to advise the Port Authority of the grounding immediately it had occurred, advice of the incident was not passed to MRCC Canberra, until 2135.

In order that all appropriate authorities receive timely advice of an incident, it is considered that it would be appropriate for there to be a standard reporting procedure between authorities, in order that a master, who may have different priorities, including the lives and well being of his crew,

does not have to worry about multi-reporting requirements.

The pilot launch crew

Special mention must be made of the role of the crew of the pilot launch. Two coxswains and one crew member were involved in the first 12 hours of the incident.

The pilot launch returned to Iron Baron almost immediately after the Pilot informed the port control office that the vessel was aground. The launch maintained position close to Iron Baron, when possible in the lee afforded by the vessel, between it and the line of breakers on the reef. The coxswain and crewman took it in turns to maintain position so the launch was

immediately available when required by the vessel. The original coxswain remained on duty until 0330 on 11 July, disembarking the non essential crew and transferring the salvage team.

The second coxswain and the crewman returned to the vessel and maintained station, although the lee afforded by the vessel had been lost, as the wind had backed to the west. They successfully took on board all the remaining crew and salvage experts at 0719 on 11 July.

All transfers to and from the vessel had been achieved without injury. The skills necessary to achieve such an outcome in the prevailing conditions over a prolonged period of time, much of it in darkness, should not be underestimated.

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.

It is considered that by the time the Pilot arrived on the bridge and assumed control of the conduct of the vessel the grounding could not be avoided.

The following factors are considered to have contributed to Iron Baron grounding on Hebe Reef:

1. A full passage plan, detailing safe clearing distances and bearings to be used while picking up the Pilot, had not been prepared, and proper management of the bridge resources had not been considered.
2. Due consideration was not paid to the effects of the strong northerly wind and south flowing flood tide when manoeuvring to pick up the Pilot.
3. The vessel's progress was not monitored by plotting positions on the chart.
4. Although navigating by radar, no safety distances or bearings were drawn on the reflector plotter.
5. The Mate did not monitor the Master's actions nor did he check the vessel's position by radar.
6. In relying upon the radar for information on the vessel's position, the Master
 - a) was initially under the impression that Iron Baron was a mile further from the pilot boarding point than would have been the case.
 - b) appears to have made no allowance for the fact that the beacon is located on the south side of the reef, that the shallows extend 2.5 cables north-east of the beacon and that the vessel's bow, 150 metres forward of the bridge, reduced the indicated distance off the reef by almost one cable.
7. The Master and the Deck Officers had not been given specific directions that passage planning was to include pilotage sections.
8. Although the Master was appropriately qualified, he had not been provided with all available training for the safe handling of ships before being appointed to his first command.

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 parts thereof, was sent to the following:

Iron Baron – Master, Mate, 2nd Mate, 3rd Mate, Chief Engineer, Chief IR, helmsman, trainee IRs.

Pilot

Pilot launch coxswain.

BHP Transport – Ship Manager

Written submissions were received from the following:

Master, 3rd Mate, Chief Engineer, Pilot and BHP Transport management.

Where considered appropriate, the text has been amended to more accurately reflect the sequence of events.

Distances off Hebe Reef

The Master maintains that the distances which he quoted are correct, ie, Iron Baron was a minimum five cables off the beacon when the Pilot

ordered the wheel be put hard to starboard at 1935¼.

The Inspector considers that this point has been adequately covered in the text.

Manoeuvring procedure

The Chief Engineer submitted:

'During May 1995, on departure from Port Latta fully loaded and after the pilot had disembarked, the main engine was put on full ahead at relatively low ship speed. The main engine was thus at high load at relatively low operating temperature.

I was concerned at the time and considered that it might reduce the strain for the main engine to increase the load and warm through to operating temperature at a slower rate as we had recently suffered a cracked cylinder liner and I did not want to risk the same happening again.

I subsequently discussed the matter with the master and requested that when we were clear of port, that we increase the main engine load at a lower rate so allowing the main engine to warm through to normal operating temp at a slower rate. This would allow the ships speed to increase to around 6 knots at half ahead and then to full ahead either in one step or by increments, navigational requirements and sea room permitting. I realised that there would inevitably be occasions when this procedure although desirable would not be practicable or possible.'

The Master submitted:

*'My reasons for engine movement to Full Ahead in two stages, was purely on the basis of the helm being hard over at the time, and I did not want to hit **critical load**, which has happened to me in the past.'*

Passage Planning

BHP Transport management submitted:

'Special mention has been made of the Company's failure to include pilotage phases in any reference to passage planning. The necessity of such a requirement is still under debate and is far from achieving any form of consensus at IMO.

An important matter for BHP Transport has been the selection and implementation of Bridge Resource Management training as the most comprehensive passage plan is useless if the navigation personnel are not utilised efficiently'.

Training

BHP Transport management submitted:

'Training is subject to the requirements set by the Australian Government under various Marine Orders in accordance with the STCW Convention. Determining the standards of training is the responsibility of the Australian Maritime Safety Authority.

BHP Transport as a major Australian shipping company, with both Australian and overseas interests, actively contributes and participates in promoting improvements in the training of its own and industry personnel well beyond the requirements of Australian Marine Orders and the STCW Convention.

All the resources of the various nautical training colleges are regularly used including the AMC ship handling simulator when it is available.'

Details of Vessel

Name	Iron Baron
IMO No.	8323745
Flag	Australian
Classification Society	Det Norske Veritas
Type	Geared bulk carrier
Owner	Wallaby Shipping SA, Panama
Operator	BHP Transport, Melbourne
Year of build	1985
Builder	Kurushima Dockyard Co Ltd. Onishi, Japan
Gross tonnage	21,975
Net tonnage	12,358
Summer deadweight	37,557 tonnes
Length overall	188.02 metres
Breadth extreme	28.01 metres
Draught (summer)	10.88 metres
Engine	2SA 6 Cyl Sulzer RTA 58
Engine power	6803 kW
Crew	20 Australian

Oil Quantities on board

Heavy Fuel Oil

No.2 DBs	Port 50t	Stbd 50t
No.4 DBs	Port 240t	Stbd 240t
Service tank		7.5t
Settling tank		5.5t
	Total: 543 tonnes	

Diesel Oil

No.1 tank	38.5t
No.2 tank	9.0t
Service tank	3.5t
Settling tank	2.5t
	Total: 53.5 tonnes

Lubricating Oils

	18,300 litres
Main engine sump	8,500 litres (approx)
	Total: 26,800 litres

Hydraulic oil

Total: 2 tonnes

Breached compartments

Ballast tanks

Fore Peak

1 PDB & 1 SDB

2 PDB& 2 SDB

3 PDB& 3 SDB

4 PDB& 4 SDB

5 PDB& 5 SDB

Heavy fuel oil tanks

2 PFO & 2 SFO

4 PFO & 4 SFO

6 S

Diesel fuel oil tanks

No.1

No.2

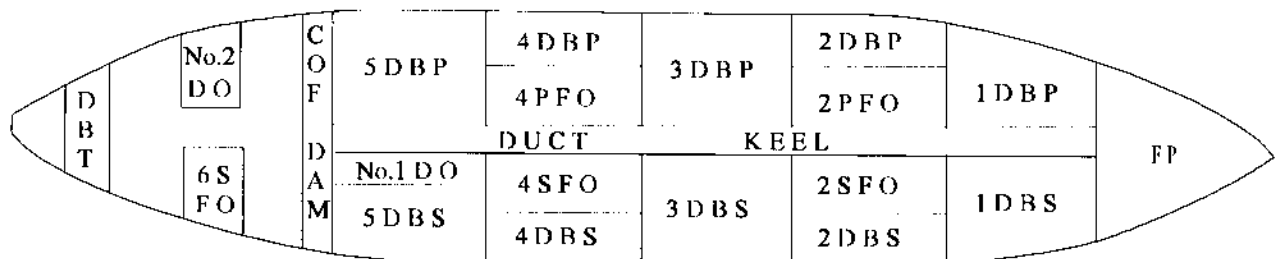
Others

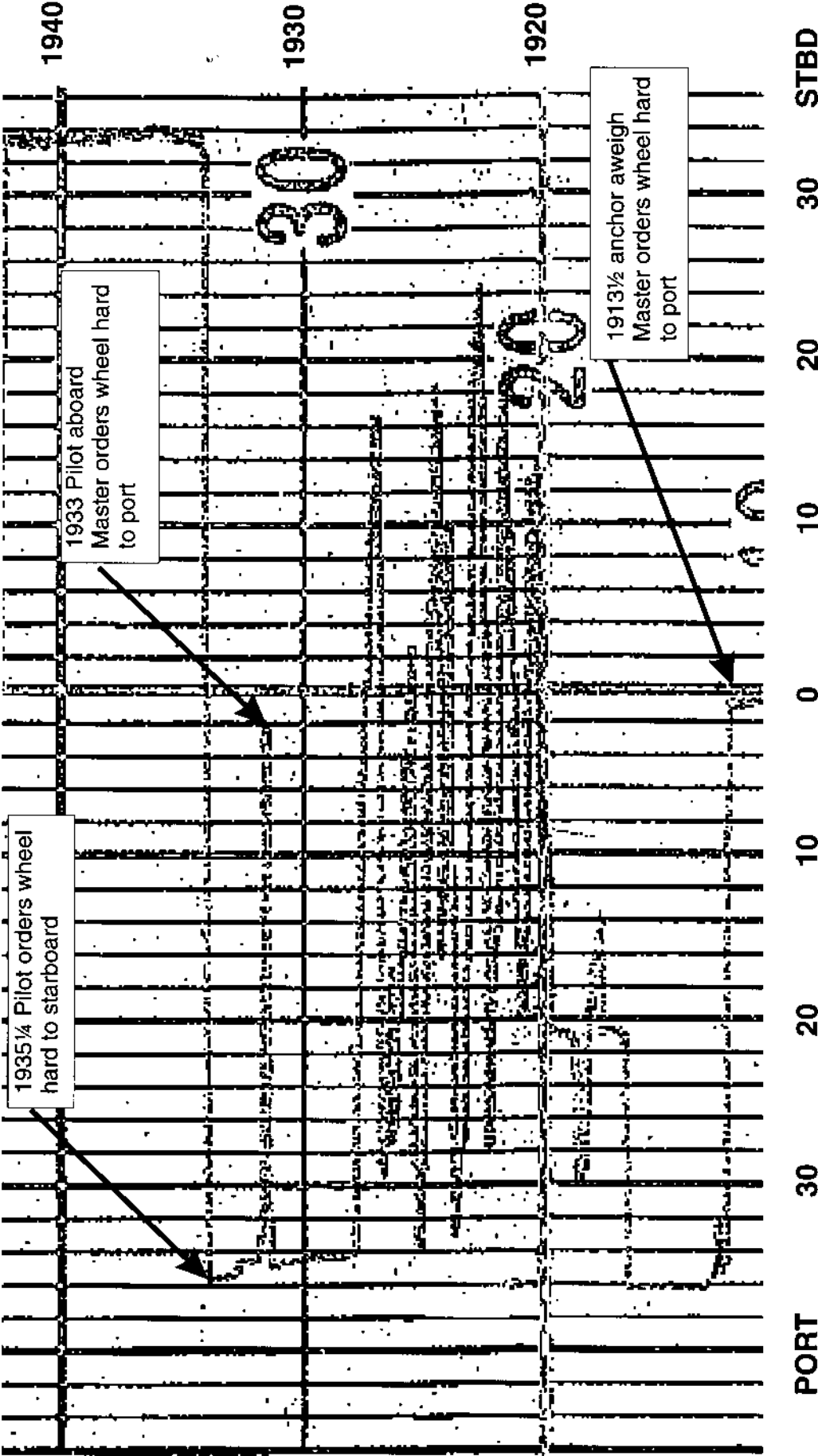
Duct Keel

No.4 cargo hold

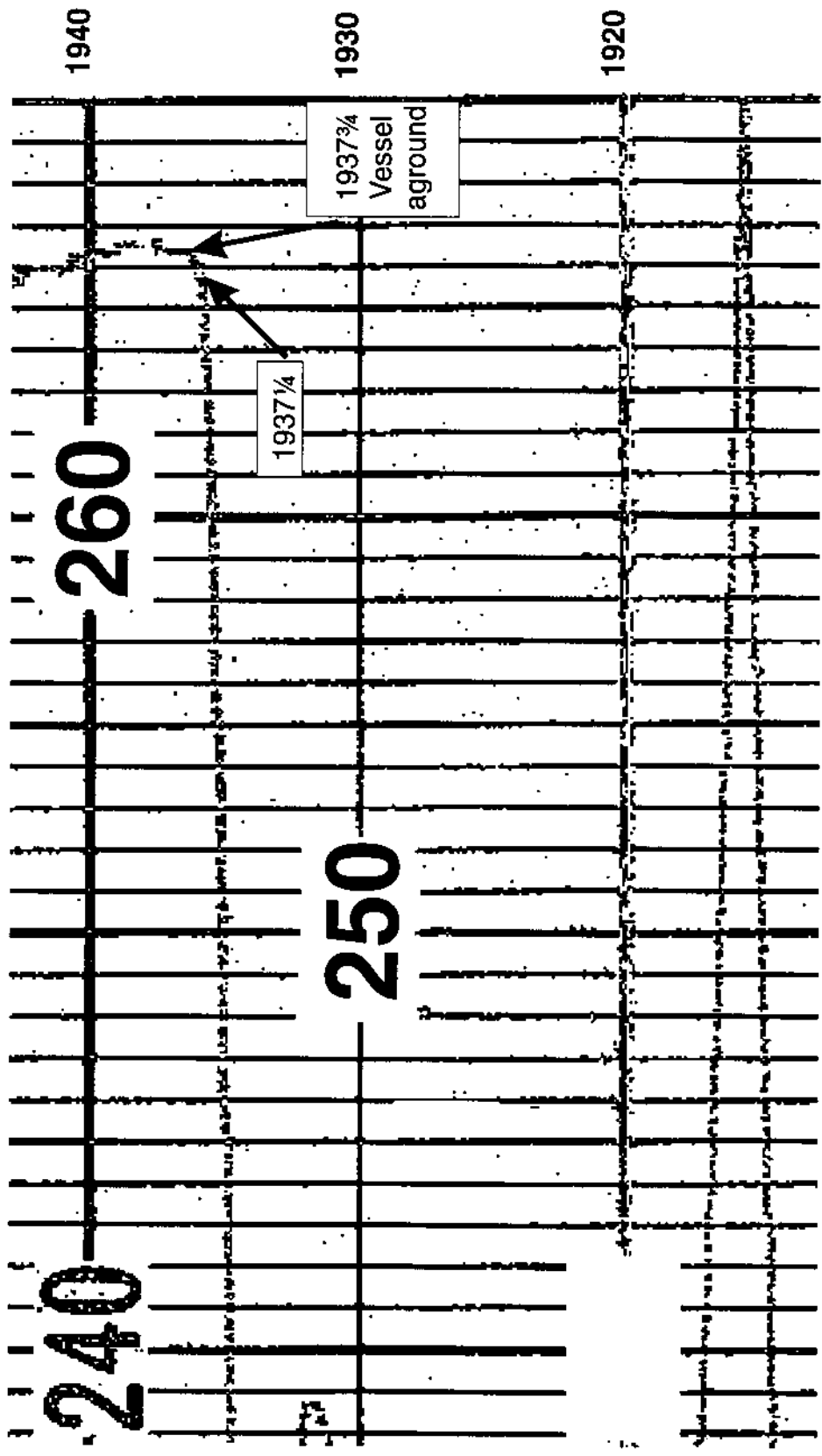
Engine room cofferdam

Engine room dirty bilge tank

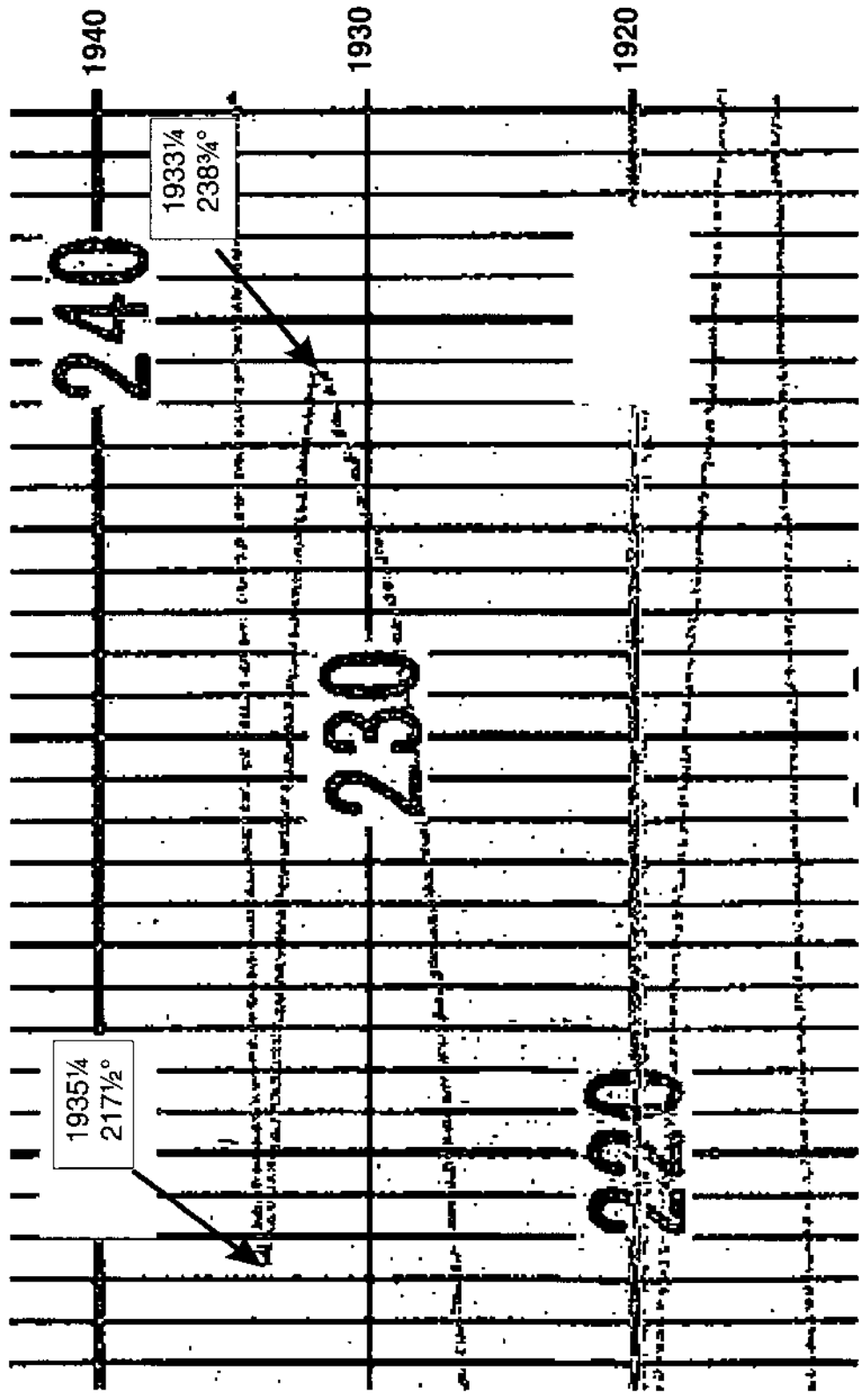




Rudder angle record



Course record 238° to 270°



Course record 215° to 245°