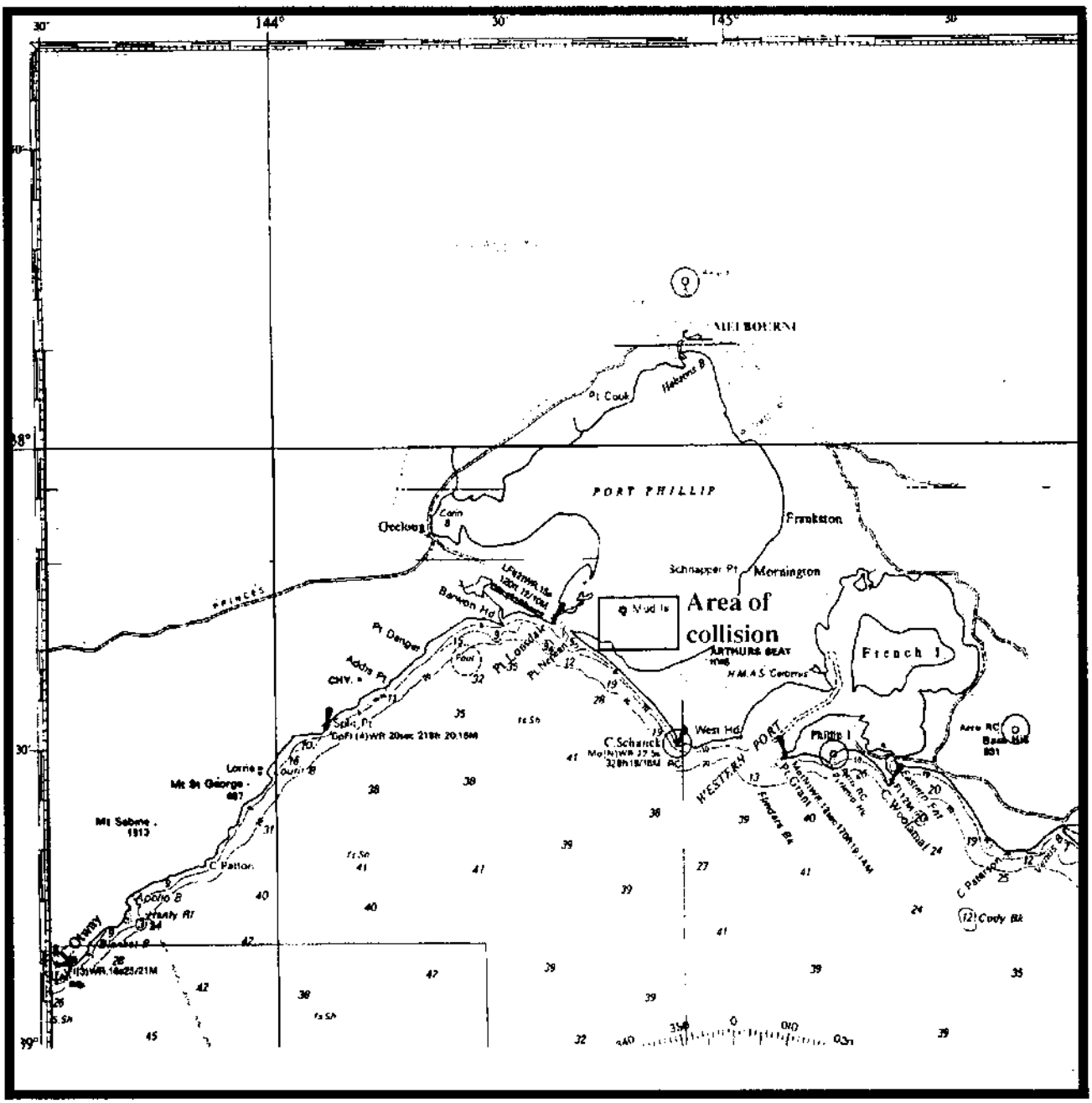
Contents



Part of chart Aus 422 showing area of collision

Summary

On the evening of 31 January 1994, the Port of Melbourne Authority's suction dredger A M Vella was operating at the eastern end of the South Channel, Port Phillip Bay. The cargo vessel Searoad Mersey, under the command of a "pilot exempt" master, entered Port Phillip Bay on its regular scheduled service. The vessel had received clearance to enter from Point Lonsdale Signal Station, which also advised of the A M Vella dredging operation.

The weather was fine, with good visibility, however, with the sun having set, the light was fading rapidly.

At 2150, while trying to pass A M Vella "port to port", Searoad Mersey made contact with No.15 beacon, on the south side of the channel, then at about 2151, collided with A M Vella, striking the dredger on its starboard side, immediately abaft the forecastle.

Both vessels sustained damage, but no-one was injured and no pollution occurred as a result of the collision.

Sources of information

Searoad Mersey: Master, Third Mate, Helmsman.

A M Vella: Master, Dredge Master, Dredge Mate, Senior Pipeman.

The Inspector gratefully acknowledges the assistance provided by:

Marine Board of Victoria.

Port of Melbourne Authority
Hydrographic Office, Queenscliff and
Signal Station, Point Lonsdale.

Port Phillip Sea Pilots

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Searoad Mersey

Searoad Mersey, a 5925 gross tonnage roll-on/roll-off cargo vessel, 91.5m in length and having a loaded draught of 5.71m, is engaged in the Bass Strait trade, serving the ports of Melbourne, Devonport and Grassy Harbour, King Island. The ship operates a regular schedule, conducting the sea passages at night, except for the sea passage from Grassy Harbour to Melbourne, and conducting cargo operations in the various ports during daylight hours. The ship is powered by two Wartsila diesel engines, producing 5576 kW, driving two variable pitch propellers, controlled from the bridge, and is fitted with twin rudders and a bow thruster.

The master, officers and ratings all work a four weeks on, four weeks off swing system. There are three bridge watch-keeping officers, who work the standard four on, eight off, three watch system, thus the master is usually not required to stand a full bridge watch. It is usual for the master to hold pilotage exemptions for the various ports and pilots are not normally employed for port arrivals and departures.

On Monday 31 January 1994, Searoad Mersey made the regular scheduled call at Grassy Harbour, arriving at 0800 and sailing at 1330. The Master, who had first joined the ship five months earlier and was halfway through the current (third) swing, spent the time at Grassy Harbour engaged in paperwork. After sailing from Grassy Harbour, he spent the afternoon resting, before taking the ship into Port Phillip Bay and to the anchorage off Melbourne.

The Third Mate had joined the ship on 25 January, having just obtained his Second Mate Class 1 Certificate of Competency, on completion of his cadetship. At 2000 on the 31st of January, he relieved the Mate as Officer of the Watch on the bridge, as the ship approached Port Phillip Heads. This would be his first entry into Port Phillip Bay as Watch Officer, although he had been present on the bridge at such times as a cadet aboard Searoad Tamar. At 2020, he gave the engineroom half an hour's notice to "stand by" and at 2030, the watch Integrated Rating reported on the bridge, to perform lookout and helmsman duties as required. Sunset that evening was at about 2038.

The Master went to the bridge at about 2035. "Stand by Below" was rung at 2042, the Master took over the con, the second steering motor was started and the Integrated Rating placed at the wheel. When the ship was in a position three miles from Point Lonsdale, the Master contacted Port Lonsdale Signal Station on VHF and received permission to enter.

With the Master having the con, the Third Mate stationed himself at the table on the port side, against the wheelhouse forward bulkhead, where he maintained the bridge note book, entering the times of passing the various points and beacons. At this

position he was able to move easily to look at the port radar, which he did occasionally.

Point Lonsdale was passed abeam to port at 2054, after which the Master brought the ship to starboard, to pass south of Popes Eye beacon, towards the South Channel. The pitch on the propellers was set at 85-90 percent, to provide a speed through the water of about 15 knots. The tide was ebbing, high water at South Channel Pile having been at 1842 and the time of the next low water being at 0023 on 1 February.

At 2103, the Master asked Point Lonsdale Signal Station for the tide height at West Channel tidal gauge and was informed that this was 29cm. He also recalled being advised that

> "the dredger A M Vella was working in the eastern end of the cut, between 15 and 19 and did not require the ship to slow down when passing".

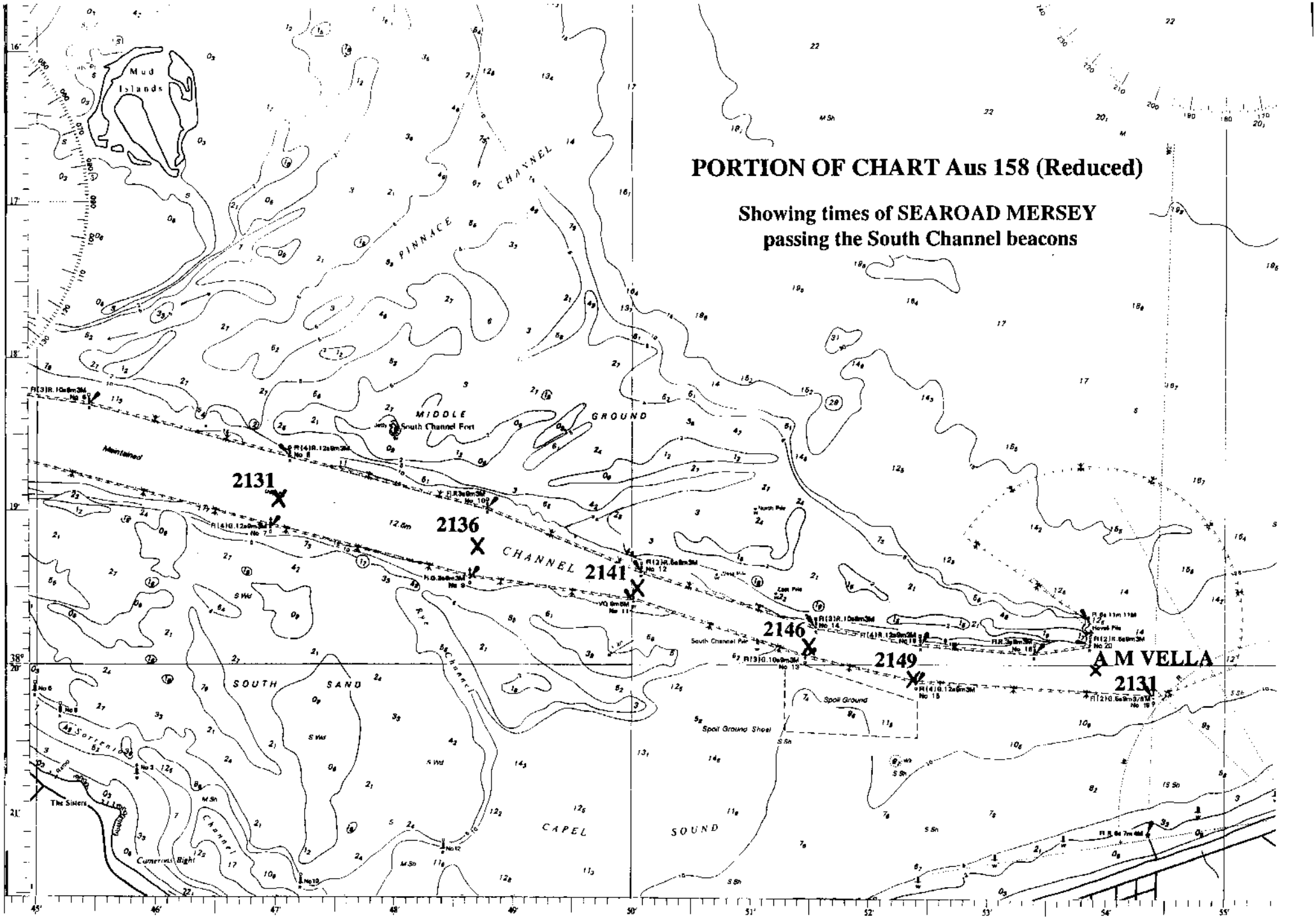
As the ship passed No.1 beacon, at 2114, the steering was switched to autopilot, to allow the helmsman to go for a smoke; The Master advised Point Lonsdale Signal Station, by VHF, of the ETA at the Hovell Beacon and at the anchorage.

Daylight had faded, civil twilight having been at 2108 and the moon, 20 days old and therefore a little over "half", was not due to rise until about 2230. A glow of lights, which transpired to be from those of the dredger, could be seen in the distance, fine on the port bow.

The helmsman was put back at the wheel as the ship approached No.7 beacon, which was passed at 2131. At this time, the Third Mate, using binoculars, was able to distinguish both the red and green sidelights of the dredger, as well as the restricted in ability to manoeuvre (red over white over red) signal. From his occasional references to the radar, he gained the impression the dredger was at the eastern end of the channel, towards No.19 beacon.

The Master, who did not use binoculars at this time, saw only the red sidelight, not the green, and acquired A M Vella as a target on the automatic radar plotting aid (ARPA), switched to the six miles range (off-centre), which indicated the dredger was proceeding in a north-westerly direction at 1.5 knots. From the radar screen he gained the impression that the dredger was roughly in the middle of the channel, midway between Nos 15 and 19 beacons, and he assumed that it would be a "red to red" (port to port) passing.

No.11 beacon, at the western end of the cut, was passed at 2141 on a heading of 107°, with A M Vella still fine on the port bow and appearing to the Master to be towards the northern side of the channel. By this time it was reasonably dark, nautical twilight being at about 2143. While passing through the cut, the Master noted a change in the aspect of A M Vella, in that he could now see both of the dredger's sidelights, indicating to him that the dredger had altered course to port. No.13 beacon, at the eastern end of the cut, was passed at 2146, and the


PORTION OF CHART Aus 158 (Reduced)
Showing times of SEAROAD MERSEY
passing the South Channel beacons
2131
2136
2141
2146
2149
A M VELLA
2131
Mud Islands
PINNACE CHANNEL
MIDDLE GROUND
South Channel Fort
CHANNEL
SOUTH SAND
Spoil Ground
Spoil Ground Shoal
CAPEL SOUND
The Sisters
Cumerona Bight

Master brought Searoad Mersey onto a heading of 110°, to give the dredger more room and putting No.15 beacon very fine on the starboard bow. His attention was then concentrated on No.15 beacon, which was going to be passed very close.

Between Nos.13 and 15 beacons, it was clear to the Third Mate that the ship was right on the edge of the channel. He noted the Master go to the starboard bridge wing and look aft, as if to make sure the ship was still within the channel. The dredger was still on the port bow, with both sidelights showing.

As the ship came up to No.15 beacon, the Master brought the ship around to port a few degrees. A M Vella called on VHF and the Master picked up the handset to acknowledge, but then put the handset back down and rushed to the starboard bridgewing, realising the ship was too close to the beacon. The Third Mate moved to the starboard wheelhouse door, to better hear orders. The Master ordered starboard helm, to keep the stern clear of the beacon, and then ordered port helm, to steady the ship up and keep it within the channel. Before the ship had passed the beacon, it made contact with the beacon, on the starboard quarter.

The Third Mate, losing sight of the beacon as it passed down the ship's side, moved back to the table on the port side, noting as he went that he could see both sidelights of the dredger, but then the dredger appeared to him to be altering course to port.

Searoad Mersey responded to the port helm, passing across the bow of A M Vella, and headed towards the northern side of the channel. The Master became concerned about grounding on the north side and ordered "midships" and "hard to starboard". This resulted in a rapid swing to starboard, back towards A M Vella, and the Master ordered "hard to port". Thinking that the helmsman had not heard, as the swing to starboard continued, the Master repeated the "hard to port" order, then ran to the wheel and checked that it was hard to port. At this point the Third Mate looked at the rudder indicator, located on the deckhead at the centre-line, and noted that it indicated starboard 10° and appeared to be stationary, but then his attention was drawn back to the dredger, which was blowing a series of short blasts on its whistle. The Master moved to the telegraph and rang full astern on both engines. Searoad Mersey then collided with AM Vella, striking on the starboard side of the dredger, just abaft the forecastle, at an angle of about 70°. As A M Vella scraped across the bow, Searoad Mersey continued to swing to starboard until, moving stern first away, the ship started to swing to port. The Master then steadied the ship up on an easterly course, to pass to the south of No.20 beacon.

Once the ship was steadied up, the Master contacted A M Vella on VHF and asked if they needed assistance, the person on the dredger replying that they were seaworthy, although not dredge-worthy and did not need assistance. He then advised Point Lonsdale Signal Station of the collision.

The engineroom was advised of what had happened and instructed to check the engineroom and vehicle deck. The

Mate arrived on the bridge, organised a damage control party and went down to check the forward spaces and to sound the tanks.

As soon as the ship was clear of the Hovell Pile beacon, the Master stopped the engines and checked both the steering system and the bow thruster, both of which appeared to be satisfactory. The Mate reported that the ship was taking water in the forepeak, and that he had started the ballast pumps. He then reported that the bulbous bow had suffered considerable damage and recommended to the Master that speed be kept down to help reduce the ingress of water.

Satisfied that it was safe to proceed, the Master continued the passage up Port Phillip Bay and requested permission from Harbour Control to berth on arrival, rather than go to anchorage, as originally intended. Permission was granted and Searoad Mersey berthed at Webb Dock at 0054 hours on 1 February 1994.

As soon as the ship berthed, it was boarded by officers of the Victorian Water Police, who breathalyser tested the Master, Third Mate and helmsman. These tests indicated zero blood alcohol content for all three.

Inspection of the vessel revealed the forward section of the bulbous bow had been compacted back about 1.5m, scoring on the bow, and a horizontal score mark on the starboard quarter.

An inspection of the rudders and underwater area of the starboard quarter by divers on 1 February revealed no damage or contact marks.

AM VELLA dredging computer equipment

A M Vella

A M Vella is a self-propelled, trailing suction, hopper dredger, having an overall length of 96.01m, a moulded depth of 9.06m and a gross tonnage of 4241. The vessel is powered by two 2000 hp (1492 kW) engines, driving two propellers and is equipped with two rudders and a bow thruster.

The dredge suction pipe is located on the starboard side of the vessel. Housed in cradles on the starboard side of the deck, it is lowered over the starboard side by three davits, each davit having its own winch. Controls for the suction pipe and pumping system are located at a control station in the starboard side of the wheelhouse. In the operating position, the forward end of the pipe, the trunnion, locates over a pipe suction in the ship's side, while the after end, with the dredge head, trails on the seabed. No strings of pipeline or hopper barges are involved in the dredging operation, therefore there are no obstructions affecting the passage of other vessels.

The vessel is owned and operated by the Port of Melbourne Authority.

For dredging operations the bridge team consists of a dredge master, a dredge mate, a senior pipeman and an assistant pipeman. The vessel works on a 24 hours, seven days a week basis and there are two bridge teams, working eight-hour watches. The ship's master is not directly involved in the watch system. The crew normally work a four week swing, crew swing changes taking place between 1800 on a Friday and 0600 on the Saturday.

In 1993, the Port of Melbourne Authority replaced the navigation buoys marking the South Channel in Port Phillip Bay with IALA pile beacons, driven 25m outside the actual channel. To obtain a uniform minimum depth within the channel, the Port Authority initiated a dredging program, which required the dredging of three areas on the south side of the channel, between Nos 9 and 19 beacons. A number of Notices to Mariners, Nos 8/93(P), 16/93(T) and 26/93, advising of dredging operations, were issued by the Port Authority between 22 February 1993 and 5 October 1993. Both Notice 8/93(P) and Notice 26/93 advised that advice on the current status of dredging could be obtained from Point Lonsdale Signal Station.

For survey purposes and for the dredging operation, a local hyperbolic navigational system was set up by the Hydrographic Office of the Port Authority, providing an accuracy of $\pm$ 3m. A computer program system was designed, providing an electronic chart of the area. Depth was colour coded with red for high spots, pink for shallow water, through green to deep blue for required dredged depth. As the dredger proceeds along the dredge run, a scale portrayal of the vessel, with the position of the dredge head, is depicted on the computer screen in real time positions from the hyperbolic navigational system. The computer automatically computes the new depth and automatically adjusts the colour on the screen. For guidance of the dredge masters, the Hydrographic Surveyor

provided a suggested track direction around the dredge areas and to the spoil ground. The dredging practice is to concentrate initially on the toe line, or the boundary of the channel.

In January 1994, A M Vella was engaged in the dredging program. Operations commenced on 4 January, with the crew swing change taking place at Williamstown on Friday 28 January, although the Master and two dredge masters remained on board for an extended swing.

After the swing change, on Saturday 29 January, A M Vella took two loads of silt from Station Pier, Port of Melbourne, then proceeded down to the Hovell where it arrived at 1630. Dredging began in Area 3, on the south side of South Channel, in the vicinity of No.19 beacon. The Master advised Point Lonsdale Signal Station that A M Vella was dredging Area 3 for one week, and that he would let them know if there were any changes.

As all of the dredging was on the south side of the channel, they expected all ships to pass to the north of A M Vella.

At 1550 on 31 January 1994, A M Vella started dredge run No.124, and at 1600 the bridge team changed watch. The dredge operation was basically following the route proposed by the Hydrographic Surveyor, except that the vessel was proceeding in a clockwise, rather than an anticlockwise direction, around Area 3. In this way, the laden vessel approached the spoil ground, located south of the channel between Nos 13 and 15 beacons, from the dredged channel, west of No.15 beacon. The Dredge Master was following this route on the advice of a previous dredge master.

During the watch, the Dredge Master and Dredge Mate spelled each other at the wheel, in accordance with usual practice. The officer at the wheel had full responsibility for the dredging operation, steering and manoeuvring the ship according to the information displayed on the computer screen, which was located to port of the steering position. Much of the officer's attention and concentration is therefore directed at the computer screen. Deviations from the eliptical circuit would occasionally be made to take the dredge head over high spots. Speed was between two and three knots, the normal dredging speed.

That dredge run was completed shortly before 1900, indicated by the vessel being down to its marks, as shown on a draught indicator on the aft bulkhead of the wheelhouse. On the completion of the dredge, the Dredge Mate went down to the deck and sounded the hopper tank, four sounding pipes on each side, to check the load.
A M Vella then proceeded to the spoil ground, where the load was dumped by opening the hopper doors, which are controlled from a panel on a console in the wheelhouse. Dredging for load No.125 commenced at 1910.

At sometime, thought to be around 2115, Searoad Mersey was heard calling Point Lonsdale Signal Station on VHF and giving their ETA Lonsdale and at Hovell. The Dredge Master then contacted Point Lonsdale and

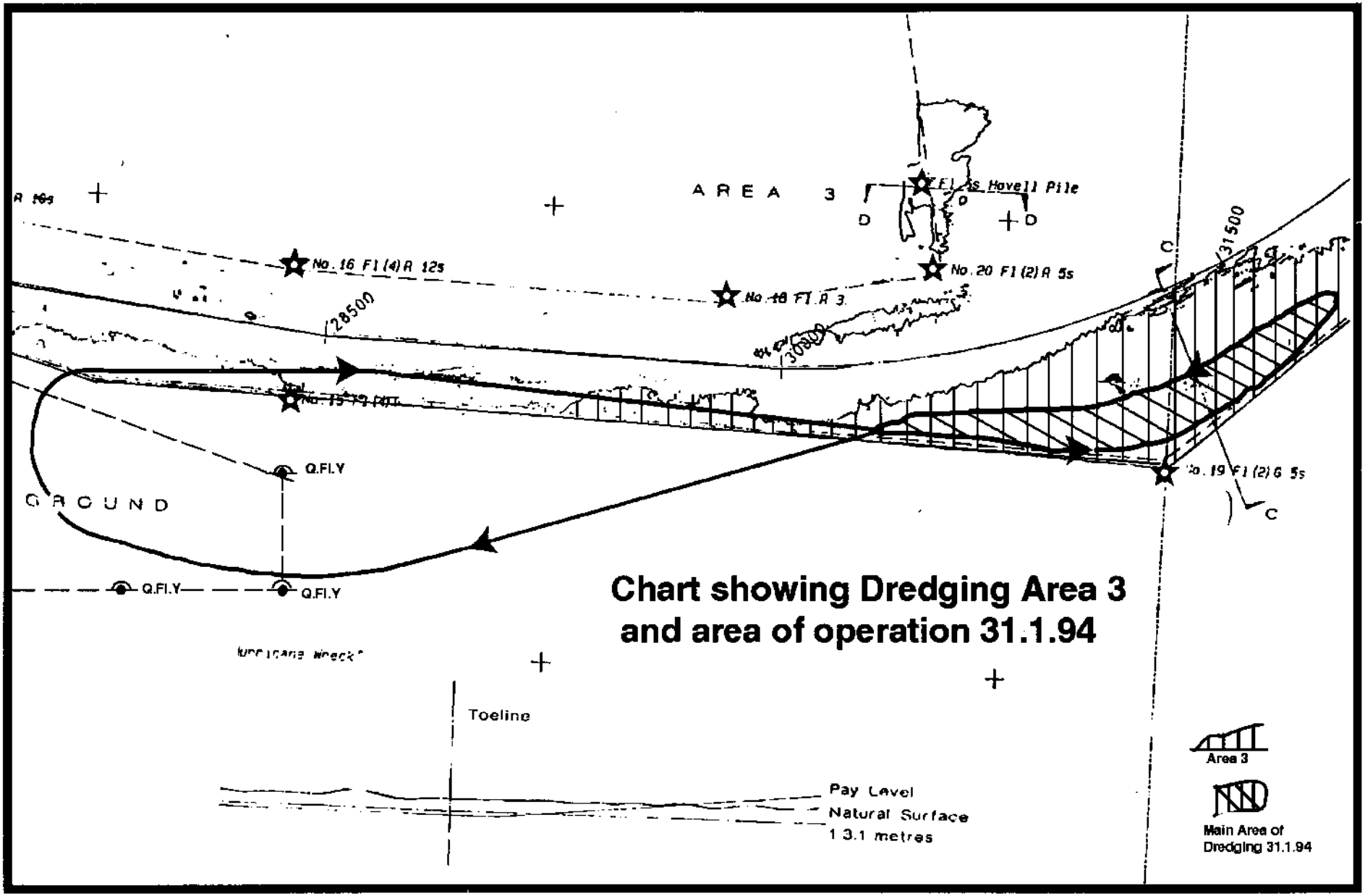


Chart showing Dredging Area 3 and area of operation 31.1.94

sought confirmation that Searoad Mersey was inbound.

At 2130, the vessel was south of No.20 beacon. The Dredge Mate, at the wheel, was steering a westerly course with No.15 beacon just to starboard of the ship's crane. With the dredge down, the vessel needed about 10 degrees of permanent port helm, to counteract the drag of the dredge on the starboard side and to maintain the required course.

Searoad Mersey was eventually seen about half a point on the starboard bow, showing both the red and the green sidelights. No concern was felt on the bridge, as Searoad Mersey was expected to pass to the north.

Dredging continued until a full load had been taken, at approximately 2145, at which time the vessel was on the southern toe line and headed west, with No.15 beacon very fine to port. The Dredge Master took over the wheel from the Dredge Mate, who went down to sound the hopper.

Searoad Mersey was almost directly ahead, or very fine to port, on the south side of the channel, between the South Channel Pile and No.13 beacon. The ship was "end on", the Dredge Master being able to sometimes see the green sidelight, sometimes the red sidelight, as it wandered slightly. To the Dredge Master it appeared that Searoad Mersey was intent on a "port to port" passing and was liable to run out of the channel.

As soon as the dredging stopped, the Senior and Assistant Pipemen, stationed at the controls on the starboard side of the wheelhouse, started to raise the pipeline. This operation, which would normally take the Senior Pipeman about one minute to raise the pipeline to deck level, took about three to four minutes as it was being carried out by the Assistant, who was under training. Speed during lifting was Dead Slow Ahead (about three knots), speeds in excess of this making the lifting difficult.

When Searoad Mersey was just west of No.15 beacon, and with A M Vella between six and eight ship's lengths (576-768m) east of the beacon, the Dredge Master called Searoad Mersey, fine on his port bow, on VHF and passed the message recalled as

> "I'm dredging the south toe line, intend maintaining course and speed. What are your intentions?".

The only reply he received was

> "Starboard 10".

Searoad Mersey broadened out to port, then altered course to port, towards the north side of the channel, and crossed ahead on to the starboard bow.

The Dredge Master thought "it was a close quarters situation, but all right". He could clearly see Searoad Mersey, illuminated by the dredgers deck lights. He then called the ship a second time and thanked him for altering to port, but received no reply.

Moments after he made this second call, he still had hold of the hand set, Searoad Mersey started to swing back to starboard to head straight for A M Vella. The Dredge Master rang

full astern on the engines, then sounded a prolonged blast on the whistle, followed by a series of short blasts, and then a series of prolonged and short blasts as Searoad Mersey continued to close.

The Dredge Mate had taken the forward port sounding and had just started to sound No.2 port, when the whistle sounded. He looked up, over the top of the hopper, and saw the bow of Searoad Mersey, about two points forward of the beam and pointed straight at him. He ran to the forecastle and then Searoad Mersey struck A M Vella on the starboard side, just abaft the forecastle. The Dredge Mate then ran aft, but returned forward, to inspect for damage. He found no water ingress.

Alerted by the whistle signals, the Master arrived on the bridge just seconds after the collision occurred and took over from the Dredge Master, who advised him that the vessel was on the way to the dump. The Master remarked that the vessel appeared to be on the southern toe line and, when satisfied that the vessel did not appear to be in any immediate danger, instructed the Dredge Master to go down for a coffee.

When Searoad Mersey called on the VHF, to ask if assistance was required, the Master was able to advise them that A M Vella was seaworthy, but not dredge-worthy, the suction pipe having been badly damaged. The Master then took the vessel into the spoil ground, where he handed the con back to the Dredge Master, who dumped the load.

The crew had been mustered and the vessel was inspected for damage. When it was found that there was no danger, the crew were stood down and the Master decided to proceed to Williamstown.

On berthing at Ann Street Pier, at 0130 on Tuesday 1 February, the vessel was boarded by officers of the Victorian Water Police, who breathalyser tested the Master and the Dredge Master. The test results were below 0.05, but indicated that alcohol had been consumed at sometime during the preceeding hours.

Inspection of the vessel revealed that, in addition to the damage to the dredging equipment, heavy indentation to the ship's side plating had been sustained, in the vicinity of the trunnion guides, vertical pipeline guide slots down to the shipside suction inlet.

Comment

During the time Searoad Mersey was proceeding along the South Channel, west of No.13 beacon, on the evening of 31 January 1994, A M Vella was actively engaged in dredging and was exhibiting the prescribed signal for a vessel restricted in its ability to manoeuvre. Searoad Mersey, therefore, had a duty to keep clear of A M Vella and indeed it was the intention of the Master to do so. As Searoad Mersey failed to keep clear, it is appropriate to look at the Master's actions and the factors behind those actions.

From the Port of Melbourne Authority Notices to Mariners Nos. 8/93(P), 16/93(T) and 26/93 and from his previous voyages into and out from Port Phillip Bay (about 20 since mid-October), the Master was aware that dredging operations were in progress. The advice provided by Point Lonsdale Signal Station (Signal Station's tape recording of radio traffic for 31 January) was

> "The A M Vella is working down towards No.19 South Channel. No need to slow down or anything".

Although the working lights of A M Vella were visible from the western end of South Channel, at 2114, the first detailed observations appear to have been when Searoad Mersey was passing No.7 beacon, at 2131, when the Master was able to see the port side light of the dredger. He acquired the dredger as a target on the ARPA, which provided the information that the target was proceeding in a north-westerly direction at a speed of 1.5 knots. From the ARPA display, he estimated A M Vella to be in mid-channel, between Nos.15 and 19 beacons. On this information, he assumed a "red to red" (port to port) passing and thereafter proceeded to visually con Searoad Mersey, without further reference to the ARPA.

At 2131, A M Vella was in a position south of No.20 beacon, and assuming that it was on the northern edge of "Area 3", would have been bearing about 102^0 at a distance of 5.6 miles fine on Searoad Mersey's port bow. A reconstruction on what would have appeared on Searoad Mersey's radar screen indicates that A M Vella would have appeared to be in the middle of the channel, although in fact, because of the bend in the channel, it was south of the centre line (see "reconstruction of collision" diagram page 25).

As Searoad Mersey proceeded eastwards along South Channel, A M Vella was dredging in a westerly direction towards No.15 beacon and its bearing from Searoad Mersey would have remained fairly steady.

On approaching No.13 beacon, the Master noticed a change in aspect of A M Vella, indicating an alteration to port, towards Searoad Mersey. It may have been that the Master had just seen the green sidelight, but more probably there was a slight change in aspect. In conning the ship to maintain a port to port passing, by altering to a course of 110^0, he took Searoad Mersey too close to No.15 beacon, resulting in contact with the beacon.

The time of this perceived change in aspect coincided with the cessation of dredging by A M Vella. As the dredge head was raised off the seabed, due to the need to have the wheel at port 10 in order to maintain a steady course while dredging, there would have been a natural tendency for A M Vella to swing to port at that moment.

When two vessels are approaching one another in a narrow channel, the relative bearings will not change appreciably until at close quarters, when the regulatory passing procedures will apply. When one of the two vessels is restricted in its ability to manoeuvre, as in the case of a dredger, and therefore the normal passing regulations may not apply, it is of utmost importance for the other vessel to ascertain exactly where the restricted vessel is located in the channel.

Neither the Master nor the Third Mate used the radar to plot the position of A M Vella to ascertain exactly where the dredger was operating. Had the position of A M Vella been properly established, and had the Master checked the ARPA for updated information, he would have been aware of the fact that the dredger was operating on the south side of the channel, that it was proceeding towards No.15 beacon and that a "port to port" passing was therefore inappropriate. It is pertinent that the Master had received warnings in three separate Notices to Mariners and had passed the dredger on previous transits of the South Channel during the preceeding weeks. On all previous occasions the Master had passed northward of the dredger.

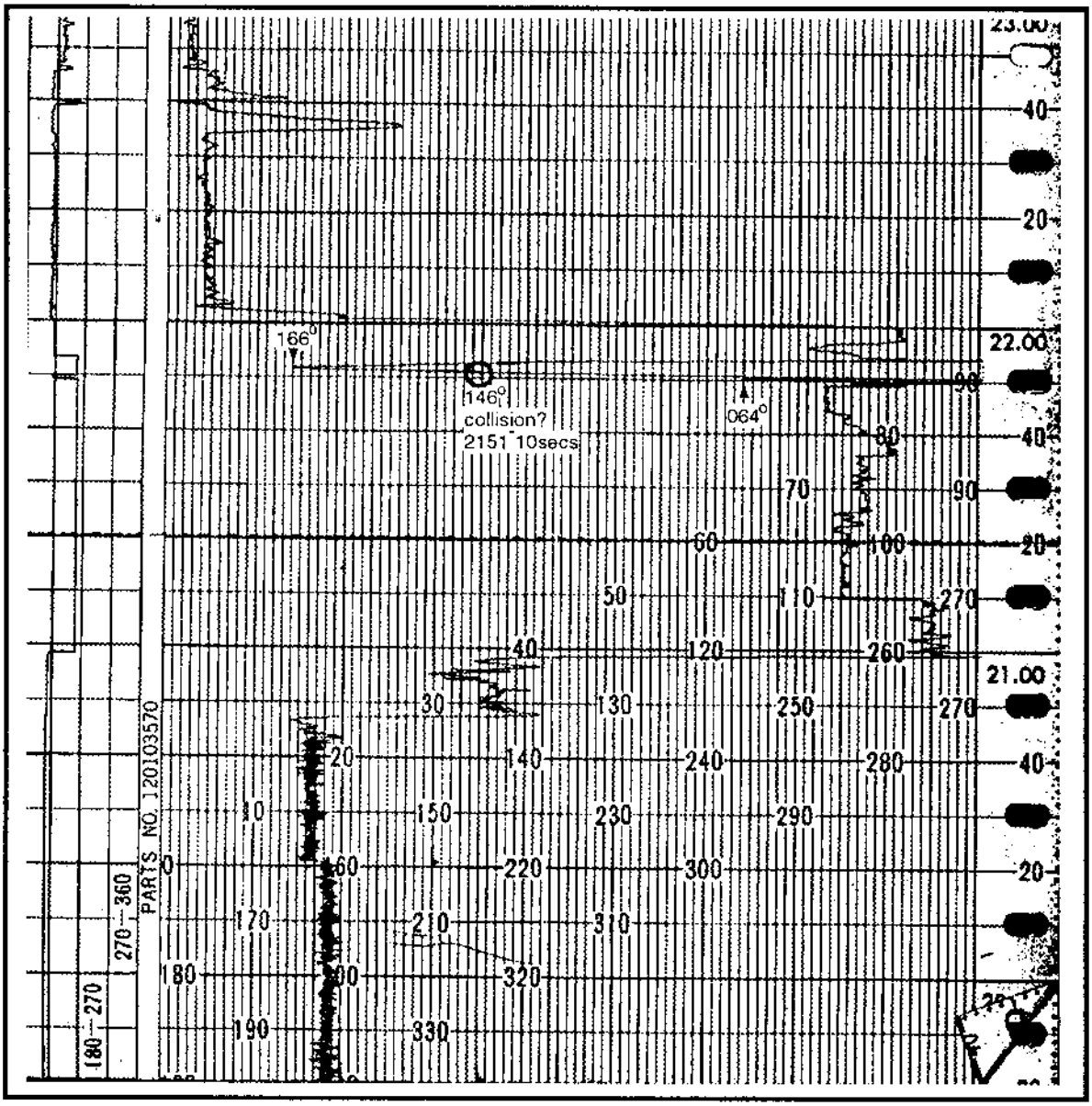
Instead, the Master conducted Searoad Mersey on an assumption, based on the initial ARPA information. In conducting Searoad Mersey to maintain a "port to port" passing, he endeavoured to pass through the closing gap between A M Vella and No.15 beacon, keeping the ship on the southern boundary of the channel, with the result that it collided with the beacon.

Pilotage knowledge

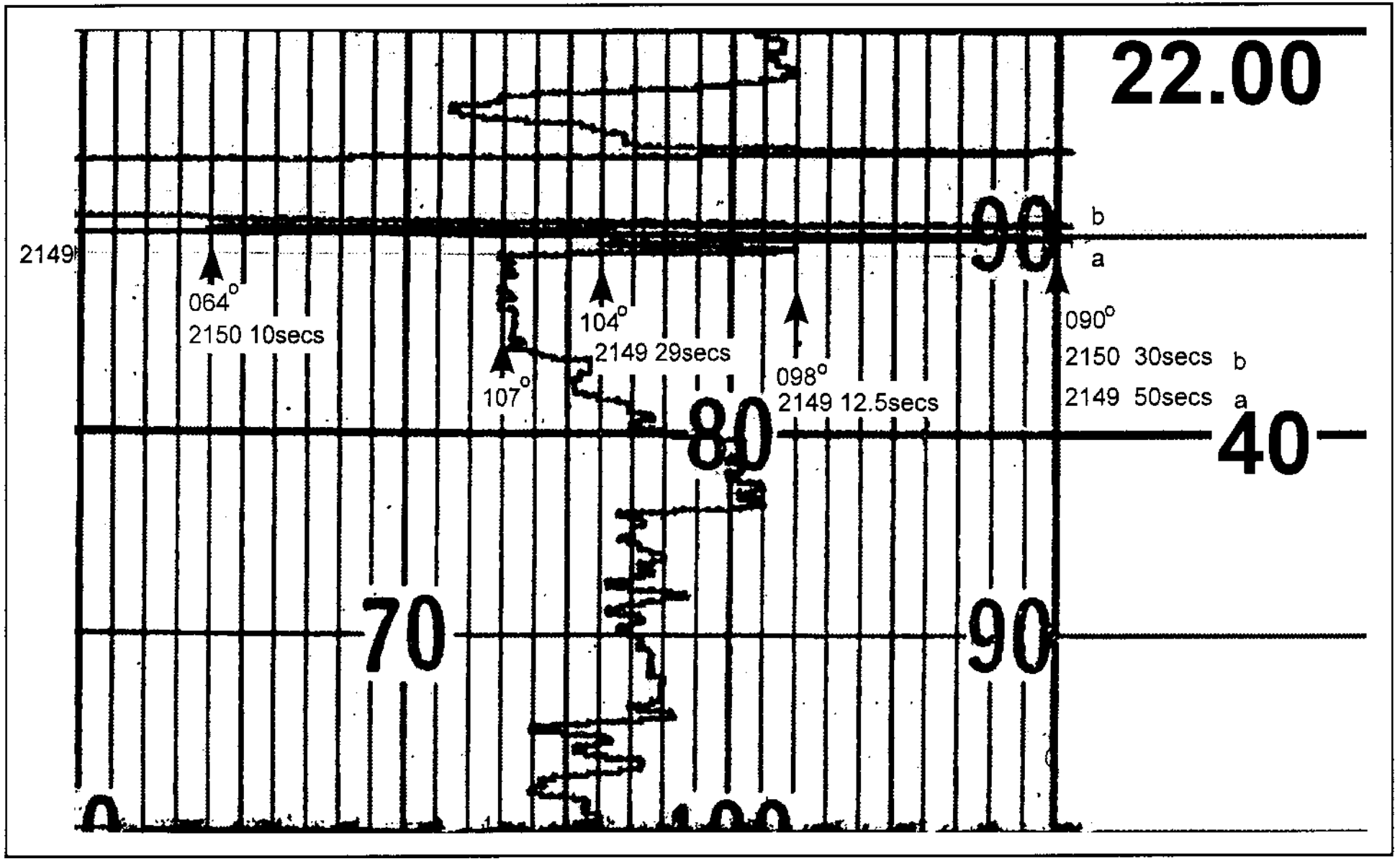
A pilot is a person having local knowledge, which includes a knowledge of where a ship may be taken outside a marked channel. A pilot exempt master should have a demonstrated knowledge similar to that of a pilot for the particular port.

The water depth immediately south of No.15 beacon is around 12m and the distance between No.15 beacon and the buoy marking the north-east extent of the spoil ground is 240m. The Master of Searoad Mersey should have been aware that Searoad Mersey could safely pass to the south of No.15 beacon and remain south of the channel until rounding No.19 beacon. This was an option the Master did not appear to consider.

It would have been reasonable for the Master to seek more detailed information regarding the dredging operation from Point Lonsdale Signal Station and to contact A M Vella by VHF, to confirm the dredger's movements and his own intentions. Traffic density is light at almost any time in the South Channel and such a procedure, practiced by the pilots, would not be unduly onerous or distracting.



Section Searoad Mersey course recorder chart



Portion of Searoad Mersey course recorder chart enlarged

Analysis

Searoad Mersey was making good a speed over the ground of 13.07 knots (6.7 m/sec) and from the time of approaching No.15 beacon to the collision was only about two minutes, with events taking place very quickly. Understandably recollections vary, but the Third Mate appeared to recall the most detail.

A study of Searoad Mersey's course recorder chart indicates that, on approaching No.13 beacon, course was adjusted to 107° at 2144. At 2149, course was altered to port, over a 12 second period, to 098°, then immediately back to starboard, to 104°. This would have been under the "starboard 10" order as recorded on the Signal Station's traffic tape (at 2149-10). The course was then immediately altered, under port helm, from 104°, at 2149-30, to 064° at 2150-10, and then immediately back to starboard to 166° at 2151-50. A slight "step" in the trace indicates that the collision probably occurred at 2151-10, with Searoad Mersey on a heading of 146°.

As Searoad Mersey closed No.15 beacon, the Master's attention was directed at the beacon and on efforts to avoid contact with it. How much port helm was applied, just before the contact with the beacon, is uncertain; the Third Mate thought either twenty degrees or hard to port, the helmsman said definitely not hard to port. Whatever the amount, it was sufficient to swing the ship through forty degrees in as many seconds.

The swing to port, to 064°, would have placed No.18 beacon and also the Hovell Pile beacon fine on the starboard bow. The Master could not recall what starboard helm he ordered, although the Third Mate recalled it as being "hard to starboard". Certainly a rapid swing to starboard was initiated.

At what point the Master realised that the swing was taking the ship back towards A M Vella is not known. After ordering hard to port, he went to the wheel, to check that the helmsman had carried out his order, and then rang full astern on the engines. From the data log, the time of ringing full astern was 2150-30, the time of attaining full astern was 2150-38 and the time of ringing stop engines, after impact, 2151-17.

The accuracy of synchronisation between course recorder and data log is also not known. From the course recorder chart, Searoad Mersey swung back through a heading of 090° at 2150-30, at which time A M Vella would have been about four points on the starboard bow at a distance of about 200m, just over one cable, and therefore suddenly of concern.

The time factor between the Master ordering hard to port and ringing full astern may have been as little as five seconds, in all probability not more than ten seconds. The Third Officer recalled the Master's two orders of "hard to port" as following immediately one after the other, virtually as one order.

When the steering system was tested by the Classification Society Surveyor

on 2 February 1994, with both systems in operation the rudders took 21 seconds to move from starboard 35° to port 30°. This provides a rate of change of 3.095 degrees per second, at which rate the rudders would take eight seconds to move from hard to starboard to starboard 10.

It is considered that, at the time the Third Mate looked at the rudder indicator, the rudders were not stopped on starboard ten, as believed, but were in fact moving to port and would have been hard over to port at about 11 seconds after the Master rang full astern.

From the course recorder chart, Searoad Mersey continued to swing to starboard until after the two ships had drawn apart. From the data log, in changing to full astern, the port propeller pitch change lagged behind that of the starboard propeller by as much as 50 percent. This difference in pitch between the two propellers, over a period of 16 seconds, probably had an opposing turning effect to that of the rudders, contributing to the ship's continued swing to starboard. Also, the turbulance would have affected the water flow to the rudders, which would have reduced their effectiveness. In addition, the movement to starboard would have been sustained during actual contact with A M Vella.

According to the helmsman, Searoad Mersey responds very quickly to the helm, steering "more like a speed boat, than normal ships" and does not require large amounts of helm.

From the available manoeuvring data (turning circle test 85 percent pitch), in altering from 104° to 064°, Searoad Mersey would have advanced about 200m, with a transfer to port of about 100m. Then, in changing from 064° to 146° at the time of collision, the ship would have advanced about 170m, with a transfer to starboard of about 125m. This manoeuvre would bring the ship back to the southern toe line, about 440m east of No.15 beacon, which is consistent with the collision position as calculated from the A M Vella evidence.

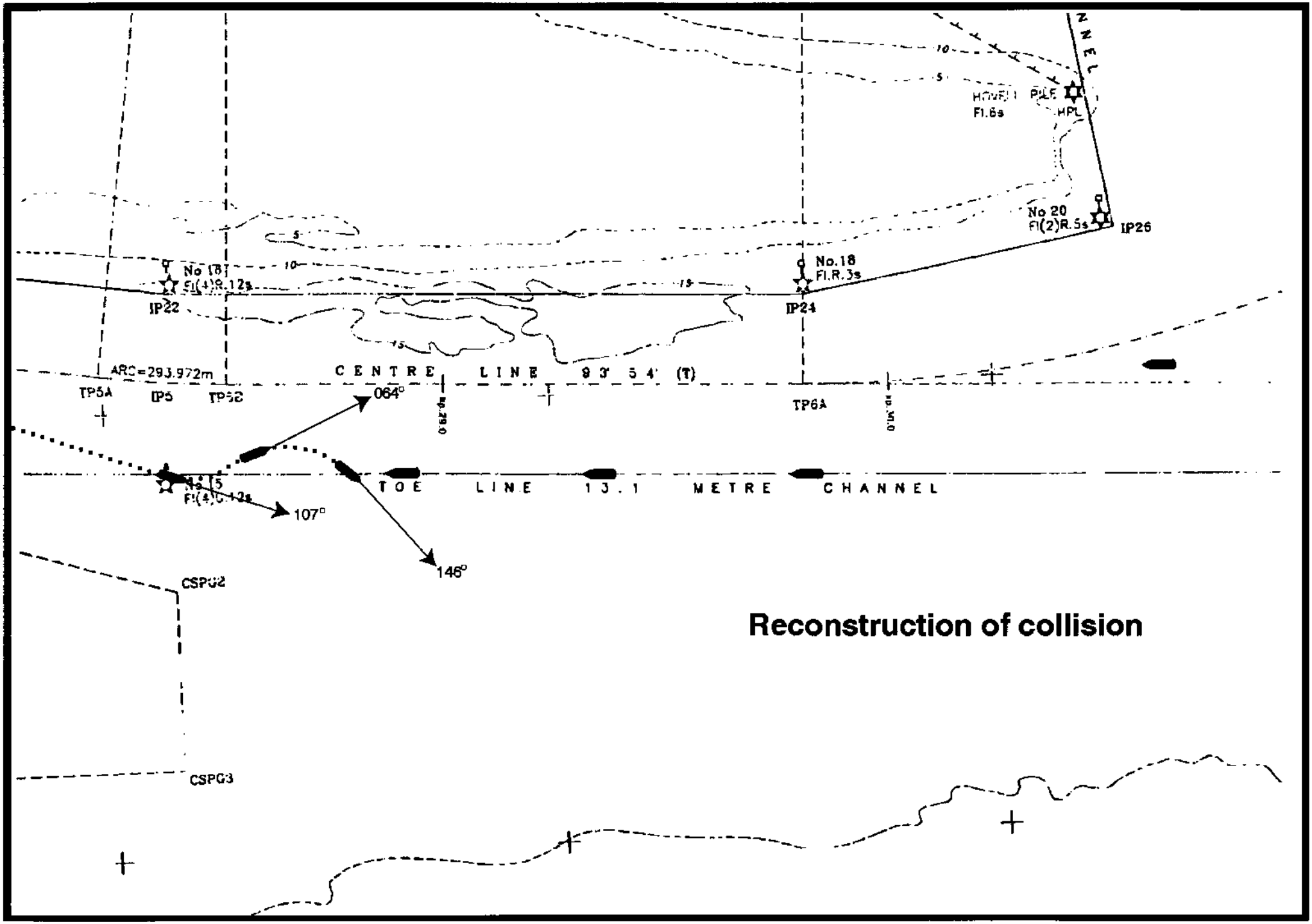
Although Searoad Mersey, under port helm, had swung to head towards the north side of the channel, it would still have been well to the south of the centre line of the channel, at that point 400m wide, when the Master ordered corrective helm. As the ship was known to be very responsive, a smaller amount of rudder, reduced once the swing to port had stopped, should have been sufficient.

It is considered that when Searoad Mersey made contact with No.15 beacon, the Master lost his orientation, over reacted and applied excessive helm.

Steering gear failure

Those on the bridge of Searoad Mersey were of the opinion that the rudders were stopped at "starboard 10" and the Master cited earlier steering system problems on the ship.

Searoad Mersey had experienced two previous problems with the steering system, in January and June 1993. In the first instance, a faulty solenoid valve caused the rudders to move to hard to starboard and in the second


No 20
Fl(2)R.5s
IP26
No.18
Fl.R.3s
IP24
No 18
Fl(4)R.12s
IP22
ARC=293.972m
CENTRE LINE 93 54' (T)
064°
TP5A
IP5
TP5B
TP6A
TOE LINE 13.1 METRE CHANNEL
107°
146°
CSPG2
CSPG3
Reconstruction of collision

instance, a faulty travel limit switch inhibited starboard rudder movement. Both of these faults were rectified and the problems had not recurred at the time of the incident. A further problem was experienced while the vessel was at sea on 3 July 1994. On that occassion a solenoid on the port steering motor stuck in the open position, causing the rudders to move to and remain at hard to starboard.

In this incident, no fault alarms occurred, the steering system functioned normally immediately after the collision and no faulty components were brought to light during thorough testing by servicing agents. It is considered the rudder indicator being stopped at "starboard 10" was a misperception, that the rudders were in fact returning to amidships from hard to starboard and that there was no momentary system failure of the steering gear.

Discrepancies in evidence

The Third Mate stated that, when passing No.7 beacon and using binoculars, he was able to see both the red and the green sidelights of A M Vella, indicating that the dredger was end on, rather than heading north-westerly as indicated by the ARPA. At a distance, green lights are not always as readily discernible as red lights, particularly in twilight or if a person has any slight "colour deficiency". The fact that the Master did not use binoculars, or a possible slight deficiency in the ability to destinguish the colour green, or a combination of both, could explain why he did not see the green sidelight seen by the Third Mate.

After Searoad Mersey made contact with No.15 beacon, the Third Mate, moving back to the port side of the wheelhouse, gained the impression that A M Vella had altered course to port, because of a change in its aspect. At this time, Searoad Mersey was swinging to port and crossing ahead of A M Vella. It is considered that the change of aspect of A M Vella was caused by the movement of Searoad Mersey, rather than any course alteration by the dredger.

Actions of A M Vella

It is operational practice for A M Vella to display the "restricted in ability to manoeuvre" signal not only while dredging and dumping, but also whilst proceeding between the dredging area and the spoil ground.

Strictly speaking, as soon as A M Vella stopped dredging and the dredge head was raised clear of the sea bed, it was no longer a vessel restricted in its ability to manoeuvre. However, dredging had not stopped until such time as the two vessels were within 1.5 miles of each other and it is considered, therefore, that A M Vella had a duty to maintain course and speed until Searoad Mersey had passed and was clear. Switching off the "restricted in ability to manoeuvre" signal at such close quarters may have only served to confuse the issue.

Speed during dredging and while raising the suction pipe is restricted to three knots, thus A M Vella was proceeding at slow speed. As soon as the Dredge Master realised that Searoad Mersey was heading back towards A M Vella, he sounded a

series of whistle signals and put the engines to full astern. At such close quarters and at slow speed, it is considered that putting the engines astern was the most appropriate action. Although the whistle signals sounded were not those prescribed under the International Regulations for Preventing Collisions at Sea, they did not affect the actions of those on board Searoad Mersey.

The Dredge Master became aware that Searoad Mersey was well over to the south side of the channel when it was between South Channel Pile and No.13 beacon. Had he contacted Searoad Mersey as it passed No.13 beacon, at 2146, instead of waiting until it was almost at No.15 beacon (less than two minutes before the collision), his VHF message

> "I am over on the south side of the channel, what's your intentions please?" (Signal Station traffic tape 2149-20)

would have provided the Master of Searoad Mersey sufficient time to change to a "starboard to starboard" passing and would have been at a time when his attention was not directed at avoiding No.15 beacon.

Management and Shipboard procedures

The Third Mate of Searoad Mersey had only recently obtained his certificate of competency as Second Mate Class 1 and this was the first occasion he had been on the bridge for port entry as Officer of the Watch. In maintaining the bridge note book, writing up the times of passing the beacons, he was conducting himself as he had done as a cadet on the bridge. He did not monitor other shipping as closely as might be expected.

The Company Operations Manual does not define the responsibilities of the Officer of the Watch under pilotage conditions, although it does refer to the International Chamber of Shipping's "Bridge Procedures Guide". When the Third Mate joined the ship, the Master did not instruct him on his duties and responsibilities.

Under pilotage, both a master and watch officer should monitor the pilot's actions, as outlined in the International Chamber of Shipping's "Bridge Procedures Guide". However, where a master holds a pilotage exemption, this important member of the bridge team is removed and, therefore, even more responsibility falls upon the watch officer.

It is considered that where a master holds a pilotage exemption, it is of the utmost importance that the officer of the watch fully understands his responsibilities and fully monitors all that is going on.

No full passage plan was drawn up on board Searoad Mersey, which should have drawn the Master's attention to the various Notices to Mariners concerning the dredging operations. Although the bottom left hand corner of the ship's chart was annotated with a number of Notices to Mariner's affecting the area, including No. 26/93, these do not appear to have been referred to by either the Master or the Officer of the Watch.

It is most important that proper passage planning, drawing on all information available, is carried out even on vessels engaged on regular, short sea passages.

Port information.

Advice regarding the South Channel dredging operation was promulgated to mariners in Port of Melbourne Authority Notices to Mariners.

Notice to Mariners No.8/93(P) "South Channel remarking and re-alignment", section 5 "Removal of buoys and old beacons/ repositioning of buoys" advised:

> "The No. 15 buoy will be replaced by a smaller light buoy of similar characteristic until dredging works north of the new No. 19 pile have been completed."

Also, section 9 advised:

> "Dredging works to achieve a depth of 12.5 metres on the south side of the new "cut" between Nos. 11 and 13 piles and between new No. 19 pile and No. 15 buoy will be conducted in July 1993. On completion of this work Nos. 11, 13 and 15 buoys will be removed."

Notice to Mariners No.16/93(T) "South Channel" section 2 "Progress of works: remarking and re-alignment of South Channel" advised:

> "Buoys No 11, 13 and 15 [will be] temporarily replaced by smaller buoys displaying the same characteristics. Until dredging is undertaken [towards the end of this year] to widen the eastern end of the South Channel, these buoys will remain to demarcate the southern limits of the channel in that area."

Notice to Mariners No.26/93 advised:

> "Dredging in South Channel by Trailer Suction Dredge A.M.Vella will commence 12th October 1993 operating 24 hours/day and will continue intermittently for approximately 3 months. Spoil will be removed to the spoil grounds...
>
> Mariners should proceed with caution at reduced speed when in the vicinity of the dredge.
>
> The three remaining temporary BUOYS in South Channel (Nos. 11, 13 and 15) are to be moved/ removed to facilitate the dredging works described above and will be permanently removed on completion of the dredging program.
>
> Mariners should be aware that shoal depths may exist up to 50 metres north of the alignment between No.11 and No.13 BEACONS until dredging works have been completed.
>
> Advice on current status of dredging, marking of spoil grounds and deployment of navigation buoys can be obtained from Point Lonsdale Signal Station,
> VHF Channel 12,
> Telephone (052) 521 252"

The advice contained in the three Notices to Mariners is explicit. However, a chart, delineating the three areas to be dredged, would have been beneficial.

Vessel Traffic Service

The Port of Melbourne Authority has installed a Vessel Traffic Service that incorporates radar coverage capability of the port approach, the South Channel and the Port of Melbourne. However, due partially to technical problems, but also to the cost of maintaining a full radar monitoring system for a relative low number of daily shipping movements (16), the radar component is not used to fully monitor shipping movements. The Vessel Traffic Service is confined to radio advice on navigational safety matters provided by the Harbour Control Centre and Point Lonsdale Signal Station.

It is considered that the advice passed by Point Lonsdale Signal Station could have been more definitive, by stating that A M Vella was dredging on the south side of the channel between Nos. 15 and 19 beacons. The phrase "working down towards No.19" is imprecise and open to interpretation, as No.19 beacon marks the eastern end of the South Channel.

Pilotage exemption requirements

The requirements for pilotage exemptions are contained in the Marine Board of Victoria "Code for training and certification of pilot exempt Masters for Victorian ports", adopted on 3 September 1993.

8.1.3 of the Code states:

"Renewal of the [pilotage exemption] certificate will also be subject to the provision of satisfactory evidence that the holder has visited officers of the Port Authority responsible for navigation of vessels within the ports there to be advised of changes in port practices, procedures or Regulations or changes in beacons, light buoys, headlands, channels, soundings, shoals, tides, currents and all other features and phenomena connected with or incidental to the navigation of the port and associated channels and entrances for which renewal is sought."

This requirement places the onus on a pilot-exempt master to keep himself informed, rather than the Port Authority promulgating information on a frequent basis. Under the Code, the Master of Searoad Mersey should have obtained full details of the dredging operations at the first convenient time after receipt of the relevant Notices to Mariners, or of his awareness that dredging was in progress.

Tidal Stream in South Channel

In explaining why Searoad Mersey had made contact with No.15 beacon, the Master was of the opinion that the vessel had been set to the south, on to the beacon, by the ebbing tide.

Advice received from the Port Phillip Sea Pilots and from the Port of Melbourne Authority Survey Office is that the direction of flow of the tide is along the direction of the channel.

Alcohol

Breathalyser tests of both the Master and Dredge Master of A M Vella indicated that both had consumed alcohol during the preceding hours.

The Dredge Master stated that the Master had relieved him on the bridge at about 2300, after the load had been dumped in the spoil ground following the collision, telling him to go to bed. However, he found he was unable to sleep and had drunk three or four stubbies with the Engineers, prior to the vessel berthing at Williamstown. Such an amount is compatible with the test result.

Although always "on call", the Master was not on duty at the time of the collision and the fact that he may have consumed some alcohol is not material to the incident.

It is not considered that the actions of any persons directly involved in the collision were affected by alcohol.

However, it is appropriate to remark on the fact that the Master stated he had drunk two small whiskies between 1830 and 1930, two hours twenty minutes before the collision and six and a half hours before the test at 0157 on 1 February. The average body is able to process the alcohol content of one standard drink (0.015 blood alcohol level) per hour, which would indicate that he had either consumed alcohol closer to the time of the test, or had consumed more than claimed.

Fatigue

Although Searoad Mersey maintains a busy schedule, the Master stated that he was able to obtain sufficient sleep and rest, and the indications were that this was the case, there having been no unduly heavy weather or extended hours of work to deprive him of sleep.

The eight hour watch system operated by the bridge teams aboard A M Vella, at their own choice, is of interest to the Inspector. Those involved found this to best suit their needs, providing a reasonable period of unbroken sleep. However, the eight hours work, eight hours rest system means that a person sleeps at different times on alternate nights, which does not conform with the body's natural circadian rhythms and could, therefore, be expected to create chronic fatigue after a time.

Conclusions

These conclusions identify the different factors contributing to the accident and should not be read as appartioning blame or liability to any particular organisation or industry

It is considered that the collision was brought about by a series of factors

1. In the first instance, the Master of Searoad Mersey did not ascertain the actual position of A M Vella in the channel.

2. Having acquired A M Vella as a target on the ARPA, the Master conducted Searoad Mersey on an assumption based on the initial information from the ARPA and did not properly monitor A M Vella's movements.

3. In endeavouring to maintain a "port to port" passing, the Master kept the ship on the southern boundary of the channel, with the result that it made contact with No.15 beacon.

4. When Searoad Mersey made contact with No.15 beacon, the Master lost his orientation, over reacted and applied excessive helm.

It is further considered that:

5. There was no momentary failure of Searoad Mersey's steering gear.

6. The apparent alteration of course to port by A M Vella, observed by the Master of Searoad Mersey, was a momentary swing to port, under port helm, as the dredge head was raised from the seabed.

7. Early VHF contact between Searoad Mersey and A M Vella would have been prudent.

8. The advice contained in the Port of Melbourne Authority's three Notices to Mariners was explicit, however, a chart delineating the three areas to be dredged would have been beneficial.

9. Advice passed to vessels by Point Lonsdale Signal Station should provide full, definitive information regarding any operations or changes in navigational aids.

10. Where a master holds a pilotage exemption, it is of the utmost importance that the officer of the watch fully understands his responsibilities and fully monitors all that is going on.

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 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, Third Mate and Watch Integrated Rating of Searoad Mersey;
the Master, Dredge Master and Dredge Mate of A M Vella;
the Port of Melbourne Authority;
the Marine Board of Victoria.

A submission was received from the Port of Melbourne Authority regarding Notices to Mariners concerning the dredging operations and the Vessel Traffic Service and amendments have been made to the text of the report to reflect the additional information.

The Port of Melbourne Authority also submitted:

> *"The Searoad Mersey is a regular caller to Port Phillip and from previous voyages should have been quite familiar with the dredging operations that were being conducted in South Channel. Thus it is quite understandable, under the circumstances, that the information relayed to Searoad Mersey by Point Lonsdale was relatively brief. Masters of other ships less familiar with the day to day operations in South Channel would naturally be given greater detailed information."*

The managers of Searoad Mersey provided a submission in which they too referred to the lack of information provided to the ship's Master by Point Lonsdale Signal Station.

The managers submitted that the use by A M Vella of the lights prescribed by rule 27 (d) (ii) of the International Regulations for Preventing Collisions at Sea - two all-round green lights in a vertical line to indicate the side on which another vessel may pass - would have prevented the incident from happening. Rule 27(d) prescribes additional signals to be displayed by a vessel engaged in dredging or underwater operations **when an obstruction exists**.

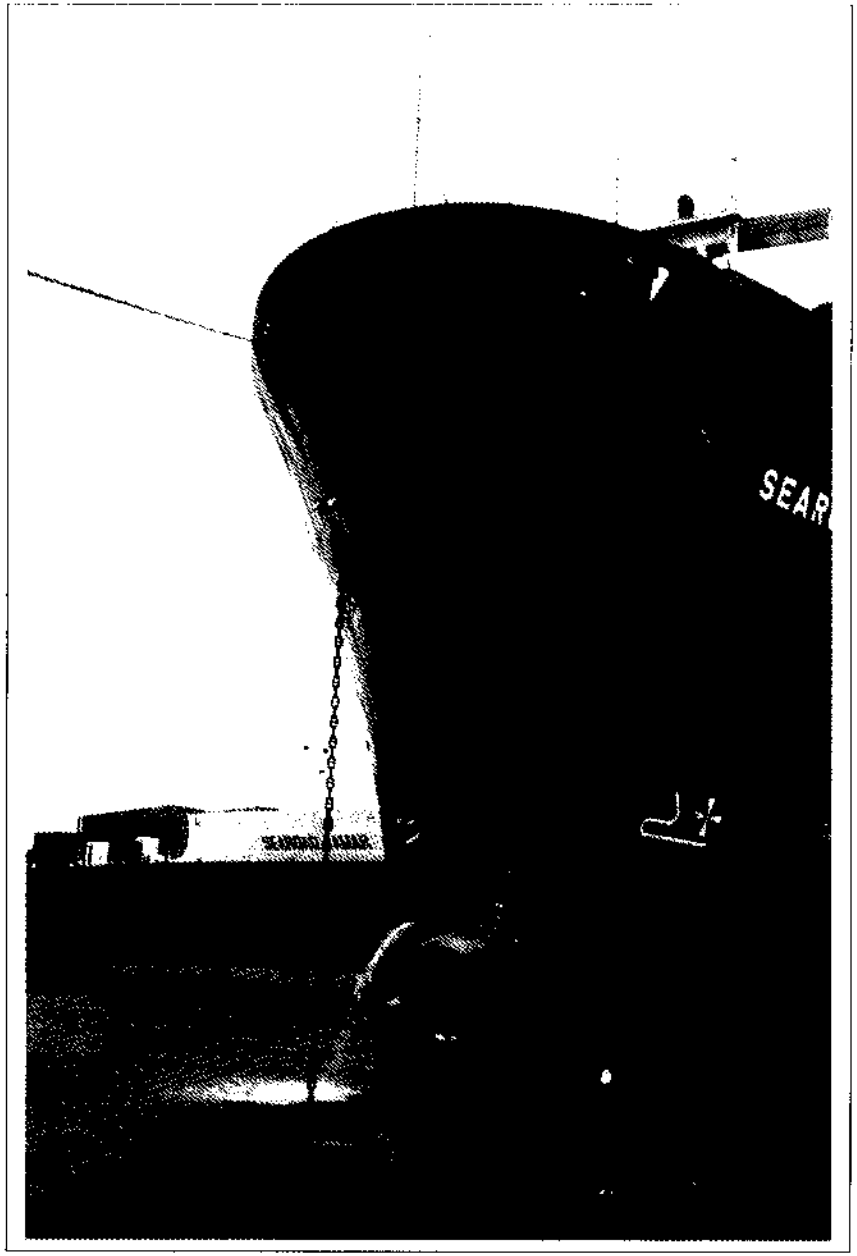
They also provided a number of arguments based on interpretations of the International Regulations for Preventing Collisions at Sea.

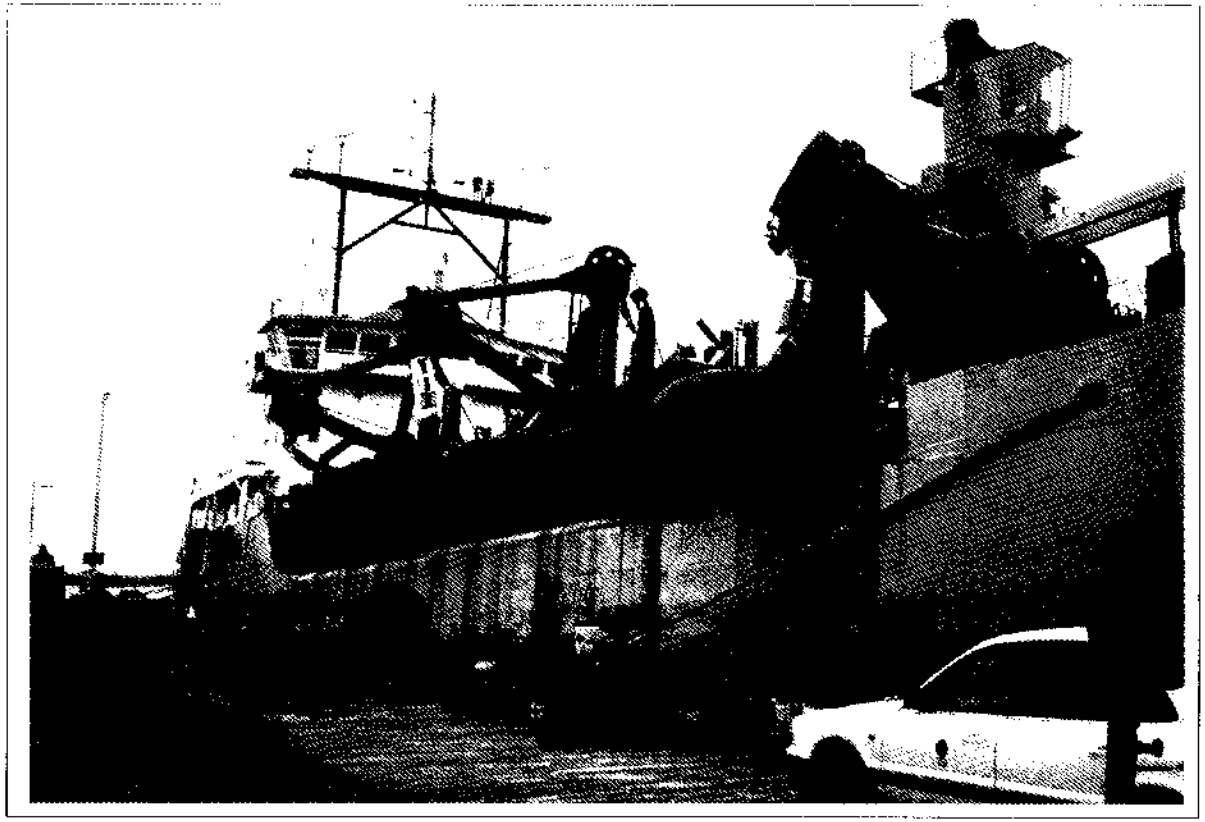
Particulars of ship

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
Net 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

Particulars of ship

Name	A M Vella
Flag	Australian
Owners	Port of Melbourne Authority
Type	Self propelled, trailing suction, hopper dredger
Builder	State Dockyard, Newcastle, NSW
Year	1973
Classification	Bureau Veritas
Length overall	96.01m
Breadth	16.61m
Maximum draught	8.03m (sheltered waters)
Gross tonnage	4121
Propellers	Two
Rudders	Two
Bow thruster	One





DAMAGE TO SEAROAD MERSEY BULBOUS BOW AND BOW PLATING AND DAMAGE TO AM VELLA SHIP'S SIDE PLATING AND DREDGE GEAR