Report 96-214

Collision between the container vessel *Sydney Express*

and the fishing trawler *Maria Luisa*

Wellington Heads

29 December 1996

Abstract

On Sunday, 29 December 1996, at approximately 2233 hours, a collision occurred at the entrance to Wellington Harbour between the container vessel *Sydney Express*, which was outbound, and the fishing trawler *Maria Luisa*, which was inbound. The *Maria Luisa* capsized in the collision and five of the six crew members lost their lives. Safety deficiencies identified included poor bridge resource management on the *Sydney Express* and contravention of the collision regulations by the *Sydney Express*, *Maria Luisa* and a third vessel, the yacht *Soundsgood*. Recommendations were made relating to bridge resource management training, and a mandatory traffic management scheme for Wellington Harbour.

The Transport Accident Investigation Commission is an independent Crown entity established to determine the circumstances and causes of accidents and incidents with a view to avoiding similar occurrences in the future. Accordingly it is inappropriate that reports should be used to assign fault or blame or determine liability, since neither the investigation nor the reporting process has been undertaken for that purpose.

The Commission may make recommendations to improve transport safety. The cost of implementing any recommendation must always be balanced against its benefits. Such analysis is a matter for the regulator and the industry.

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Transport Accident Investigation Commission

Marine Accident Report 96-214

Vessel Particulars:	***Sydney Express***	***Maria Luisa***
Type:	Container	Fishing Trawler
Class:	VII: Foreign Going (SOLAS)	X: fishing (Up to 100 nautical miles off the NZ coast)
Length (overall):	117.88 m	19.83 m
Length (registered):	110.04 m	18.46 m
Breadth:	19.42 m	6.4 m
Draught (loaded):	7.30 m	3.0 m
Gross Tonnage:	5552 t	82.94 t
Construction:	Steel	Steel
Built:	Berne, West Germany in 1996	Auckland in 1983
Propulsion plant:	One 5280 kW MAN B & W 12V 32/40 diesel-engine driving a single controllable-pitch propeller	One 317 kW Caterpillar diesel-engine driving a single fixed-pitch propeller
Service speed:	17 knots	8 knots
Owner:	Marex mbH Co *Sydney Express*	Rockfish Fishing Ltd
Operator:	Tasman Express Line Ltd	Owner
Port of registry:	Douglas (Isle of Man)	Wellington (New Zealand)
Persons on board:	Crew: 15 Supernumerary: 1	Crew: 6
Injuries:	Nil	Crew: 5 (fatal) 1 (minor)
Nature of damage:	Slight impact damage to shell plating on bulbous bow	Moderate impact damage to shell plating: extensive salt water damage to equipment (vessel sank)

Location: Wellington Harbour entrance channel, between Barrett Reef and Pencarrow Head

Date and time: Sunday, 29 December 1996, at 2233 hours[1]

Investigator in Charge: Capt. T Burfoot

[1] All times in this report are NZDT (UTC + 13 hours)

Sydney Express

***Maria Luisa* on the slip after salvage**

1. Factual Information

1.1 History of the voyage (*Sydney Express*)

1.1.1 The *Sydney Express* had made an overnight trip from Lyttelton to Wellington, arriving off Wellington Heads at 0830 hours on Sunday, 29 December 1996. The Master, who held a pilot exemption for the Port of Wellington, conned the vessel into the harbour and berthed it starboard side to the east end of Thorndon Container Terminal. The *Sydney Express* was all fast at 0930 hours.

1.1.2 Cargo operations commenced at 1130 hours with containers being exchanged throughout the day and into the late evening. The *Sydney Express* was scheduled to depart Wellington at 2200 hours that evening. At 2040 hours the third mate tested the bridge equipment in preparation for the departure of the vessel.

1.1.3 The following tests were performed on the bridge equipment:

- Manual steering from tiller number one position with both steering gear motors running (both were left running)
- Manual telegraph link between the engine room and the bridge
- The propeller pitch was tested from the bridge and engine room control positions
- The two bridge very high frequency (VHF) radios were switched on (one on channel 16 and the other on channel 14)
- The 2182 single side band watch receiver radio was switched on
- The depth sounder was switched on
- The navigation lights were tested and left on
- The gyro compass repeaters were checked for alignment with the master gyro compass
- The master gyro compass was compared with the magnetic compass heading
- One radar set was switched on and its picture adjusted
- The whistle was sounded

1.1.4 As was the usual practice, the two GPS navigation units had been left on from the time the vessel arrived in Wellington. One GPS was interfaced with both radar sets. A series of co-ordinates (waypoints) were programmed into that GPS to show the preferred route out of Wellington Harbour. The waypoints and the tracks between them were electronically super-imposed onto the screen of whichever radar set was in use. The same waypoints and tracks were plotted on the working chart in ink (see Figure 1). The track broadly followed the recommended courses in the Port of Wellington Port and Navigational Information booklet for exempt masters.

1.1.5 The third mate noted two deficiencies in the bridge equipment; the electro-magnetic speed log and the starboard bridge-wing gyro compass repeater were not working. Although this was not recorded in the bridge log book, the master was aware of each deficiency; the speed log having been faulty for some six months and the starboard gyro repeater for the previous two days.

1.1.6 Cargo operations were complete at 2140 hours. The crew spent the following 20 minutes securing the cargo and the vessel for sea. The master arrived on the bridge shortly before 2200 hours and made his own checks on the operational status of the bridge equipment, and in doing so, set the radar to the 1.5 mile range scale.

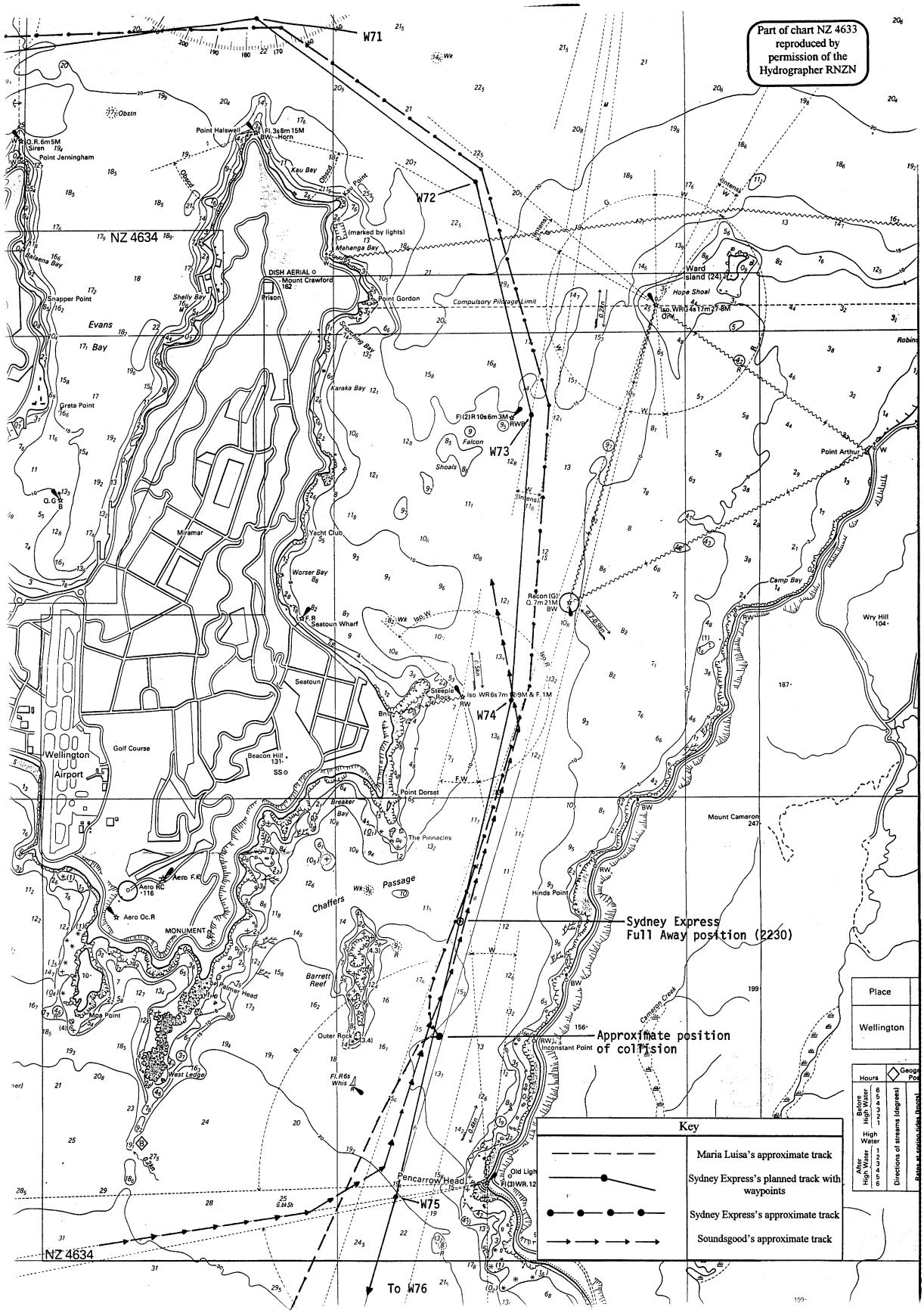

Figure 1
Part of chart NZ4633
Showing approximate tracks and key positions

1.1.7 At about 2155 hours the master was in contact with the first and second mates using portable VHF radios selected on channel 15. The first mate was in charge of the forward unmooring team, the second mate was in charge aft and the third mate was on the wharf reading the sailing draught, which he later recorded as 5.8 m forward and 6.6 m aft. The helmsman was part of the aft unmooring team.

1.1.8 By 2200 hours the moorings had been reduced to one breast line and one spring line at each end (traditionally referred to as "singled up to one-and-one").

1.1.9 At 2201 hours the master called Wellington Harbour Radio (*Beacon Hill*) on VHF channel 14, informing them that the *Sydney Express* was singled up and requesting permission to depart.

1.1.10 *Beacon Hill* replied (Transcript of VHF recording at *Beacon Hill*):

> Roger thanks for that; got the Condor 10 inbound. She is just past the rear lead area; otherwise we're sitting out to the south we've got the Phantom Of The Straits; she's waiting for these BT Global Challenge vessels to arrive; weather-wise, at the entrance we're calm with no swell and that's the good news.

1.1.11 The master replied "Roger sir many thanks for that".

1.1.12 The third mate, on arrival on the bridge to assume his role as officer-of-the-watch, overheard Wellington Harbour Radio passing the traffic movements to the master.

1.1.13 At 2202 hours the remaining mooring lines were let go and the master began manoeuvring the *Sydney Express* off the berth. He had hands-on control of the controllable-pitch propeller, the helm and the bow thruster from the starboard bridgewing console.

1.1.14 At 2205 hours the third mate recorded the vessel as being clear of the berth and proceeding outwards. At about this time the helmsman arrived on the bridge, having been released from the aft unmooring team, and the master passed manual steering control to him at the number two helm position inside the bridge (starboard of the centre-line of the vessel). The propeller pitch control was set at about position 4 (on a scale of 0 - 10) and the helmsman given a course of 080° gyro, to steer.

1.1.15 Between 2205 and 2230 hours no further entries were recorded in the bridge movement log book[2] nor were any positions marked on the chart. The *Sydney Express* was not fitted with a course recorder nor a propeller pitch recorder. The courses steered, track followed and speeds attained are estimated based on the recollections of the master, third mate and helmsman.

1.1.16 The master was navigating the vessel by eye using the various harbour navigation lights to monitor the position of the vessel in the harbour and harbour channel. He occasionally glanced at the radar to check the position of the vessel in relation to the GPS referenced track displayed on the radar screen. The third mate was using a similar style of navigation to the master to monitor the progress of the vessel. According to him "We had been in and out of that port a number of times. The master had a lot of experience coming in and out as well so there was no specific reason to actually plot anything on the chart".

1.1.17 The weather was partly cloudy and fine. There was no significant wind and the sea was glassy. A half-metre swell was running near the entrance to the harbour. Visibility was excellent.

[2] The book in which times and events are recorded when the vessel is entering or leaving port.

1.1.18 After leaving the wharf the bow thruster had been shut down as it had negligible effect at higher speeds. The master was adjusting the propeller pitch himself and, in the absence of a reliable log, was using the GPS calculated speed over the ground displayed in the top right corner of the radar screen as an indicator of the speed of the vessel.

1.1.19 The depth sounder was set on the 0 to 50 m range and was giving a digital readout for the depth of water under the keel. The one radar set that was operating, was still set on the 1.5 mile range scale in the north-up, relative-motion mode and remained so throughout the passage until the time of the collision.

1.1.20 The unmooring teams forward and aft continued to secure their mooring stations as the *Sydney Express* tracked across the entrance to Evans Bay towards the waypoint north of Point Halswell (Waypoint 71 on Figure 1). A floodlight on the foremast of the vessel was illuminating the forward mooring station (forecastle). In addition a row of low-wattage lights recessed into the hatch coamings on each side of the vessel were illuminating the maindeck walkways from the accommodation to the bow.

1.1.21 While the maindeck walkway lighting was not visible from the bridge, the forecastle lighting was noticeable. According to the master, this did not affect his night vision or his ability to keep a proper lookout.

1.1.22 As the vessel neared Point Halswell the third mate recalled overhearing a conversation on VHF channel 14 between *Beacon Hill* and what he thought was a yacht, during which he heard the *Sydney Express* mentioned. The master recalled hearing "other traffic" on the VHF.

1.1.23 At about waypoint 71 the master ordered the helmsman to steer approximately 125° gyro to make for waypoint 72. The master recalled the speed of the vessel was about 12 knots at that time. From that point the recollection of the master, third mate and the helmsman as to the precise helm orders and courses steered was limited. The master maintained that the vessel kept broadly to the GPS track displayed on the radar screen. The third mate recalled that the vessel stayed within one cable either side of the track.

1.1.24 Between waypoints 71 and 72 the master gradually increased the propeller pitch setting to 7. Near waypoint 72 the master gave the helmsman a course of 165° gyro to make for waypoint 73 near Falcon Shoals Light Beacon. The course on the chart between waypoints 72 and 73 was 167° true.

1.1.25 As the *Sydney Express* tracked towards Falcon Shoals Beacon both the master and the third mate saw two vessels on their starboard bow. According to them each was showing a red sidelight only. The two vessels appeared to them to be in the channel near the harbour entrance. The red lights of each vessel appeared to be of similar intensity. The third mate commented that one of them must be the yacht that he had overheard talking to *Beacon Hill*. The master paid little attention to the two vessels as he was concentrating on the approaching course alteration point off Falcon Shoals to bring the *Sydney Express* into the intensified sector of Somes Island sectored leading light.

1.1.26 No attempt was made by the master or third mate to identify, plot or determine if a risk of collision existed with either of the two vessels. They assumed, because they saw only a single red light displayed by each vessel, that they were vessels under sail. Later they both commented that it was not worthwhile starting a manual radar plot as it takes at least six minutes to attain an accurate plot during which time their own course and speed needed to be steady.

1.1.27 At about 2220 hours, when Falcon Shoals Beacon was broadly abeam to starboard (waypoint 73) the master ordered a course change to 185° gyro. Once steadied on the new course the master began to take more interest in the two vessels in the channel ahead of his vessel. The Barrett Reef Buoy was visible, flashing red every six seconds, and the bearings of the two vessels were between the buoy and the course the ship was taking.

1.1.28 The master did not observe the two vessels on radar so was unable to determine how far off they were. One was, in his estimation, half a point[3], the other one point on the starboard bow of the *Sydney Express*. He estimated that both vessels were on the port side of the channel (western sector of the leads) and crossing over to the starboard side.

1.1.29 Somewhere between Falcon Shoals and Steeple Rock Beacons (Waypoints 73 and 74), but according to the third mate, before the *Sydney Express* passed the front leading light (Racon G) the anchors were secured and the light illuminating the forecastle was switched off.

1.1.30 At about 2225 hours the master gave a helm order "Starboard five" and told the helmsman to steer 195°. When the heading was almost on 195 the master ordered 196 degree course. The corresponding GPS track for that sector was 193° which, if followed, converged with the line of the leading lights, meeting that line at waypoint 75 off Pencarrow Head.

1.1.31 The master chose the course of 196 because of the two vessels ahead which were, in his opinion, west of the leads and moving across to starboard. Course 196 would keep the *Sydney Express* parallel to, and west of, the leading line.

1.1.32 Once the *Sydney Express* had steadied on the course of 196 the master estimated that the first of the two approaching vessels (later identified as the yacht *Soundsgood*) was "fine on the starboard bow" and the second (the *Maria Luisa*) was about one point on the starboard bow. The third mate later stated that the yacht was fine on the port bow. The helmsman said later that it was right ahead.

1.1.33 At about 2228 hours the master told the third mate that Full Away[4] would be at 2230 hours. At about this time the propeller pitch control was moved up to 10 (full). The GPS indicated the speed of the vessel over the ground was 14 to 15 knots.

1.1.34 The third mate telephoned the engine room and told the duty engineer that Full Away would be at 2230 hours. The master gave the helmsman a helm order of, "starboard 5", to increase the passing distance between the *Sydney Express* and the yacht. The helmsman repeated the helm order and applied starboard 5 helm. The third mate, who had been speaking to the engine room on the telephone, did not hear the helm order.

1.1.35 After the yacht had passed 50 to 100 m off the port side of the *Sydney Express* the master focused his attention on the *Maria Luisa* that was "fine on his starboard bow and still showing a red". Aware that the *Sydney Express* was west of the leading line in the channel before taking the evasive action to avoid the yacht, the master became concerned that his vessel was too close to Barrett Reef for his liking. He decided to "continue showing the *Maria Luisa* a green" and alter course to port. He thought this was an appropriate action to take for the following reasons:

- He felt he did not have sufficient sea room to alter his course further to starboard; and

[3] One point equals 11.25° of arc.
[4] End of harbour passage and start of the sea voyage.

- In his past experience small vessels approaching the channel from the west "usually nipped around to port and showed me a green". He said he wanted to encourage the *Maria Luisa* to do the same.

1.1.36 After the master's starboard 5 helm order the helmsman's and master's accounts of events differed significantly.

1.1.37 The master stated that after the yacht had passed he ordered the helm to midships and possibly steady on a course which he vaguely recalled being 200°; after a short delay he gave a new course to steer of 185° (10° to port of the 196° course the helmsman had last steadied on); he felt the vessel heel slightly to starboard; looked up at the rudder angle indicator; saw that the rudder was over 15 - 20° to starboard; said "[**][5] You have gone the wrong way man"; and ordered the rudder hard to port.

1.1.38 The helmsman later stated that he did not hear any order to amidships the helm or steady on a course. According to him the next order he got after starboard 5 was "Steer 185". Having received the order to steer 185° he took a moment to determine in which direction 185 was, and was about to apply port helm when the master told him that he still had the wrong helm on. He had begun to apply port helm when the master ordered hard port rudder. The helmsman maintained that at no time did he put the rudder further than 5° to starboard.

1.1.39 The third mate, having informed the engine room of the planned 2230 hour Full Away, stood by the bridge telegraph. At 2230 hours he rang Full Away on the telegraph and walked out onto the port bridgewing. He took a visual bearing of Pencarrow Light for the purpose of plotting a 2230 position on the chart to mark the Full Away position. As he took the bearing he noted the yacht passing abeam at a distance of 50 to 100m. Having taken the bearing the third mate looked aft and observed the leading lights off-set to the west, as he expected, but still in the intensified white sector.

1.1.40 The third mate walked back through the wheelhouse into the curtained-off chart space, plotted the bearing of Pencarrow Light on the chart, marked the position where the bearing line intersected the inked course line, labelled the position as 2230, noted the time and Pencarrow bearing as Full Away in the bridge movement log book, walked back out into the wheelhouse, picked up the binoculars and looked directly at the *Maria Luisa*.

1.1.41 The third mate exclaimed "[**][5] it's a fishing boat and it's [**][5] close. Immediately following this the third mate heard the master order the helmsman to steer 185°. Still observing the *Maria Luisa* through the binoculars, the third mate heard the master say "[**][5] you are going the wrong way man, hard to port". The third mate then heard the helmsman say "oh sorry" and looked up and saw the rudder angle indicator at 20° to starboard moving back to midships. He noticed the *Maria Luisa* was still fine on their starboard bow before the bow of the *Sydney Express* began swinging to port.

1.1.42 As the *Sydney Express* began swinging rapidly to port, the *Maria Luisa*, which was close enough for the master and third mate to make out the shape of its hull, appeared to them to be making a rapid turn to its starboard. The master, who expected the *Maria Luisa* to "see what I was doing and nip around to port and show me a green" said, "What the [**][5] is he doing?". He reached in front of the helmsman and sounded one medium (neither short or long) blast on the whistle "to wake him up" and moved the propeller pitch control lever to pitch 10 Astern (full astern).

[5] Expletive deleted.

1.1.43 The *Maria Luisa* disappeared from view under the starboard bow of the *Sydney Express* and emerged on the port side shortly after. Initially the master thought the *Maria Luisa* "was going to make it" but at about 2233 hours the two vessels collided, the bulbous bow of the *Sydney Express* making contact initially with the port quarter of the *Maria Luisa*. The *Maria Luisa* was capsized during the collision.

1.1.44 The master of the *Sydney Express*, aware that his ship was heading towards the eastern shore-line, made several changes of helm and propeller pitch to regain the centre of the channel, turn his vessel around and render assistance to the *Maria Luisa*. The third mate reported the collision to *Beacon Hill*.

1.1.45 A rescue boat was launched from the *Sydney Express* and a search for the crew from the *Maria Luisa* made. One trainee deck-hand from the *Maria Luisa* was rescued. *Beacon Hill* initiated a search and rescue operation involving several vessels and aircraft co-ordinated by the Wellington Police Launch. The up-turned hull of the *Maria Luisa* was towed in to Seatoun where it sank off the Seatoun Wharf. The bodies of four other crew members were recovered from the hull, a fifth crew member is missing, presumed drowned.

1.2 History of the voyage (*Maria Luisa*)

1.2.1 The fishing trawler *Maria Luisa* was based in Wellington and fished predominantly around the central New Zealand area. The average length of trips was four days.

1.2.2 At about 1100 hours on Saturday, 28 December 1996, the *Maria Luisa* departed Wellington for fishing grounds in and around Cook Strait. On board was the master, one Qualified Fishing Deck-hand (QFDH), two trainee deck-hands and two observers (6 in total).

1.2.3 The master intended to fish for two days and return to Wellington before a forecast ex-tropical cyclone passed over the area.

1.2.4 Details of the movements of the *Maria Luisa* over the following two days are sketchy. The only crewman to survive the accident was one of the trainee deck-hands, who had little to do with the navigation of the vessel. The trainee recalled the master mentioning the 18 mile mark. According to the owner of the *Maria Luisa* this referred to the distance off Cape Campbell. There were several fishing grounds in that area marked on the chart recovered from the vessel after the accident.

1.2.5 The trainee recalled the *Maria Luisa* heading in a south or south-west direction after leaving Wellington Harbour. The crew fished from about 1600 to 2300 hours on Saturday, after which they slept while the vessel drifted exhibiting a not-under-command[6] signal.

1.2.6 At about 0400 hours on Sunday the *Maria Luisa* resumed fishing, completed two trawls and started back towards Wellington at about 1700 hours. The master slept for some of the return trip, leaving the QFDH on watch.

1.2.7 At about 2100 hours the master telephoned the owner to let him know that they were heading back to Wellington. He told the owner that there were a few things that needed fixing. One item was the radar set. The master also telephoned a radar technician and requested that he attend the vessel the next day to repair the radar. It was not established whether the radar was unserviceable before the *Maria Luisa* departed the wharf, or if it failed at sea.

[6] Two all-round red lights, one above the other, can be exhibited by *a vessel which through some exceptional circumstance is unable to manoeuvre as required by these rules* (International Collision Regulations) *and is therefore unable to keep out of the way of another vessel.*

1.2.8 At about 2145 hours, when the *Maria Luisa* was an estimated five miles from the Barrett Reef Buoy, the master took the con from the QFDH, who remained in the wheelhouse. The surviving trainee deck-hand was standing on the port side deck outside the wheelhouse door. The three remaining crew were down in the galley watching television.

1.2.9 The sea was calm and visibility good. The autopilot was engaged. At 2219 hours, when the *Maria Luisa* was about two nautical miles out from Barrett Reef Buoy the master called *Beacon Hill* on VHF radio channel 14 and reported that they were "a couple of miles off the buoy on the way up thanks". The trainee recalled looking at the GPS monitor which indicated the speed over the ground of the *Maria Luisa* was 6.2 knots.

1.2.10 *Beacon Hill* replied (transcript of VHF recording at *Beacon Hill*):

> Roger thanks for that; at this stage we've got *Sydney Express*; she should be off the terminal out bound at the moment; we'll have the Aratika out bound in your time but at 2300; got the Toanui sailing ex Burnham so will have one tug heading off down there shortly.

1.2.11 The master of the *Maria Luisa* replied:

> Roger, thanks for that we'll catch you next time out; cheerio.

1.2.12 Some time after the master had reported to *Beacon Hill* the crew raised and secured the paravanes which were extended out on each side of the *Maria Luisa*. The deck lights were switched on during this operation and were turned off after its completion. The trainee climbed on top of the wheelhouse to secure the paravanes after they had been raised. While he was up there he distinctly recalled seeing their white masthead light burning brightly.

1.2.13 Some time before the *Maria Luisa* passed Pencarrow Head the trainee observed the master using the autopilot to alter course to starboard, which was, in his opinion, a navigational adjustment. Shortly after, the trainee left the vicinity of the wheelhouse to get a drink of water. As he was going down the stairs to the galley he heard someone in the wheelhouse say that there was a small vessel up ahead (the *Soundsgood*). The trainee, although away for about 30 seconds only, did not see the *Soundsgood* when he returned to the wheelhouse.

1.2.14 The trainee was certain that the *Maria Luisa* was approaching the entrance on the starboard side of the channel (East of the leading lights). He was certain of this because:

- Both of the leading lights were to port of the bow of the *Maria Luisa*, although he could not recall if they were off-set from each other
- Pencarrow Light appeared to him to be close on their starboard side.

1.2.15 When the *Maria Luisa* was off Pencarrow Head the master exclaimed, "look, there is a big ship. What the hell is it doing?" The trainee looked out of the wheelhouse door to get a better look. He saw the master make another small alteration of course to starboard using the autopilot.

1.2.16 When the trainee first looked at the big ship (*Sydney Express*) he saw a strong red sidelight and a faint green sidelight. He did not see any white masthead lights. As he looked he saw the aspect of the *Sydney Express* change. The green light became brighter. He deduced from this that the *Sydney Express* was turning to port "on to us".

1.2.17 The trainee leaned into the wheelhouse and said to the master "red to red, bad Karma". The QFDH leaned out of the wheelhouse door, had a quick look, hurried into the wheelhouse and spoke to the master. The trainee noticed the *Maria Luisa* turning rapidly to starboard. As he looked at the *Sydney Express* he noticed its red sidelight disappear. Shortly after he heard a single blast on a whistle and the bulbous bow of the *Sydney Express* collided with the *Maria Luisa* on its port quarter.

1.2.18 The port side of the *Maria Luisa* was lifted out of the water which buried the starboard rail in the water. The vessel capsized and the trainee found himself underwater pinned against the railing by the force of the water. After a short time the water pressure decreased and he was able to escape and surface beside the upturned hull.

1.2.19 The trainee kicked off his boots and swam clear of the hull for fear of it sinking and "sucking" him down with it. Once it became apparent to him that the *Maria Luisa* was not sinking he swam back and climbed onto the hull, from where he was eventually rescued by the crew of the rescue boat launched from the *Sydney Express*.

1.3 History of the voyage (The yacht *Soundsgood*)

1.3.1 On Sunday, 29 December, the *Soundsgood*, an 11 m sloop, was returning from the Marlborough Sounds in South Island via Tory Channel to Wellington. On board was the owner/skipper, his two daughters and one son. During the evening the *Soundsgood* rounded the south coast of Wellington and approached Wellington Harbour entrance, from the west.

1.3.2 The skipper had entered Wellington Harbour on three previous occasions, the last being about one year before. He was navigating the vessel by eye using the small scale chart NZ 46. He was not steering by compass.

1.3.3 The yacht was under power for most of the way but had its sails up to help steady the boat. At about 2000 hours the gentle breeze that had been blowing dropped so the sails were taken down. Wellington Harbour entrance was visible as the yacht approached between the red and white sectors of the Pencarrow sector light located on Pencarrow Head.

1.3.4 The speed of the *Soundsgood* was 4.5 knots and since dusk the yacht had been exhibiting a tricolour[7] lantern at the top of the mast. The yacht was fitted with a white masthead light near one of the spreaders for exhibiting when it was operating as a power-driven vessel; however, it had not been switched on, and had it been it would have been under the tricolour lantern. The skipper and two of the children were in the cockpit; the youngest daughter was asleep in the cabin. The VHF was switched on channel 16.

1.3.5 Shortly before 2200 hours the skipper became aware of the navigation lights belonging to a small vessel (the *Maria Luisa*) on his starboard bow which he thought was approaching broadly from the south. At about the same time the skipper realised that Barrett Reef Buoy was well inside their course line so he began to angle across into the channel intending to pick up the intensified white sector of Somes Island sector light. As the *Soundsgood* altered course bringing the *Maria Luisa* astern the skipper noticed its two sidelights and a single white masthead light. The *Maria Luisa* appeared to be following and "possibly closing" with them.

1.3.6 Shortly after passing Barrett Reef Buoy to port and with their vessel in the white intensified sector of Somes Island Light the skipper observed the sidelights and two masthead lights of the *Sydney Express* at an estimated 1.5 miles away and on collision course with their yacht (the two masthead lights were in line).

[7] A lantern where the sidelights and sternlight are combined as one sectored light.

1.3.7 The skipper of the *Soundsgood* made a large alteration in course to starboard to avoid collision. Shortly after making the alteration he saw the *Sydney Express* alter course to starboard also. Seeing this, the skipper altered his course back to port but still kept slightly starboard of his intended course line.

1.3.8 According to the skipper of *Soundsgood* the two vessels passed in the channel near the north end of Barrett Reef with 50 to 100m clearance, quite a large passing distance in his opinion. He stated that the *Soundsgood* was west of the main leading line at the time of passing. At some time before passing the *Sydney Express* the son recalled looking back and seeing the *Maria Luisa* "almost directly behind us, perhaps slightly to starboard of us".

1.3.9 Once the *Sydney Express* had passed, the crew of the *Soundsgood* paid little attention to what was behind them until they heard the whistle of the *Sydney Express*. They looked back and saw from the silhouette of the ship that it had altered to port across the channel, obscuring the *Maria Luisa*. They assumed from this manoeuvre that the *Sydney Express* was manoeuvring to rendezvous with a pilot launch. Shortly after, the skipper of the *Soundsgood* changed course to port and headed towards Worser Bay to leave the channel.

1.4 Beacon Hill Signal Station (*Beacon Hill*)

1.4.1 The signal station is located on *Beacon Hill* at an elevation of 131 m and overlooks the harbour entrance from Point Gordon to Palmer head and out to about two miles south of Pencarrow Head. The operator was due to start his duty at 1800 hours on Sunday, 29 December. He arrived early for his shift at 1630 hours and took control of the station.

1.4.2 He checked the daily shipping orders which show the projected shipping movements for the day. He noted that the *Sydney Express* was due to sail at 2200 hours and that the master was an exempt master.

1.4.3 The operator remembered the radio call with the *Sydney Express* (2201 hours) and subsequently with the *Maria Luisa* (2219 hours). The *Maria Luisa* was not on his shipping orders but that was not unusual. Fishing and other small commercial vessels were encouraged to use the reporting scheme when entering, departing or moving within harbour limits. Commercial vessels operating under a Wellington Regional Council Licence were required to do so.

1.4.4 At the time the *Maria Luisa* reported in, the *Sydney Express* was still north of Point Halswell and had not then entered into his field of view; therefore, the operator simply reported to the *Maria Luisa* that the *Sydney Express* was "off the terminal and outbound".

1.4.5 After the *Maria Luisa* reported in two miles from the buoy the operator did not relay this new information to the out-bound *Sydney Express*; instead he assumed the *Sydney Express* would be monitoring VHF channel 14 and would have heard the exchange of information with the *Maria Luisa*.

1.4.6 At 2223 hours (four minutes after the *Maria Luisa* reported in) the rail ferry *Aratika* called *Beacon Hill* on VHF channel 14 and advised that they expected to be away from the berth at 2235 hours.

1.4.7 The operator replied:

> 2235; roger thanks for that; we got the *Sydney Express* outbound at the moment; she is between the leads so she is going to be well clear of you; otherwise we got the fishing vessel Santa Monica (*Maria Luisa*) off to the south heading up our way; weather-wise we're still calm and no swell.

1.4.8 When the *Sydney Express* came into the operator's field of view off Point Gordon he noted that it appeared to be well lit as though the crew were still lashing cargo on deck. He was not surprised as, in his experience, this often happened. He recalled the deck lights being switched off some time before the *Sydney Express* reached Steeple Rock Light.

1.4.9 Although the operator did not have the signal station radar set in operation he judged that the *Sydney Express* remained on its starboard side of the channel (west of the leading lights) until the time of the collision. This judgement was made based on his eight years experience as signal station operator. He worked on a number of reference points within and outside the signal station and was used to confirming his estimates with reference to the station radar.

1.4.10 The operator saw the *Maria Luisa* when the vessel was about one mile off the Barrett Reef Buoy. He noted that it had deck lights switched on also, although he was still able to make out its red sidelight and white masthead light.

1.4.11 He judged that the *Maria Luisa* had approached the harbour entrance from the west or south-west, then angled across the port side of the channel (western side) and was closer to the centre of the channel than it had been earlier (within the white intensified sector of the lead light) by the time the vessel crossed a line between the Barrett Reef Buoy and Pencarrow Head. He was not surprised at the line of approach the *Maria Luisa* took, as from his experience most fishing vessels and other small craft adopted this approach when entering the harbour from the west or south-west.

1.4.12 The operator switched on the light in the signal station to log the time of 2236 hours when the *Maria Luisa* crossed between Barrett Reef Buoy and Pencarrow Head (the station clock was later found to be four minutes fast). He did not look at either vessel again before the collision. He did not see the *Soundsgood* at any time.

1.4.13 At about 2233 hours the operator heard a "garbled" message on VHF channel 14, followed shortly after by a message from the *Sydney Express* saying that they had collided with a vessel off Pencarrow Head and requested assistance.

1.4.14 The operator switched off the lights inside the signal station and observed the lights of the *Sydney Express* "in a line between *Beacon Hill* and Pencarrow about 200 to 300 m off Pencarrow; well across, even east of the white intensified sector".

1.4.15 The operator immediately initiated a search and rescue operation.

1.4.16 *Beacon Hill* Signal Station was owned, operated and controlled by the Wellington Regional Council under the Harbourmaster's charge. It is not meant to be a navigation guidance system for the port but more a provider of information and a communication link between the various port services.

1.4.17 Functions of *Beacon Hill* included the following:

- To maintain a 24 hour visual lookout over the harbour entrance (A radar set is provided to assist the operator)
- To maintain a 24 hour listening watch on four VHF channels (04, 14, 16 and 62)
- To provide a traffic information service to all vessels required to monitor VHF channel 14, and for any other vessel on request
- To provide a position reporting system
- To provide weather conditions at the signal station, and tidal information on request
- To provide safety and navigation messages to all compulsory monitoring vessels, and other vessels on request
- To receive and relay vessels ETA and ETD's.

1.4.18 Some time after the accident the *Beacon Hill* operator was asked to attend the signal station on a night when weather conditions were similar to those on the night of the accident. Without the aid of radar he was asked to judge the track of an outbound vessel in relation to the leading lights. After the pilot disembarked from the vessel, the pilot launch was directed by the operator to follow the same approximate path he had observed the *Maria Luisa* take on the night of the accident.

1.4.19 The operator explained to the investigator how he determined the track of the *Maria Luisa* with the aid of reference points. The investigator followed the track of the outbound vessel and the inbound pilot launch on the radar set and was satisfied that the operator was capable of monitoring the tracks of in and outbound vessels with reasonable accuracy without the aid of radar in good visibility.

1.4.20 All harbour navigation lights were lit and operating normally.

1.5 Vessel information (*Sydney Express*)

1.5.1 The *Sydney Express* is a 118 m, 588 TEU[8] container vessel providing a liner service between Australia and New Zealand. The vessel is equipped with two port side-mounted electro-hydraulic, 40-tonne cranes which provide a self-loading/discharging capability.

1.5.2 Propulsion is by one 5280 kW MANB&W medium-speed diesel-engine driving one controllable-pitch, right-hand-turning propeller at constant 153 RPM. The following table shows various relevant pitch settings, the corresponding speeds and times taken to effect changes in pitch:

Pitch setting	Lever position	Pitch	Speed in knots (ballast)	Pitch order	Time to attain zero pitch	Time to attain 70% pitch	Time to attain 100% pitch
Ahead full (sea)	10	95%	18.0	Astern full	29”	1’ 13”	2’ 45”
Ahead full (harbour)	7	69%	14.5	Astern full	22”	1’ 17”	2’ 35”
Ahead half	5	48%	11.5	Astern full	16”	1’ 08”	2’ 30”
Ahead slow	3	26%	7.0	Astern full	7”	no data	2’ 22”
Ahead dead slow	1	5%	2.0	Astern full	2”	no data	2’ 17”
Stop	0	0	0	Ahead full	--	1’ 13”	--

1.5.3 During sea trials the *Sydney Express* took 2 minutes 25 seconds and 749 m to stop from a speed of 17.4 knots when the crash stop manoeuvre (Ahead full to Astern full) was performed in deep water. When loaded and in shallow water, such as near the site of the accident, these figures would be significantly increased.

1.5.4 The *Sydney Express* is fitted with a single semi-balanced, articulated-fin (Becker) rudder. This type of rudder is fitted with a trailing edge flap which pivots around a second axis to improve the over-all aerofoil shape of the rudder at angles greater than 35°; whereas a standard rudder will stall at angles over 35° the Becker rudder can be moved up to 45° either way without stalling, significantly increasing rudder effectiveness. The following table shows times taken to perform certain rudder movements with two steering motors in operation, at full sea speed, as was the case at the time of the accident:

[8] Twenty foot container or Equivalent Unit

Designation	Time
Rudder amidships to starboard (0° to 45°)	7”
Rudder starboard to port (35° to 30°)	11”
Rudder port to starboard (35° to 30°)	11”
Rudder starboard to amidships (45° to 0°)	8”

1.5.5 During sea trials the turning circle tests yielded the following results:

Turn	Advance	Transfer	Diameter
Port	371 m	271 m	274 m
Starboard	413 m	324 m	309 m

(Refer to Figure 2 below)

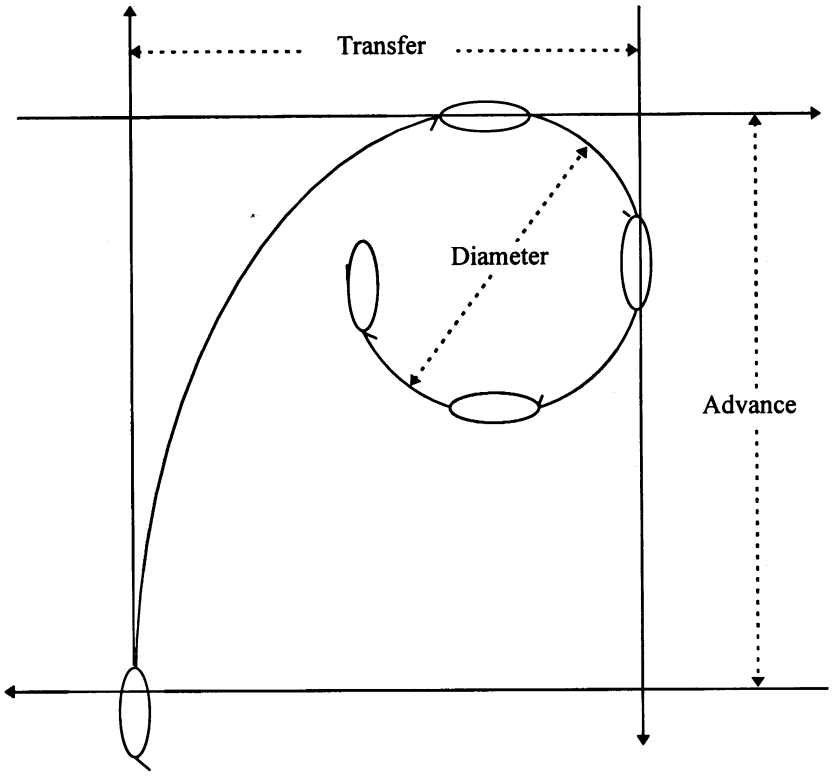

Figure 2
Turning circle diagram
(Example only, not to scale)

1.5.6 The sea trials were conducted with the *Sydney Express* in ballast condition and in deep water. No turning circle data was provided for shallow water. Shallow water effect generally increases the advance, transfer and diameter of a turn.

1.5.7 Like most container vessels the *Sydney Express*, when loaded, carries a small GM (measure of vessel stability). This makes the vessel susceptible to heeling in a turn. If a significant helm application is made the *Sydney Express* initially heels slightly into the turn until the rate-of-turn causes other forces to come into play at which time the vessel will begin to heel away from the direction of turn. To minimise the heel in a turn the master had advised the watch officers and helmsmen, where possible, to apply a maximum of 5° helm when making normal alterations of course.

1.5.8 Due to the non-follow-up tiller steering arrangement, which had the potential to confuse a helmsman who was not used to such a system, the master had adopted a different style when using a helmsman to steer manually.

1.5.9 As the tiller positions were not on the centreline of the vessel he favoured giving helmsmen a course to steer rather than requiring them to line up on objects forward of the vessel.

1.5.10 If a course change was required the master would normally: give a helm order to start the vessel swinging in the desired direction; monitor the gyro himself; give an opposite helm order to counter the swing; and as the head of the vessel neared the desired new course, give the helmsman the new course to steady on.

1.5.11 The master used this method to prevent the helmsman confusing the helm direction, and prevent the helmsman from applying too much rudder which, with its high effectiveness, could create a rapid swing with consequent large angles of heel in the turn.

1.5.12 When the *Sydney Express* has no deck-cargo, and is in normal working condition of trim, there is a blind sector from the bridge that extends 185 m forward of the bow at sea level. When the vessel is carrying a full deck-load of containers the blind sector extends out to 200 m forward of the bow.

1.5.13 At the time of the accident the deck was only partly loaded. The visibility would have been restricted up to 185 m forward of the bow over the centre-line row of containers and to about 190m on either side out to the extremities of the vessel. The two cranes do not create any blind sector on the starboard side of the vessel.

1.5.14 The sidelights of the *Maria Luisa* would have been visible on the bridge of the *Sydney Express* until the fishing vessel came closer than 110m ahead. The masthead light, if operating, would have been visible until the fishing vessel came closer than about 60 m ahead. The sidelights on the *Soundsgood*, on top of the mast, would have remained visible regardless of how close the yacht was except when it passed behind the cranes as it went down the port side of the *Sydney Express.* (See Figure 3)

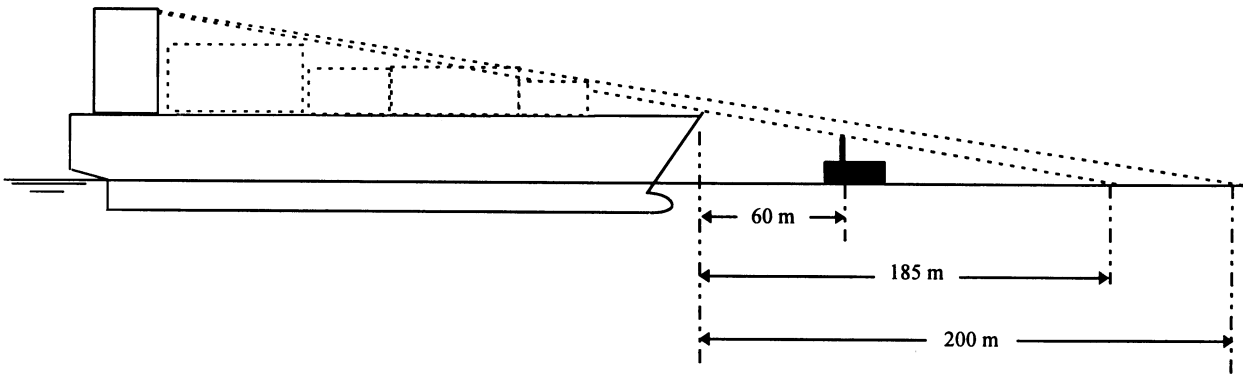

Figure 3
Visibility diagram showing approximate distances
(Diagram not to scale)

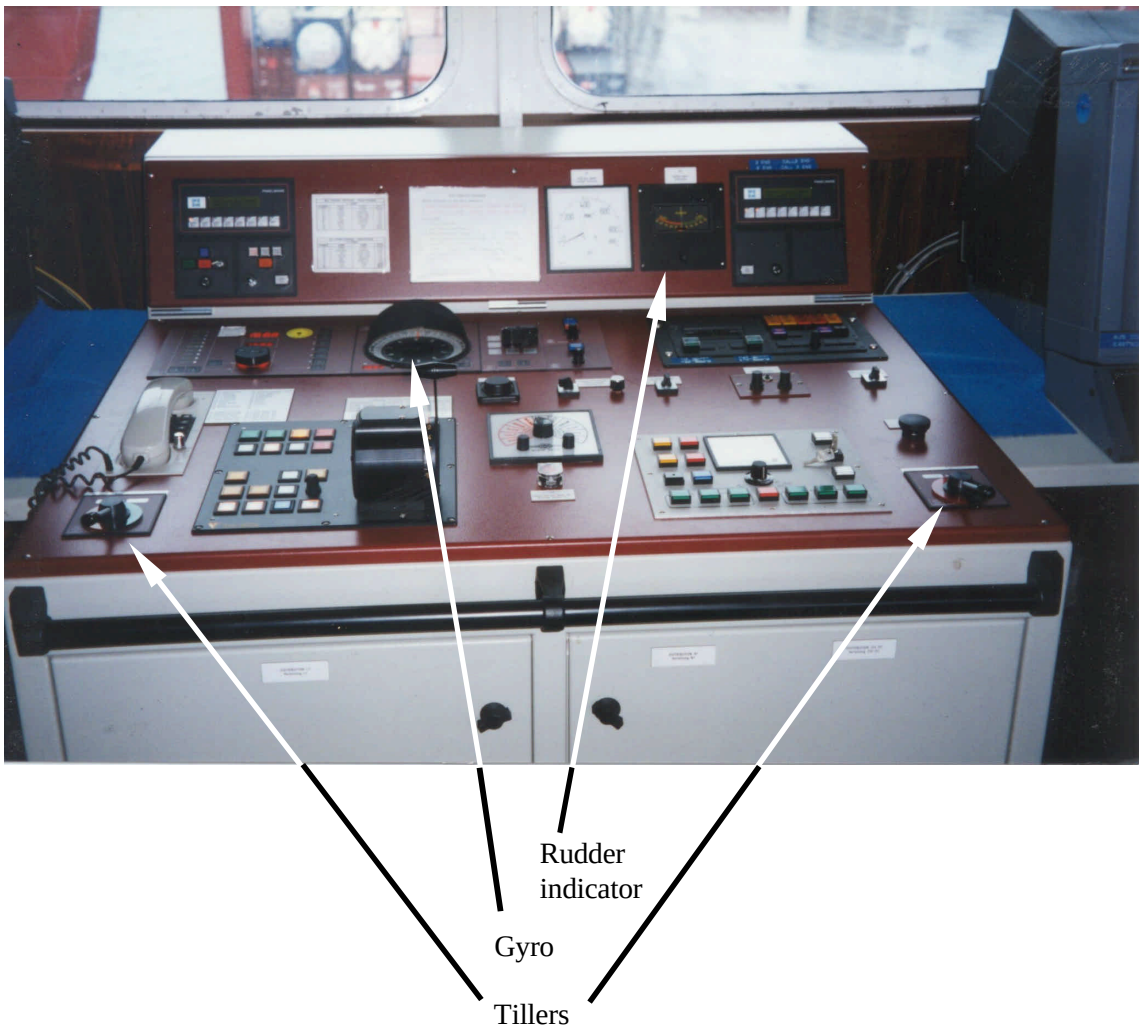

Figure 4
***Sydney Express*, bridge and console layout**

1.5.15 In order to comply with Annex 1 of the Collision Regulations (positioning and technical details of lights and shapes) the sidelights on the *Sydney Express* are positioned down near the maindeck forward of the front crane. The two masthead lights are positioned high on the foremast and mainmast.

1.5.16 Navigation aids on board the *Sydney Express* included the following:

- Two Racal Decca Bridgemaster day/night colour radar sets, both fitted with manual plotting facility
- Two GPS navigation receivers
- One digital display echo-sounder
- Two VHF radios
- One electromagnetic speed log (not working)
- One Anchutz gyro with repeaters (starboard bridge-wing repeater not working) and automatic pilot.

1.5.17 One radar set is located on the centreline of the bridge, the other on the starboard side with the control console between. Each radar set has an adjustable pedestal chair mounted in front of it. Manual steering is achieved by operating one of four tillers; two on a console located to starboard of the centreline, between the two radar sets; and one on each bridge-wing console. (See Figure 4)

1.5.18 There is no steering wheel and each tiller operates in the non-follow-up mode. The tiller is held over in one direction until the desired rudder angle is observed on the rudder-angle indicator. The tiller, which is spring loaded, is then released and the rudder will stay in that position until either further or opposite rudder is applied using the tiller.

1.6 Vessel information (*Maria Luisa*)

1.6.1 The *Maria Luisa* was a 19.83 m stern trawl fishing vessel constructed mainly from steel and based in Port Nicholson, Wellington. The propulsion plant consisted of one 317 kW Caterpillar diesel-engine driving a fixed-pitch, shrouded propeller. The service speed was about 8 knots.

1.6.2 The wheelhouse was located forward on top of the accommodation and the engine room was forward of amidships. Access to the accommodation was from a door leading to the main working deck or by an internal access from the wheelhouse. There was a door on the port side aft of the wheelhouse that lead out onto the raised foredeck.

1.6.3 The trawl gantry and machinery was located aft. An anchor winch was set on the foredeck in front of the wheelhouse.

1.6.4 Bridge equipment on board the *Maria Luisa* included the following:

- One radar set (not working at the time of the collision)
- One GPS navigation receiver with chart monitor
- One VHF radio
- One gyro compass with auto pilot
- One colour depth sounder
- One SSB radio.

A cellular telephone was also fitted.

1.6.5 Steering was hydraulic to a single, semi-balanced rudder. Little information was available on the manoeuvring characteristics of the *Maria Luisa*, but the owner stated that the vessel could turn in its own length using a self-centring tiller arrangement which was located on the control dashboard next to the main steering wheel.

1.6.6 Neither the wheel nor tiller could override the automatic pilot unless the autopilot was first disengaged, which was done by pushing the auto-off button on the unit.

1.7 Personnel information

1.7.1 The master of the *Sydney Express* had 44 years' sea-going experience; obtained his New Zealand Foreign-going Masters Certificate in 1966 (and held a current masters licence at the time of the accident); was first promoted to master in 1972 and had been serving as master with Tasman Express Line since 1984, when the company was first formed.

1.7.2 The master obtained, in 1986 a Pilot Exemption Certificate for Wellington which had last been revalidated on 21 December 1996, eight days before the accident. Under section 215(7) of the Harbours Act 1950 the master had to have used his exemption certificate twice within a one-year period, and maintained good health and eyesight, to keep the pilot exemption current. The master complied with these requirements.

1.7.3 The *Sydney Express* was a relatively new vessel. The master had completed one tour of duty of about five weeks and was nearing the end of his second tour of about six weeks at the time of the accident.

1.7.4 The master normally obtained about seven hours' sleep each night and supplemented this with a one-hour nap each afternoon. The *Sydney Express* had spent from 21 December to 27 December at the wharf in Dunedin awaiting spare parts for the main engine. The schedule from Dunedin through Lyttelton and Wellington allowed him to obtain his full quota of sleep. The master stated that he "felt a bit jaded" in the early evening of 29 December due to the heat and high humidity, but as the temperature decreased in the evening he felt better and felt fully alert when the vessel departed the wharf.

1.7.5 The third mate on the *Sydney Express* had a total of 16 years' sea-going experience. He obtained his New Zealand Master Foreign-going Certificate in 1992 (and held a current masters licence at the time of the accident). In 1993 he joined Tasman Express Line as third mate and, apart from several trips as relieving second mate, had held that position until the time of the accident.

1.7.6 The third mate had completed one four-week tour of duty on board the *Sydney Express* and was nearing the end of a second six-week tour.

1.7.7 The third mate normally kept the 8 to 12 watch which was maintained at sea, and in port when the vessel was working cargo. He had maintained his normal sleep pattern over the previous two days.

1.7.8 The helmsman started his sea-going career in 1964 and had maintained that career with the exception of a two-year break from 1980 to 1982. He obtained his steering certificate in about 1967 and his United Kingdom Able Seaman Certificate in 1969.

1.7.9 The helmsman had worked on a variety of United Kingdom and New Zealand ships as Able Seaman until 1993 when he obtained his New Zealand Integrated Rating (IR) Certificate which was required with the introduction of the IR system on New Zealand ships.

1.7.10 The helmsman, who had extensive experience in steering vessels at sea and during port approaches and departures, had extensive experience with steering vessels using the non-follow-up mode. The *Sydney Express* was the first vessel that he had steered using a tiller rather than a wheel.

1.7.11 The helmsman was relieving on the *Sydney Express*, having joined the vessel for the first time six days before the accident, during which time he had steered the vessel on three separate occasions. Before taking the helm he had received instruction from other crew members and the master on how the *Sydney Express* reacted to rudder movements.

1.7.12 Soon after arrival alongside in Wellington after the accident, the master, third mate and helmsman agreed to a voluntary breath test for alcohol. All three returned clear results.

1.7.13 The master of the *Maria Luisa* had been involved in the fishing industry for most of his working life. In about 1988 he obtained his Skipper of Coastal Fishing Boat Certificate which was subsequently endorsed to act as Mate of Deep-sea Fishing Boat. He held a 2nd Class Diesel Trawler Engineer Certificate also. He had been master on a fishing vessel under the same ownership as the *Maria Luisa* since 1990 and transferred to the *Maria Luisa* when it was purchased in April 1996.

1.7.14 Post-mortem toxicology examinations revealed that the master of the *Maria Luisa* had an average of 0.17 nanograms of tetrahydrocannabinol (THC), and 10 nanograms of tetrahydrocannabinol acid (THC acid), per millilitre of blood in his body. THC is the principal psychoactive constituent of cannabis and THC acid is the inactive metabolite of THC.

1.7.15 From witness statements it was known that the master smoked cannabis occasionally, the last observed episode occurring four days prior to the accident; "...when a marijuana cigarette was passed around the group, (he) took his turn and had a smoke..."

1.7.16 The toxicology reports from two separate analysts included the following comments:

1.7.16.1 Analyst "A" (based on the level of THC alone);

> A blood THC level of 0.17 ng/mL is consistent with the master having smoked a single cannabis cigarette within 4 to 24 hours or more prior to death.
>
> Blood levels are a poor indicator of cannabis intoxication. It is not possible to determine, from the blood level alone, whether or not the master was intoxicated by cannabis at the time of the incident.
>
> Blood THC levels produced by smoking a cannabis cigarette and the rate at which the levels decrease vary widely between individuals and are dependent on a number of factors. These factors include frequency of use, smoking technique and experience, the size and potency of the cannabis cigarette and the individual's body weight.
>
> Subjective symptoms of cannabis intoxication usually peak 10 to 15 minutes after smoking cannabis and last about 1 to 4 hours. Occasionally subjective symptoms may last much longer than 4 hours.
>
> A "hangover" effect is possible as performance decrement have been reported for complex mental tasks up to 24 hours after smoking cannabis at a time when subjective effects had long since returned to baseline.

1.7.16.2 Analyst "B" (based on the comparative levels of THC and THC acid);

> Applying the formula to (the master's) data, it appears that cannabis exposure occurred approximately seven (7) hours before his death (when metabolism is assumed to have ceased) with 95% confidence limits (2.6 - 18.6 hours)
>
> The low level of Δ^9-tetrahydrocannabionol acid in (the master's) blood almost certainly indicates that he was not a regular user of cannabis and the level of Δ^9 tetrahydrocannabinol in his blood is far too low, in my opinion, to ascribe cannabis intoxication as a causal factor in (his) death and, in my opinion, far too low to provide presumptive evidence of impairment.

1.7.17 The surviving trainee deck-hand had been involved with the fishing industry for about seven years. He did not hold any formal marine qualifications. He had known the master of the *Maria Luisa* for many years and had served under him on many occasions in the past. He had served on board the *Maria Luisa* for approximately six months.

1.8 Damage to the vessels and other information

1.8.1 The *Sydney Express* suffered minor indenting on the starboard side of the bulbous bow above the waterline, and scraping of the paint below the waterline from under the bulbous bow to the port shoulder.

1.8.2 The *Maria Luisa* suffered moderate indenting, firstly at the point of initial impact, then down the port side in a direction forward and towards the keel. At the keel the direction of steel distortion changed to run back up the port side. The damage was consistent with the vessel having been turned over to starboard and forced under by the port shoulder of the *Sydney Express* until buoyancy forced it to the surface. Sea water damage to equipment was substantial.

1.8.3 The Commission was presented with various statements from persons involved in the search and salvage operation, and from persons in control of vessels which subsequently passed through the accident area. The information was compared with estimated tidal current velocities in the region of Wellington Harbour, which were produced by the National Institute of Water and Atmospheric Research (NIWA) for the purposes of the investigation.

1.8.4 Most of the evidence contained in the statements and the NIWA report broadly correlated with the other evidence used to estimate the position of the collision, although none of it was conclusive.

1.8.5 About five months after the accident, the Royal New Zealand Naval Reserve conducted an underwater survey of the accident area to locate several heavy items of equipment that were lost off the *Maria Luisa* either during the capsize or some time after when the vessel was being towed upside down to the Seatoun Wharf. Police divers endeavoured to locate missing items identified by the RNZRN survey, but were not successful.

1.8.6 It is not known at what stage of the collision, or subsequent salvage operation, the items fell from the *Maria Luisa* or if such items would move on the seabed due to wave action during bad weather. If any of the items had been found, their location may have given a broad indication, but not conclusive evidence, of the position of the collision.

1.9 The main relevant rules, regulations and instructions

1.9.1 The following Rules from the International Regulations for Preventing Collisions at Sea (1972) (collision regulations) are relevant to this collision:

1.9.1.1 Rule 2 (b): Responsibility

In construing and complying with these rules due regard shall be had to all dangers of navigation and collision and to any special circumstances, including the limitations of the vessels involved, which may make a departure from these rules necessary to avoid immediate danger.

1.9.1.2 Rule 5: Lookout

Every vessel shall at all times maintain a proper look-out by sight and hearing as well as all available means appropriate to the prevailing circumstances and conditions so far as to make a full appraisal of the situation and of the risk of collision.

1.9.1.3 Rule 7(b): Risk of collision

Proper use shall be made of radar equipment if fitted and operational, including long-range scanning to obtain early warning of risk of collision and radar plotting or equivalent systematic observation of detected objects.

1.9.1.4 Rule 8: Action to avoid collision

(e) If necessary to avoid collision or allow more time to assess the situation, a vessel shall slacken her speed or take all way off by stopping or reversing her means of propulsion.

(f) (i) A vessel which, by any of these rules, is required not to impede the passage or safe passage of another vessel shall, when required by the circumstances of the case, take early action to allow sufficient sea room to allow the safe passage of the other vessel.

(ii) A vessel required not to impede the passage or safe passage of another vessel is not relieved of this obligation if approaching the other vessel so as to involve risk of collision and shall, when taking action, have full regard to the action which may be required by the rules of this part.

(iii) A vessel the passage of which is not to be impeded remains fully obliged to comply with the rules of this part when the two vessels are approaching one another so as to involve a risk of collision.

1.9.1.5 Rule 9: Narrow channels

(a) A vessel proceeding along the course of a narrow channel or fairway shall keep as near to the outer limit of the channel or fairway which lies on her starboard side as is safe and practicable.

(b) A vessel of less than 20 metres in length or a sailing vessel shall not impede the passage of a vessel which can safely navigate only within a narrow channel or fairway.

(c) A vessel engaged in fishing shall not impede the passage of any other vessel navigating within a narrow channel or fairway.

(d) A vessel shall not cross a narrow channel or fairway if such crossing impedes the passage of a vessel which can safely navigate only within such channel or fairway. The latter vessel may use the sound signal prescribed in Rule 34(d) if in doubt as to the intention of the crossing vessel.

1.9.1.6 Rule 14: Head-on situation

(a) When two power driven vessels are meeting on reciprocal or nearly reciprocal courses so as to involve risk of collision each shall alter her course to starboard so that each shall pass on the port side of the other.

(b) Such a situation shall be deemed to exist when a vessel sees the other ahead or nearly ahead and by night she could see the masthead lights of the other in line or nearly in line and/or both sidelights and by day she observes the corresponding aspect of the other vessel

(c) When a vessel is in any doubt as to whether such a situation exists she shall assume that it does exist and act accordingly.

1.9.1.7 Rule 16: Action by give way vessel

Every vessel which is directed to keep out of the way of another vessel shall, so far as possible, take early and substantial action to keep well clear.

1.9.1.8 Rule 17: Action by stand-on vessel

(a) (i) Where one of two vessels is to keep out of the way the other shall keep her course and speed.

(ii) The latter vessel may however take action to avoid collision by her manoeuvre alone, as soon as becomes apparent to her that the vessel required to keep out of the way is not taking appropriate action in compliance with these rules.

(b) When, from any cause, the vessel required to keep her course and speed finds herself so close that collision cannot be avoided by the action of the give-way vessel alone, she shall take action as will best aid to avoid collision.

(d) This rule does not relieve the give way vessel of her obligation to keep out of the way.

1.9.1.9 Rule 34: Manoeuvring and warning signals

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

- one short blast to mean “I am altering my course to starboard”;
- 2 short blasts to mean “I am altering my course to port”;

- 3 short blasts to mean "I am operating astern propulsion".

(d) When vessels in sight of one another are approaching each other and from any cause either vessel fails to understand the intentions or actions of the other, or is in doubt whether sufficient action is being taken by the other to avoid collision, the vessel in doubt shall immediately indicate such doubt by giving at least 5 short and rapid blasts on the whistle. Such a signal may be supplemented by a light signal of at least 5 short and rapid flashes.

1.9.2 The following rule from the General Harbour (Nautical and Miscellaneous) Regulations 1968 applies to this accident:

1.9.2.1 Rule 44: Duties of persons in charge of motor boats, yachts, launches, etc -

The master of every motor boat or launch, yacht, or small sailing or rowing boat shall ensure that his launch, yacht, boat as the case may be, does not impede the navigation of any vessel of 500 tons gross or more, or any hovercraft, or any seaplane in the process of taking off or landing.

1.9.3 There are no Wellington Harbour By-laws that add to or contradict the relevant rules mentioned in this section of the report. The Wellington Regional Council has produced a Port and Navigational Information for Candidates Sitting the Wellington Pilot Exemption Examination Booklet.

1.9.4 This booklet contains, among other things, sailing directions and recommended courses for entering and departing Wellington Harbour. The courses are not binding.

1.9.5 In the New Zealand Pilot (NP 51), the section headed up Entry Directions states in paragraph 4.141:

Light sector. To avoid outward bound traffic, vessels entering harbour are required to keep slightly E of the leading line. An intensified white light sector (014° - 019°) of Main Entrance Hope Shoals Rear Light assists vessels to remain in the fairway, until abreast Steeple Rock Light. The intensified sector will be exhibited by day on request to the port radio station.

2. Analysis

2.1 Give-way vessels

2.1.1 Rule 9 of the collision regulations refers to narrow channels and fairways; however, there is no definition given in the rules as to what constitutes a narrow channel or fairway. The depth of the channel between Barrett Reef and the eastern shoreline is fairly constant across its width until the seabed rises up steeply on either side. The *Sydney Express*, the *Maria Luisa* and the *Soundsgood* therefore each had equal area in which to manoeuvre, save for a few metres on either side of the channel. The width of the channel is about 1140 m (0.62 nautical miles).

2.1.2 The skipper of a highly manoeuvrable vessel such as the *Soundsgood* or *Maria Luisa* might not consider the channel between Barrett Reef and the eastern shore to be narrow; whereas the master of the *Sydney Express*, having due regard to the turning circle of his vessel and stopping distance in relation to the room available, did consider that his vessel was proceeding along a narrow channel.

2.1.3 Rule 44 of the General Harbour (Nautical and Miscellaneous) Regulations 1968 requires that, among others, yachts and small sailing vessels shall not impede the navigation of a vessel of 500 GRT within harbour limits. The *Sydney Express* was clearly over 500 GRT and therefore the *Soundsgood* was in contravention of this rule by staying on the port side of the leading line, close to where the *Sydney Express* would normally have passed and thus causing the master to alter his course to starboard.

2.1.4 It is unclear from Rule 44 whether the *Maria Luisa* is included in the category of a motor boat or launch because, as with the collision regulations, these are not defined.

2.1.5 The Concise Oxford Dictionary defines fairway as, "a navigable channel; a regular course or track of a ship". Although there are no defined limits as to how much of the Wellington entrance channel constitutes *the regular course or track of a ship*, it can reasonably be assumed that the fairway would include the intensified sector of the main leading lights.

2.1.6 Both the *Soundsgood* and the *Maria Luisa* were proceeding up the channel within the intensified sector of the main leading lights, along the fairway, and thus were required by Rule 9 (a) to keep as near to the outer limit of the fairway which lay on their starboard side as was safe and practicable.

2.1.7 A key word in Rule 9(b) of the collision regulations is *safely*. The *Maria Luisa* and the *Soundsgood* could safely navigate almost anywhere in the channel, given their manoeuvrability; however, the *Sydney Express*, due to its limited manoeuvrability, needed to keep as close to the centre of the channel as was safe and practicable so as to maintain maximum sea room in case of an emergency or the need to manoeuvre as required by the collision regulations.

2.1.8 As both the *Maria Luisa* and the *Soundsgood* are vessels under 20 m in length, they were required by Rule 9(b) not to impede the passage of the *Sydney Express* which could only *safely* navigate close to the centre of the channel.

2.1.9 As there are no defining limits for the fairway, and the regular course or track of a ship would not normally take it close to Barrett Reef or the eastern shoreline, it is unclear as to whether small vessels are entitled to proceed up the channel on the port side, well clear of the channel centre.

2.1.10 A harbour by-law, appropriately promulgated, that clarified the collision regulations, and the General Harbour (Nautical and Miscellaneous) Regulations 1968, for the Wellington entrance channel would have been appropriate.

2.1.11 There is no sure evidence fixing the track of the *Maria Luisa* as the vessel approached the harbour entrance. The trainee deck-hand's evidence for the vessel being east of the leads is vague. He stated that both leading lights were on the port bow of the *Maria Luisa*. This would be expected once the master had made the first alteration of course to starboard. The direction and amount of off-set between the lights, which the deck-hand could not recall, is the real determining factor. To state that Pencarrow Light "looked close", at night and without the use of radar, is equally vague.

2.1.12 Information gained from computer discs used in the GPS chart monitor fitted on the *Maria Luisa* showed several out-bound tracks from Wellington to the fishing grounds where the *Maria Luisa* was believed to have been fishing. There were no inbound tracks to give an indication of the master's normal inbound route. The Barrett Reef Buoy was, however, marked "WELLINGTON" on the disc. It is possible the buoy was used as an arrival waypoint for entering the harbour.

2.1.13 The master of the *Maria Luisa* was without the aid of radar and appeared to be following a GPS track on his approach to the harbour. He normally reported to *Beacon Hill* when his vessel was two miles out from the Barrett Reef Buoy. He was probably heading for the GPS mark on the buoy and monitoring the distance-to-go to that mark. When the *Maria Luisa* was close enough for the master to see the harbour navigation lights he would have started navigating by eye, adjusting his course to starboard to gain the leading line. This seems to fit with the deck-hand's description of the master's actions.

2.1.14 The evidence of the crew on the *Soundsgood* with regard to the position of the *Maria Luisa* in the channel is equally vague. The skipper was not steering by compass, so was unable to state what course he was steering when he and his crew saw the *Maria Luisa* directly behind them. Although aware of the main leading lights, he was using the Somes Island sector light to navigate by and consequently remained on the port side of the channel.

2.1.15 The evidence of the crew of the *Soundsgood* confirms that the *Sydney Express* was keeping to its starboard side of the channel. If the *Soundsgood* and the *Maria Luisa* had been keeping to their own starboard side of the channel or fairway then there would not have been any conflict and the collision should not have occurred.

2.1.16 The judgement of the *Beacon Hill* operator and the evidence of the master, third mate and helmsman on the *Sydney Express* coincide to place the *Maria Luisa* west of the leading line during its approach to, and into, the channel which was in contravention of Rule 9(a); failure to keep to the starboard side of the fairway, and Rule 9(b); impeding the passage of the *Sydney Express*, forcing the master to take action to avoid collision.

2.1.17 The tracks of the *Soundsgood* and the *Maria Luisa* through the channel each created a risk of collision situation with the *Sydney Express*.

2.2 Lights

2.2.1 The *Soundsgood* was not exhibiting the correct lights for a power-driven vessel as required by the collision regulations. This led the *Sydney Express* to believe that the *Soundsgood* was a vessel under sail, with limited manoeuvrability in the calm conditions.

2.2.2 It is difficult to explain why neither the master nor the third mate on the *Sydney Express* saw the white masthead light on the *Maria Luisa*. The evidence of the *Beacon Hill* operator, the crew of the *Soundsgood* and the deck-hand on the *Maria Luisa* suggests that the light was burning brightly. The masthead light on the *Maria Luisa* stands well above the sidelights and the glow of the deck lights. It is likely that this, coupled with their preconception that the *Maria Luisa* was a sailing vessel, caused them to miss the masthead light.

2.2.3 The navigation lights on the *Soundsgood* were positioned on top of the mast and those of the *Maria Luisa* were on top of the wheelhouse, a lot closer to the sea surface. From the bridge of the *Sydney Express*, when viewing the two red lights together, this could create an illusion that the *Maria Luisa* was further away than it was.

2.2.4 At night there is a high presence of background light in the direction from which the *Sydney Express* was approaching, which makes it difficult for an inbound vessel to identify the navigation lights of an approaching vessel. The sidelights on the *Sydney Express*, when viewed from small vessels at a distance, merge readily with the line of background lights. The forecastle is at a similar height to the sidelights. When the forecastle is illuminated the sidelights become more obscure still. This would have been exacerbated by the reflection of the shore lights in the glassy water on the night of the collision.

2.3 Communications

2.3.1 Analysis of the transcript of the VHF channel 14 recording indicated that the bridge team on *Sydney Express* and the master of the *Maria Luisa* looked upon the reporting scheme as a chore rather than a useful tool for navigation.

2.3.2 After reporting the expected departure from the berth, the VHF volume on the *Sydney Express* was lowered. The third mate, having overheard *Beacon Hill* mention the *Phantom Of The Straits* and BT Global Challenge Yachts, assumed that the subsequent VHF conversation *Beacon Hill* had with the *Maria Luisa* was with a yacht.

2.3.3 No-one on the *Sydney Express* recalls hearing the VHF conversation between *Beacon Hill* and the *Aratika* during which the fishing vessel (wrongly called the *Santa Monica*) was mentioned.

2.3.4 The master of the *Maria Luisa*, having reported in, two miles south of Barrett Reef Buoy, indicated by his reply that he was about to stop monitoring channel 14. He may have been misled by the information received that the *Sydney Express* was further away than it was; however, if he had continued monitoring channel 14 he would have heard *Beacon Hill* telling the *Aratika* that the *Sydney Express* was "between the leads".

2.3.5 The open-loop style of communication between *Beacon Hill* and the vessels participating in the reporting scheme puts the onus on each vessel to obtain updated information on traffic movements by closely monitoring the VHF at all times. While it was a requirement for some vessels to monitor channel 14, it is often not possible to pay close attention to the VHF traffic all the time, so vital information may be missed.

2.3.6 A closed-loop style of communication, where each participating vessel that is going to be affected by new information is contacted, would be preferable.

2.4 *Soundsgood* versus *Sydney Express*

2.4.1 The *Soundsgood*, having elected to use what could reasonably be deemed the fairway, was required by Rule 9(a) to keep as far to the starboard side of that fairway as was safe and practicable. The *Soundsgood* was also the give-way vessel under Rule 9(b) of the collision regulations; the *Sydney Express* was entitled to follow its intended track down the channel.

2.4.2 The *Soundsgood* saw the *Sydney Express* some time after the forward mooring lights on the latter had been switched off, which was shortly before the *Sydney Express* reached waypoint 74 off Steeple Rock. The *Soundsgood* saw the masthead lights of the *Sydney Express* in line and determined that a risk of collision existed.

2.4.3 The *Soundsgood* made an appropriate turn to starboard; however, when the *Sydney Express* was observed altering course to starboard off Steeple Rock, the *Soundsgood* altered back to port almost to their original course. It would have been prudent for the *Soundsgood*, given its position on the wrong side of the fairway, to have maintained the starboard alteration until the *Sydney Express* was finally past and clear. The alteration back to port by the skipper of the *Soundsgood* showed a lack of appreciation for the restricted manoeuvrability of large vessels, and for the collision regulations.

2.4.4 On the *Sydney Express* the master and third mate saw the *Soundsgood* and the *Maria Luisa*. They both assumed that each vessel was under sail. Although they continued to look at the red light each vessel was exhibiting, they did not use all available means to determine if a risk of collision existed. Although the plotting facilities on the radar sets were not suitable for such circumstances, observing the targets by radar would have given their distance off, and an indication of their relative track from the direction of the tails on the radar screen.

2.4.5 The alteration of course to starboard by the *Soundsgood* would not be readily apparent to an observer on the *Sydney Express*. The colour of the light would not change and the perception of any change in heading was limited by the single point of reference.

2.4.6 Once the master had seen that the *Soundsgood* and the *Maria Luisa* were going to impede his passage, it would have been appropriate to have sounded at least five rapid short blasts on the whistle as required under Rule 34(d).

2.4.7 Due to the presence of the incoming vessels in the channel, when the master ordered the course change off Steeple Rock he opted to alter 3° further and steam parallel to the leading line on his starboard side of the channel. This was an appropriate decision.

2.4.8 Once steadied on a course of 196° the master judged that the *Soundsgood*, the give-way vessel, was taking insufficient action to avoid collision and ordered the 5° starboard helm to increase the passing distance. This was an appropriate decision allowed under Rule 17(a)(ii), and one that was made at the last minute. This action by the *Sydney Express* did not relieve the *Soundsgood* of its obligation to keep out of the way (Rule 17(d) of the collision regulations).

2.5 *Maria Luisa* versus *Sydney Express*

2.5.1 The third mate noticed the *Soundsgood* abeam of the bridge shortly after 2230 hours and he subsequently recorded the time of the collision as 2233 hours. Less than one minute would have elapsed between the time that the helm was ordered hard to port and the collision. That leaves about two minutes between the time the master ordered 5° starboard helm to avoid the *Soundsgood* and ordering "hard to port".

2.5.2 It is unlikely that the helm remained on starboard 5 for that two minutes, as would be the case according to the helmsman's evidence. If so, the *Sydney Express* would have made a substantial turn to starboard, and possibly even have collided with Barrett Reef.

2.5.3 The evidence suggests that the initial course change resulting from the 5° starboard helm order was about 4° to starboard. The helm was probably put amidships soon after passing the *Soundsgood*.

2.5.4 The master's workload was high at this time and his situational awareness low. He knew that he was west of the leading line, more so than he would normally be, but unsure how far west. He could see the Barrett Reef Buoy closer on his starboard bow than he would have liked. He had inside that, and fine on his starboard bow, a vessel showing a red light, of which he knew little of its range, course or speed.

2.5.5 The third mate knew equally little about the *Maria Luisa* and had busied himself with what could best be described as a low priority task under the circumstances. The 2230 hour position was obtained hastily and, consisting of one visual bearing and a quick look behind at the off-set leads, could not be relied upon to determine the position of the vessel with accuracy. His situational awareness was low also, having been unaware of the course changes that were taking place. At that stage neither he nor the master was aware that the *Maria Luisa* was not a sailing vessel.

2.5.6 The master judged that there was a risk of collision with the *Maria Luisa*, that the *Maria Luisa* was taking insufficient action to avoid a collision and that he needed to take action by his manoeuvre alone to avoid the collision as allowed under rule 17(a)(ii).

2.5.7 Rather than risk colliding with Barrett Reef, the master decided to alter course to port. At that time the third mate made his first input into the situation by telling the master that it was a fishing vessel and it was close.

2.5.8 The third mate's comment would have added more urgency to the manoeuvre. In his haste the master ordered the helmsman to steer 185° without giving him any indication whether that was to port or starboard. It would appear that the helmsman applied helm in the wrong direction (15 to 20° to starboard). The master felt the vessel heel the wrong way, realised the situation, corrected the helmsman and overcompensated for the error by ordering hard to port.

2.5.9 The master of the *Maria Luisa* appeared to have seen the *Sydney Express* only in the last few minutes before the collision. If the radar set on the *Maria Luisa* had been operational the master may have been alerted to the *Sydney Express* earlier. When the deck-hand first looked at the *Sydney Express* it was so close that he did not see its white masthead lights. If he had looked up he may well have done so. It could not be determined whether the radar on the *Maria Luisa* was serviceable when the vessel left Wellington. Its unserviceability at the time of entering Wellington deprived the master of a valuable aid to navigation and collision avoidance.

2.5.10 The deck-hand's description of the sidelights on the *Sydney Express* suggests that the vessel had just altered course to starboard slightly (possibly due to the incorrect helm application) before it came rapidly around to port.

2.5.11 The last minute turn to starboard made by the *Maria Luisa* was the correct action to take at that time.

2.5.12 In areas of heavy traffic and close proximity to hazards, the master often will have to hold a delicate balance of other ship avoidance and planned track maintenance. The priority should be to avoid collision, but not at the expense of a grounding.

2.5.13 The decision by the master of the *Sydney Express* to turn to port was made on the basis of scanty information. Had he realised the *Maria Luisa* was so close he may not have chosen this option. To alter course to port for a vessel close, nearly ahead and showing a red sidelight was unwise. Such an action was not the action "as will best aid to avoid collision" required by Rule 17(b) of the collision regulations.

2.5.14 The third mate stated that the *Sydney Express* was in the white intensified sector of the rear leading light at the time it passed the *Soundsgood*. The *Sydney Express* was thought to have been steering on a course of about 200° from that time until the master decided to alter course to port. At the time of altering course the *Sydney Express* was probably just outside, if not in, the intensified sector.

2.5.15 The master still had sight of the Barrett Reef buoy on his starboard bow at the time of altering to port. There was enough depth of water for the *Sydney Express* to have passed close to the buoy.

2.5.16 From the time the *Sydney Express* rounded Steeple Rock, and the master realised that both approaching vessels were on the western side of the leads, the combined closing speed of the vessels was about 21 knots and increasing. The master had the option of slowing down to give himself more time to assess the situation, and give the two vessels showing red more time to move across to starboard (Rule 8(e)). Five rapid short blasts on the whistle at that stage may have alerted the *Maria Luisa* to their presence earlier (Rule 34(d)). Neither option was exercised.

2.5.17 Regardless of what action the *Sydney Express* took in avoiding the *Maria Luisa*, this did not relieve the *Maria Luisa* of its obligation to keep out of the way (Rule 17(d) of the collision regulations).

2.5.18 The visibility forward from the bridge of the *Sydney Express* was within acceptable limits and is not considered to have been a factor which contributed to the collision. The *Maria Luisa* had been detected visually well before the collision. By the time the *Maria Luisa* was lost from view in the blind sector under the bow, the collision was inevitable.

2.6 Bridge resource management

2.6.1 The standard of resource management on the bridge of the *Sydney Express* was less than optimum. The attitude of the third mate was one of "the master knows what he is doing, leave him to it". The reliance that both the master and the third mate placed on monitoring the various harbour navigation lights visually while navigating in confined waters was inappropriate, even when backed up by the GPS navigation system.

2.6.2 A passage plan out of Wellington had been made, but was far from complete. Even though the GPS had been programmed with the intended track, and that track had been drawn on the chart, there were no limits set as to minimum distances off navigational hazards, so consequently no environment had been set for challenge and response between the third mate and the master.

2.6.3 Even if limits had been set, it is unlikely that the third mate would have made a challenge, as the progress of the vessel was not being accurately monitored for the entire departure from the harbour, nor was it recorded. There was no record of propeller pitch setting, courses steered or position fixing. In the absence of automatic recording, such data should be recorded manually in the movement book.

2.6.4 The master did not ask for advice as to the position of the ship in the channel, and none was offered by the third mate; consequently, when the master needed to know the exact position of his vessel in the channel at a critical time the information was not readily available to him.

2.6.5 Proper use was not made of radar to obtain distances off prominent points, parallel indexing or detecting collision targets. The good visibility and calm sea conditions appeared to have lulled the bridge team into a false sense of security, to a point where the level of attentiveness was low.

2.6.6 When navigating in close confines it is prudent to use both radar sets. This allows the situation to be monitored by more than one person, or for the same person to monitor the situation from two aspects without having to make frequent time-consuming adjustments.

2.7 Bridge equipment (*Sydney Express*)

2.7.1 The design of the *Sydney Express* bridge appears to be a mix between a conventional bridge and the pilot/co-pilot approach favoured by manufacturers of high-speed craft, where the master sits behind the radar set with all the controls within easy reach. The result is an ergonomically unfriendly bridge when the vessel is being conned using a helmsman.

2.7.2 The helmsman has to steer from a position off the centre-line of the ship, this position being occupied by one of the radar sets. The choice is to steer from tiller position one or two.

2.7.3 At tiller position one the helmsman has to operate the tiller with his left hand or risk interfering with the operation of the centre radar set. At this position the helmsman obstructs access to the telephone and the main engine combinator. The gyro course repeater is directly in front of a helmsman but the rudder angle indicators are off to his left.

2.7.4 At tiller position two helmsmen are obliged to operate the tiller with their right hand or risk interfering with the operation of the starboard radar set. At this position a helmsman obstructs access to the controls of the bow thruster and whistle. The rudder angle indicators are directly in front of the helmsman but the gyro course repeater is off to his left.

2.7.5 The poor console design means the master and/or officer-of-the-watch must reach across in front of the helmsman to reach the various controls.

2.7.6 The non-follow-up tiller system of steering, while becoming more common, is not as ergonomically friendly as the follow-up system. It works well when simple rudder movements are ordered; however, when a helmsman has to switch back and forth between steering a course and applying a specific rudder angle in a harbour navigation situation he can become confused easily if he is a novice.

2.7.7 The helmsman on the night of the accident had conned the vessel on three occasions prior to departing Wellington. He was reported to have been operating the tiller system adequately on each of those occasions. In a high stress situation, such as immediately prior to the collision, his lack of experience with the system, coupled with the poor design layout of the tillers, gyro repeater and rudder angle indicator, may have contributed to the error in helm application prior to the collision.

2.7.8 While the helm error was not a causal factor in the collision, it was contributing in that it placed more pressure on the master at a time when his workload was already high.

2.7.9 The *Sydney Express* is not required under the IMO's SOLAS regulations to have an Automatic Radar Plotting Aid (ARPA). Only vessels over 10,000 gross tonnes are required to have ARPA. ARPA significantly reduces the workload of the bridge team when operating in high density traffic areas such as in and around harbours.

2.7.10 It cannot be said that ARPA would have prevented the collision between the *Sydney Express* and the *Maria Luisa*; however, the master and the third mate both stated that they did not commence a plot of the *Maria Luisa* and the *Soundsgood* because of the limitations of their radar equipment in that respect.

2.7.11 If, however, one of the radar sets on board the *Sydney Express* was fitted with an ARPA, plotting of the two vessels would probably have been carried out. This would have improved significantly the situational awareness on the bridge leading up to the collision, and may have prevented the collision.

2.7.12 If radar plotting had been undertaken the accuracy of target data may have been affected by the lack of a log recording the vessel's speed through the water.

2.8 Toxicology

2.8.1 The levels of THC and THC acid detected in the blood of the master of the *Maria Luisa* was unlikely to have been reached if the only cannabis ingested by him was the result of sharing one cigarette with a group and that four days prior to the accident. According to the two independent analysts the levels indicated that cannabis could have been ingested as recently as 2.6 or 4.5 hours prior to the accident, or as long as 18.6 or 24 hours previously; the variation being due to their individual opinions and the "models" used in stating those opinions.

2.8.2 Because of the factors enumerated in the toxicology reports it could not be determined to what extent the cannabis ingested by the master impaired his performance while he had the con until the collision occurred. If the master had ingested cannabis within the 24 hour period prior to the accident, as is indicated by the results of the toxicology, he must have done so while he was in command of the *Maria Luisa* at sea.

2.8.3 If the master had ingested cannabis while the *Maria Luisa* was at sea, this would be of concern as he would have been significantly impaired for a period of time. The level of impairment and the rate at which it decreased would depend on the factors described in the toxicology reports. Therefore the extent of any impairment of the master's performance or judgement in the period leading up to and at the time of the accident, as a result of prior cannabis ingestion, cannot be ascertained.

3. Findings

3.1 The *Sydney Express* was manned and operated in accordance with SOLAS requirements and each of the required statutory certificates was valid.

3.2 The *Maria Luisa* was appropriately crewed as required by the relevant regulations and held a current Certificate of Survey.

3.3 The sailing vessel *Soundsgood* did not have to meet any survey or crewing requirements.

3.4 The *Sydney Express*, a vessel of over 500 gross tonnes proceeding outwards along a narrow channel/fairway, needed to stay as near to the centre as was practicable in order to navigate safely.

3.5 The *Soundsgood*, a sailing vessel under power, of less than 20 m in length and proceeding inwards along the same narrow channel/fairway, was required to keep as near to the outer limit of the fairway which lay on its starboard side as was safe and practicable (Rule 9(a)); and was required not to impede the passage of the *Sydney Express* (Rule 9(b) of the collision regulations and Rule 44 of the General Harbour (Nautical and Miscellaneous) Regulations 1968).

3.6 The *Maria Luisa*, a fishing vessel of less than 20 m in length and proceeding inwards along the same narrow channel/fairway, was required to keep as near to the outer limit of the fairway which lay on its starboard side as was safe and practicable (Rule 9(a)); and was required not to impede the passage of the *Sydney Express* (Rule 9(b) of the collision regulations).

3.7 The *Soundsgood* was not exhibiting the correct navigation lights for a sailing vessel under power.

3.8 The *Soundsgood* proceeded up the port side of the channel and impeded the passage of the *Sydney Express* thus contravening Rule 9(a) and (b) of the collision regulations and Rule 44 of the General Harbour (Nautical and Miscellaneous) Regulations 1968.

3.9 When it became doubtful whether the *Soundsgood* was taking sufficient action to avoid collision, the *Sydney Express* failed to sound at least five short rapid blasts on its whistle as required by Rule 34(d) of the collision regulations.

3.10 The *Sydney Express* had to deviate from its course to increase the closest-approach distance from the *Soundsgood* as allowed under Rule 17(a)(ii).

3.11 The deviation to avoid the *Soundsgood* placed the *Sydney Express* further to starboard in the channel than it would normally be.

3.12 By proceeding up the port side of the channel the *Maria Luisa* impeded the passage of the *Sydney Express* thus contravening Rule 9(a) and (b) of the collision regulations.

3.13 The *Maria Luisa* was the give-way vessel under the collision regulations.

3.14 The crew of the *Sydney Express* did not make proper use of the radar equipment fitted as required by Rule 7(b) of the collision regulations.

3.15 When it became doubtful whether the *Maria Luisa* was taking sufficient action to avoid collision, the *Sydney Express* failed to sound at least five short rapid blasts on its whistle as required by Rule 34(d) of the collision regulations.

3.16 When it became apparent to the master on the *Sydney Express* that collision could not be avoided by the action of the *Maria Luisa* alone, he was obliged to take action as would best aid to avoid collision (Rule 17(b)).

3.17 The decision by the master of the *Sydney Express* to alter course to port was based on inadequate information as to the relative positions of the vessels.

3.18 The decision by the master of the *Sydney Express* to alter course to port was made at a time when his workload was high and his situational awareness was low.

3.19 Poor bridge resource management on the *Sydney Express* caused the master's high workload, and the low situational awareness among the bridge team.

3.20 The *Sydney Express* altering course to port was not the best action to aid avoiding collision.

3.21 The *Sydney Express* had adequate sea room to move further to starboard to avoid the *Maria Luisa*.

3.22 In putting the helm the wrong way the helmsman added to the master's workload, but did not cause the collision.

3.23 The master's unclear helm instructions under pressure, the poor ergonomics of the helm, and the helmsman's inexperience with it, were factors which contributed to the wrong helm application.

3.24 The master of the *Maria Luisa* did not see the *Sydney Express* until a risk of collision already existed.

3.25 The turn to starboard the *Maria Luisa* made to avoid the *Sydney Express* was appropriate, but the presence of the *Sydney Express* should have been detected, and the starboard turn made, earlier.

3.26 The likelihood of detection of the *Sydney Express* by the master of the *Maria Luisa* would have been enhanced if the radar set on the *Maria Luisa* had been serviceable, and used.

3.27 Neither the *Sydney Express* nor the *Maria Luisa* sounded the appropriate manoeuvring signals to indicate the direction of their respective turns.

3.28 The *Maria Luisa* was turned over as a result of the collision with its port quarter by the *Sydney Express*.

3.29 Neither the *Sydney Express* nor the *Maria Luisa* utilised the *Beacon Hill* traffic reporting scheme on VHF channel 14 to its fullest potential.

3.30 The masters of both the *Sydney Express* and the *Maria Luisa* missed vital information by not closely monitoring VHF channel 14.

3.31 The open-loop style of communication between *Beacon Hill* and participating vessels did not ensure that all vessels received the relevant information.

3.32 The role of cannabis ingestion by the master of the *Maria Luisa* in the decision-making and performance of his duties in the period leading up to the accident is uncertain. However, it is unlikely that he would still have been significantly impaired by cannabis when the accident occurred.

4. Safety Actions

4.1 The Maritime Safety Authority (MSA) is currently producing a marine notice which will endorse BRM training and recommend to the industry that BRM forms part of company training policy.

5. Safety Recommendations

5.1 It was recommended to the Wellington Regional Council Harbourmaster that the Regional Council:

5.1.1 Adopt local by-laws to establish a mandatory, unambiguous traffic management system for vessels entering or leaving Wellington Harbour. Such a system should be promulgated on the chart and in all relevant publications pertaining to navigation in and around Wellington Harbour. (019/97)

5.1.2 Revise and consolidate existing standing orders and instructions into a Beacon Hill Operations Manual. Instructions should include the role of the signal station in monitoring and enforcing the traffic management system, which should include a closed-loop style of communication. (020/97)

5.2 The Wellington Regional Council Harbourmaster responded as follows:

5.2.1 019/97 The Commission's recommendation will be given full consideration, and following extensive consultation with the maritime industry, any necessary amendments to harbour bylaws will be submitted to the Wellington Regional Council for approval as part of a revision of harbour bylaws already scheduled for implementation by June 1998.

5.2.2 020/97 Yes. A consolidated and revised Beacon Hill Operations Manual has already been prepared, and subject to the contents of the Commission's Final Report, and evaluation of other official reports into this incident, will be promulgated at an early date.

In addition, to supplement the marine V.H.F. voice-recording system already in use, a new upgraded radar which will also record and store radar data is proposed to be installed by December 1997.

5.3 It was recommended to the Marine Manager for Tasman Express Line that:

5.3.1 He introduces and ensures effective Bridge Resource Management (BRM) techniques on all vessels under his management. (021/97)

5.3.2 He installs, although not required under SOLAS, an ARPA to one of the radar sets on each vessel under his management. (022/97)

5.3.3 He make all sea staff in his employment aware of the effect the light illuminating the forecastle can have on the ability of other vessels to distinguish the sidelights of their ship at night. (023/97)

5.3.4 He ensures all sea staff in his employment record the progress of their vessels, which must be done manually in the absence of automatic recording devices. (024/97)

5.4 The Marine Manager for Tasman Express Line responded as follows:

5.4.1 021/97 **Bridge Resource Management Training (BRM):** We note that the MSA is to produce a marine notice which will endorse BRM training and recommend that BRM forms part of company taining policy.

Tasman Express will send some of its senior and junior officers on BRM courses and evaluate the results. We understand there are courses running in Australia, with the possibility of New Zealand in the near future, and will be seeking details of these courses at the earliest opportunity.

5.4.2 022/97 **ARPA radar:** As bareboat charterers and ship managers, Tasman Express will, on release of the report, recommend to the vessel owners that one radar on *Wellington Express* and *Sydney Express* is fitted with ARPA radar.

5.4.3 023/97 **Forecastle lighting:** We will be informing our masters, on release of the report, on the effects of forecastle lighting on other vessels.

5.4.4 024/97 **Recording the progress of vessels by manual means:** Whilst recognising the practical difficulties of recording of engine movements, propeller pitch indication, helm orders etc on our vessels in some circumstances, we will advise our masters, on the release of the report, that they are to ensure all movements are recorded where this is practicable.

5.5 It was recommended to the owner of the *Soundsgood* that:

5.5.1 He fit navigation lights to the *Soundsgood* that comply with the collision regulations for that vessel when operating as a power-driven vessel. (025/97)

11 June 1997

Hon. W P Jeffries
Chief Commissioner