



Report 98-202

harbour tug *Purau*

and

restricted-limit ferry *Ngatiki*

collision

Port of Lyttelton

6 March 1998

Abstract

At about 0810 on Friday, 6 March 1998, the harbour tug *Purau* and the Diamond Harbour ferry *Ngatiki*, with eight passengers on board, were in collision in the Port of Lyttelton. The ferry was severely damaged and all except one passenger received minor injuries.

Safety issues identified included the failure to keep a proper lookout, improper interpretation of collision avoidance regulations, incomplete communication requirements for vessels moving within the port and speeds in excess of harbour restrictions. Safety recommendations were made to the Operations Manager of Lyttelton Harbour Cruises and to the Marine Operations Manager of the Lyttelton Port Company to address the above safety issues.



Figure 1
Purau and Ngatiki shortly after collision

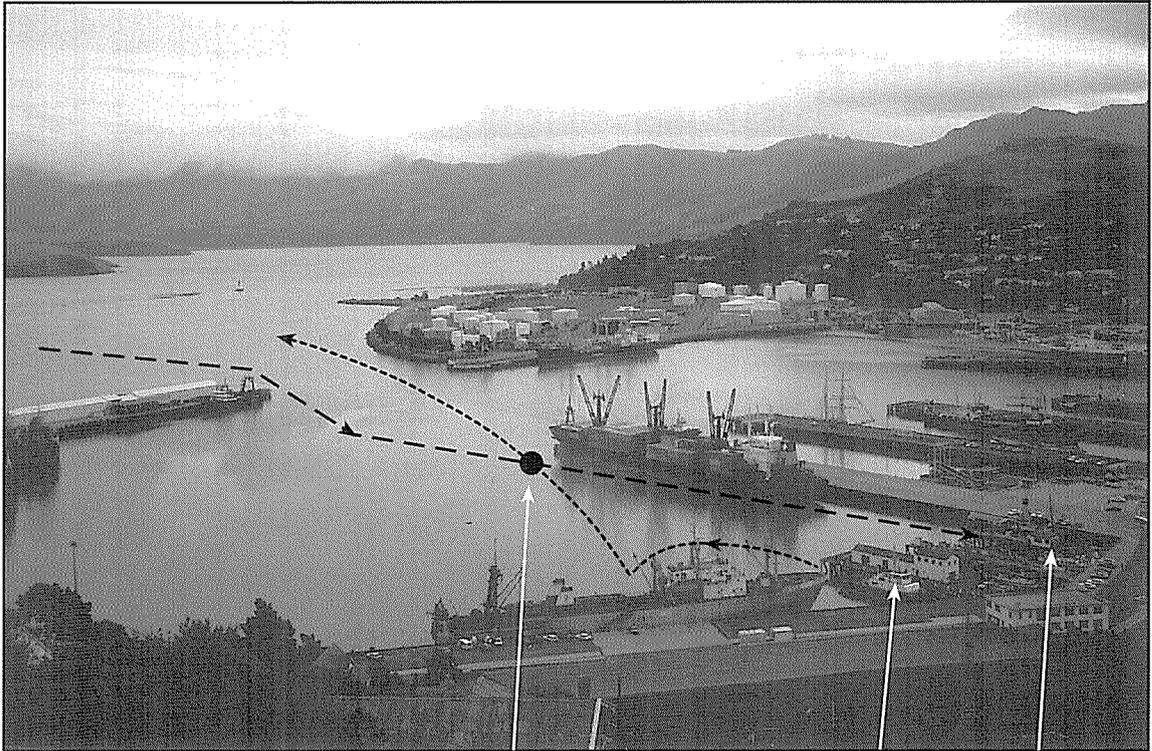
Transport Accident Investigation Commission

Marine Accident Report 98-202

Vessel particulars:

	<i>Ferry Ngatiki</i>	<i>Tug Purau</i>
Type:	Passenger ferry	Harbour tug
Class:	Class IV and V Restricted Limit Passenger Vessel	MSA Class IX LR Class #100A1 TUG + LMC
Plying limits:	Lyttelton River Limits	Lyttelton Extended River Limit
Allowable passengers:	73	Nil
Length:	14.74 m	29.85 m
Breadth:	4.2 m	9.49 m
Gross tonnage:	19.03 t	247 t
Construction:	Timber (Kauri)	Steel
Propulsion:	One 62.27 kW General Motors model 3-71 diesel engine driving a single fixed blade propeller	Two 1103 kW Niigata diesel engines each driving a shrouded fixed blade omni-directional propeller
Operating speed:	maximum 8.0 knots limited to 5 knots in inner harbour	maximum 13.5 knots limited to 5 knots in inner harbour
Built:	At Lyttelton in 1954 by J.Miller Limited	At Nagasaki, Japan in 1986 by Nagasaki Shipyard Company Limited
Location:	Port of Lyttelton	
Date and time:	6 March 1998 at about 0810 ¹	
Persons on board:	Crew: 1 Passengers: 8	Crew: 5 Passengers: nil
Injuries:	Crew: nil Passengers: 7 (minor)	Crew: nil Passengers: N/A
Nature of damage:	Extensive to ferry Minimal to tug	
Inspector-in-Charge:	Captain John Mockett	

¹ All times in this report are NZDT (UTC + 13) and are expressed in the 24 hour mode



Position of the collision

Tug berth

Ferry berth

Key:

-----	Intended track of Ngatiki
-----	Intended track of Purau

Figure 2
An overview of the Port of Lyttelton

1. Factual Information

1.1 History of the trip

- 1.1.1 At about 0810 on Friday, 6 March 1998, the tug *Purau* and the ferry *Ngatiki* were in collision in the Port of Lyttelton in the area near the end of Number 2 Wharf. The *Purau* was proceeding out to a ship-handling job and the *Ngatiki* was at the end of a scheduled trip from Diamond Harbour to Lyttelton. (See Figures 1, 2 and 3)
- 1.1.2 The *Purau* left its berth on the eastern side of Number 1 Wharf (see Figure 3) at about 0805. The incumbent master was on board but was not on the bridge at the time. With his approval, the conduct of the vessel was undertaken by a trainee tug master. The trainee master reversed the tug out of the berth and then turned it around, stern to starboard, off the end of the wharf and proceeded towards the western mole (Naval Point) of the harbour entrance. The trainee master stated that during the reversing manoeuvre, he contacted the Lyttelton Signal Tower (the Tower) on very high frequency (VHF) radio channel 12 and advised his departure from the berth.
- 1.1.3 The *Ngatiki*, with eight passengers on board, had left Diamond Harbour on the south side of the Lyttelton Harbour at the scheduled time of 0800. The skipper proceeded in a direct line from Diamond Harbour to the eastern mole of Port of Lyttelton. He entered the inner harbour on the starboard side of the entrance, close to the eastern mole, and proceeded towards the ferry berth at B Pier. (See Figure 3)
- 1.1.4 The *Purau* was on its way out to meet and assist the incoming container vessel, *Arthur Maersk*, that was due outside the port at 0830 and then to berth on Cashin Quay. The Duty Signalman at the Tower reported that the trainee master of *Purau* contacted him on VHF radio channel 12 and confirmed his departure from the berth.
- 1.1.5 As the skipper of *Ngatiki* approached the entrance of the inner harbour, he appraised any possible conflicting vessel movements within the inner harbour. On the previous passage from Lyttelton to Diamond Harbour, he had noticed that the *Spirit of Freedom* had been entering the harbour. He first checked that this vessel was clear of his route to B Pier. He had been monitoring VHF channel 12 and heard a conversation between the vessel *Polar Star* and the Tower that gave him the impression that the *Polar Star* was about to move. However, he observed that the *Polar Star* was still secured to its berth on the West side of Number 2 Wharf and had no tugs in attendance. He therefore assumed that any impending movement of that vessel would not affect his own passage through the harbour.
- 1.1.6 To reach B Pier from the entrance moles, the skipper of *Ngatiki* had to pass on the East side of Number 2 Wharf, where the vessel *Green Wave* was berthed, (see Figure 3). He checked that it was still secured alongside and had no tugs in attendance and assumed that it too would not be moving. He made a visual check around the harbour and came to the conclusion that no other vessels were moving.
- 1.1.7 The skipper stated that he heard no other VHF traffic to indicate any movements in the inner harbour. He stated that the tugs would normally report their movements on VHF, but on this occasion he heard no such report. The skipper of *Ngatiki* was not required to report his arrival and departure movements.

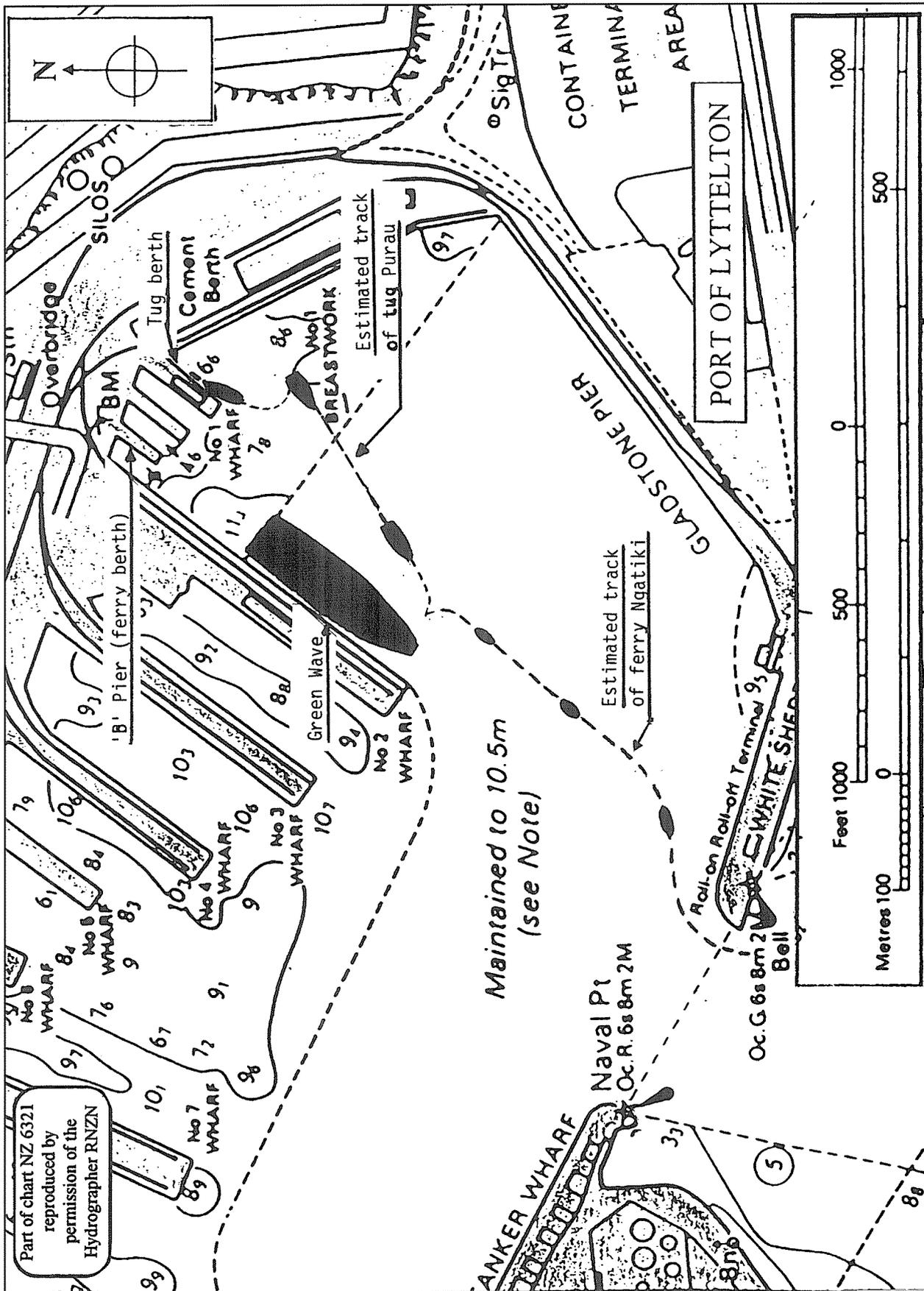


Figure 3
Part of Chart NZ 6321 showing estimated tracks of Purau and Ngatiki

- 1.1.8 Shortly after leaving the berth, one of the two *Purau* deckhands, who was also a relieving tug master, joined the trainee master on the bridge. After turning the tug around, both entrance moles were visible allowing the trainee master to assess his passage to the outer harbour. The trainee master and the deckhand saw the *Ngatiki* proceeding towards its berth. They stated that the *Ngatiki* was on the eastern side of the inner harbour and was fine on the port bow of the tug. The trainee master was not initially alarmed due to his expectation that *Ngatiki* would alter course as his first impression was that it was the give-way vessel under the Shipping (Distress and Prevention of Collision) Regulations 1988.
- 1.1.9 The skipper of *Ngatiki* had satisfied himself that no other vessel was moving in his area of operation, and continued in his usual manner to the ferry berth. He stated that he had not seen the *Purau* moving away from its berth at Number 1 Wharf and he felt that the tug must have been in the blind sector created by the mullion between the wheelhouse windows. (See Figure 4.) He conceded that it must have been proceeding across the harbour at that time and said that had he sighted *Purau*, "I would have gone way behind him. We give way to tugs, we don't go anywhere near them."
- 1.1.10 On the bridge of the *Purau*, the trainee master further appraised the developing situation and concluded that a risk of collision existed. At this time, the deckhand also thought that the *Ngatiki* was not acting as expected and exclaimed, "What the hell is this guy doing."
- 1.1.11 Because of the fine angle of the *Ngatiki* on the port bow of *Purau*, the trainee master considered that it could be either a crossing vessel or a head-on or nearly head-on vessel. Because of his doubt, he concluded that it should be treated as a head-on situation under the Shipping (Distress and Prevention of Collision) Regulations 1988 but delayed his alteration to starboard as he was aware that *Ngatiki* may alter course to port at any time to make for its berth on B Pier.
- 1.1.12 When it became apparent to the trainee master that *Ngatiki* was not going to alter course he sounded the warning signal of five short and rapid blasts on the whistle. The trainee master stated that the ferry was about 100 m away at this time.
- 1.1.13 The skipper of *Ngatiki* was alerted to the presence of *Purau* by the warning signal. He stated that this was the first time that he realised the *Purau* was moving and it took him a few seconds to appraise the situation. The skipper estimated that *Purau* was two points (22.5 degrees) on his starboard bow and the distance between the two vessels was only 20 m.
- 1.1.14 The trainee master of *Purau* considered that the *Ngatiki* was not taking any avoiding action and altered the course of the tug to starboard. At the same time he put the propulsion control units to the astern mode and increased the engine revolutions to full. He estimated that at the time of his alteration of course, the *Ngatiki* was about 30 m away and still fine on his port bow. He stated that his alteration of course was intended to make the two vessels pass 'port-to-port'.
- 1.1.15 At the same time, the skipper of *Ngatiki*, having realised that the *Purau* was approaching on his starboard bow, increased engine power to full and made an alteration of course hard to port to attempt to cross the bow and subsequently to alter hard to starboard and pass 'starboard-to-starboard'. He stated later that the *Purau* was too close on his starboard bow to contemplate an initial alteration to starboard and that his actions had been instinctive.
- 1.1.16 Some of the way came off the *Purau* due to the full astern manoeuvre, but the simultaneous course alterations of the two vessels resulted in the *Purau* hitting the *Ngatiki* amidships on its starboard side. The impact caused the *Ngatiki* to heel violently over to port. The skipper later estimated the heel to be about 80 degrees. The large heel caused an inrush of water into the port side of the *Ngatiki*. The *Ngatiki* was holed on its starboard side and superstructure.



Figure 4
View from steering position of *Ngatiki*

- 1.1.17 The *Purau* remained embedded in the starboard side of *Ngatiki* for a short period and the two vessels swung around together as a result of the collision. As the astern power took effect, *Purau* pulled free of *Ngatiki* but the vessel continued to swing and it passed down the port side of *Ngatiki*. The skipper of *Ngatiki* put his vessel astern to clear the immediate area of the collision. During this confused movement of the two vessels, the starboard quarter of *Purau* came into contact with the bulbous bow of the *Green Wave*.
- 1.1.18 Although no ferry passengers had been seated in the area of impact the violence of the collision, the large ingress of water as the vessel heeled over and the flying loose or damaged objects resulted in the majority of the occupants receiving cuts, abrasions and bruises.
- 1.1.19 Immediately after the collision, one of the passengers jumped into the water. The crew of *Purau* threw her a life-ring and the skipper of *Ngatiki* threw her a buoyancy raft. The master of *Purau* stood his vessel clear of the area, while the skipper of *Ngatiki* manoeuvred to rescue the passenger from the water.
- 1.1.20 Once the passenger was on board the *Ngatiki*, the skipper proceeded to his berth at B Pier. He had been unable to notify the emergency services because his radio had been damaged in the collision. However, witnesses ashore had notified them and ambulance and fire services awaited the ferry's arrival at its berth.
- 1.1.21 The trainee master of *Purau* held his position clear of the collision site and stood by to render assistance. Once the *Ngatiki* rescued the passenger from the water and made its way to the berth, and had been met by the emergency services, the crew of *Purau* conducted tests of the propulsion and steering equipment. Having satisfied themselves that there was no damage, they proceeded out to meet the in-coming vessel.
- 1.1.22 As a result of the contact between *Purau* and the *Green Wave*, the stern fender support of the *Purau* was distorted and the bulbous bow of *Green Wave* scored and slightly indented. The *Green Wave* was undergoing tank surveys at the time and both the internal and external structure was inspected by the master, the port engineer and the surveyor. They all considered the external damage to be minimal and were unable to find any indication of the damage internally.

1.2 Weather information

- 1.2.1 The weather recorded by the Lyttelton Signal Tower at 0600 was cloudy and fine; a northerly wind of 15 knots; a barometer reading of 1005.6 hPa and a temperature of 21.0 degrees. The conditions recorded at 0900 were cloudy and fine; a northerly wind of 20 knots; a barometer reading of 1006.2 hPa and a temperature of 22.3 degrees. The harbour conditions were reported as smooth seas with good visibility.

1.3 Post-accident information

- 1.3.1 The trainee master of *Purau* stated that harbour speed was achieved when operating in the condition known as "clutched in". This was the method shown to him and normally used by the tug masters under whom he trained. When clutched in;
- the engine speed control was set at "zero" which gave rpm just above those at which the clutch slipped,
 - the Z-Peller² controls were set at right ahead.

² Refer paragraph 1.4.2

- 1.3.2 The trainee master had previously been under the impression that when operating in the clutched in mode, the speed of the tug was about 4 knots.
- 1.3.3 Observations were made of *Purau* on several subsequent occasions as it made the same manoeuvre as on the accident trip.
- Timings showed that it took between 50 and 55 seconds to transit from the turnaround position to the site of the collision, a distance of about 210 m. This equates to a speed of between 7.6 and 8.4 knots.
 - Actual speed was observed using an infrared laser system and was seen to be 15 km/h which equates to 8.1 knots.
 - These observations were taken while the trainee master of *Purau* had the conduct of the vessel.
- 1.3.4 The skipper of *Ngatiki* stated that when operating in the inner harbour the speed of the vessel would have been 5 knots.
- 1.3.5 Observations were unable to be made of *Ngatiki* as it was not returned to service. However observations were made of *Onawe*, another of the company ferries of similar dimensions and capability, on several inner harbour passages.
- Timings showed that it took between 52 and 56 seconds to transit from about 50 m inside the eastern mole to the site of the collision, a distance of about 240 m. This equates to a speed of between 8.4 and 9.2 knots.
 - Actual speeds were observed using an infrared laser system and were seen to be between 14 and 16 km/h which equates to between 7.6 and 8.6 knots.
 - These observations were taken while two different skippers had conduct of the vessel. However, the skipper of *Ngatiki* had the conduct of the vessel during the observations that resulted in 8.4 knots by timing and 7.6 knots by laser.
- 1.3.6 The *Onawe* was of similar size and operating speed to *Ngatiki*. Both ferries had been used for many years on the crossings to and from Diamond Harbour and the skipper of *Ngatiki* had been accustomed to driving either one as required. The likelihood existed that he would drive both vessels in a similar manner and it was assumed that the observations of *Onawe* would be valid when applied to *Ngatiki*.

1.4 Vessel information *Purau*

- 1.4.1 *Purau* was a dedicated harbour tug, owned and operated by Lyttelton Port Company Limited. It was operated under a safe ship management system provided by Lloyds Register of Shipping. Safety and operation manuals were in place and adequately covered the normal operations of the vessel. The vessel did not have a complete Safe Ship Management Certificate but was operating under an exemption, subject to audit finalisation.
- 1.4.2 The propulsion and steering of the vessel was by the Z-Peller system. Each of the two fixed-blade propellers turned only in one direction. There was no rudder for steering but the propellers were covered by shrouds which could be rotated independently through 360 degrees to direct the flow of water and thus alter the direction of the vessel. The engines and steering were operated by bridge control.

- 1.4.3 The engine speed control was independent of the steering control and minimum operating rpm were just above those at which the clutch slipped and was known as being “clutched in”. These rpm were achieved when the engine speed controller was set at a notched position and marked as “zero” on the controller. The clutched in condition was utilised as harbour speed.
- 1.4.4 To vary the speed of the tug while on a constant engine rpm the propeller shrouds could be rotated through an appropriate angle so that the flow of water past the propellers was directed away from the fore and aft line. When each shroud was directed at 90 degrees, the tug would be stopped. To change from ahead to astern mode the propeller shrouds were rotated through 180 degrees to direct the flow of water ahead. There was no speed indicator on the bridge.
- 1.4.5 Steering was achieved by rotating the propeller shrouds, either singly or together as required. The rate of turn could be increased by varying the engine rpm on one or other of the engines.
- 1.4.6 The bridge was designed for single person operation with all controls, including those for the forward towing winch being readily to hand at the central steering position.
- 1.4.7 *Purau* operated with a minimum complement of four, comprising master, engineer and two deckhands. The maximum allowable complement was seven and lifesaving equipment was provided for eight persons. The tug was not permitted to carry passengers.

1.5 Vessel information *Ngatiki*

- 1.5.1 *Ngatiki* was a dedicated passenger ferry that had been operating in the Lyttelton Harbour area for over 40 years. It was operated under a safe ship management system provided by Marine and Industrial Limited. Safety and Operations manuals were in place and adequately covered the normal operations of the vessel. The vessel did not have a complete Safe Ship Management Certificate but was operating under an exemption, subject to audit finalisation.
- 1.5.2 *Ngatiki* was a conventional vessel with a single inboard diesel engine with ahead and astern modes. There was no speed indicator in the wheelhouse. Steering was achieved by conventional single rudder.
- 1.5.3 *Ngatiki* was operated single-handedly by the skipper. The maximum allowable number of passengers was 73, with lifesaving equipment being provided for 76 persons. Buoyancy apparatus consisted of lifebuoys and liferafts. No lifejackets were provided.
- 1.5.4 The wheelhouse was fitted with three forward windows. The central athwartships window was the largest. The windows on either side were smaller and angled slightly towards aft. The width of the mullion between the windows was about 20 cm, (see Figure 4). The steering position of *Ngatiki* was in line with the mullion between the central and port side windows.

1.6 Personnel information

- 1.6.1 The trainee tug master started his sea-going career in 1965 with Blue Star Line and progressed to First Mate. He gained his Foreign Going Masters Certificate in 1976. He left Blue Star Line in 1981 and spent two years teaching at the School of Fisheries in Nelson. He returned to sea in 1983 with Pacifica Shipping as Third Mate and progressed to Master in 1987. As a regular caller into Lyttelton he had gained his pilot exemption for the port 1985. He took employment with the Lyttelton Port Company on 7 January 1998 as trainee tug master/relieving pilot.

1.6.2 The deckhand, who was on the bridge of the tug at the time of the collision, was employed by the Lyttelton Port Company as a relieving tug master. He held a Commercial Launch Master Certificate. He had completed his training as tug master about four months before the accident. He occasionally served on the tugs as deckhand, as he was on the day of the collision. He had previously been one of the skippers of the Lyttelton pilot launch and had been working in the port for 18 years.

1.6.3 The skipper of the *Ngatiki* had been operating on the Diamond Harbour ferry service for 17 years. He had previously been part owner of a ferry service in Tauranga for two years. He held a Commercial Launch Masters Certificate. He was Operations Manager of Lyttelton Harbour Cruises.

1.7 Working routines *Purau*

1.7.1 As the majority of port movements were made during the day, the trainee master of *Purau* had been working predominantly during daylight hours to give him as much training as possible. His last duty had been at 1800 the previous day. The 0805 departure on the day of the collision was his first job of the day. His duty times often involved weekend work.

1.7.2 The deckhand had been on duty during the previous day as relief master. He had also been deckhand on a ship-handling job beginning at 0030 that had taken about one hour. The crew was then on duty again at 0500 but that job was delayed so he then slept until the 0800 job. As with other crew members, his duty times often included weekend work.

1.7.3 The tugs leave their berth in time to enable them to meet an incoming vessel about halfway down the outer Harbour. The *Purau* had left the berth to meet the *Arthur Maersk* due outside the port at 0830 and would have had sufficient time to be on station at the normal meeting position in the outer harbour.

1.8 Working routines *Ngatiki*

1.8.1 The skipper of *Ngatiki*, who is also the Operations Manager of the company, worked a five day week from Monday to Friday. The previous day he had started at 0600 and finished at 1500. On the day of the collision he had started at 0600 and made two trips prior to the accident trip. This would be his regular work pattern unless he had to substitute for one of the other skippers for any reason. In addition to the commuter ferry crossings to Diamond Harbour, the company also ran at least one harbour cruise each day.

1.8.2 The skipper of *Ngatiki* stated that he routinely monitored all vessel movements as he entered the inner harbour. He particularly noted any tug movements because the positions of their respective berths meant that the ferry crossed the tugs passages all the time. It was his normal practice to give the tugs a wide berth irrespective of their aspect of approach.

1.8.3 Although the *Ngatiki* plies between two fixed points there was no passage plan or charted route. Because there was always a variety of other vessels moving to, from and within the port, crossings often varied although following a basic line.

1.8.4 The commuter services of Lyttelton Harbour Cruises were timed to coincide with a bus service from Lyttelton to Christchurch. The ferry services left Diamond Harbour at scheduled times. The crossing on which the collision occurred was the 0800 departure from Diamond Harbour and had left on time.

1.9 Training information

- 1.9.1 Trainee tug masters enter into the Lyttelton Port Company training scheme already equipped with ship handling experience. Entrants are expected to be experienced ship masters or launch skippers and hold the corresponding certificates. Training was specific to learning the skills necessary to driving the particular tugs owned by the port and the control of those tugs when assisting a pilot manoeuvring a vessel in the port. The trainee master of *Purau* was employed as Trainee Tug Master/Relief Pilot and was an experienced ship master holding a pilotage exemption for the Port of Lyttelton.
- 1.9.2 The training for tug master took the form of initially observing the incumbent masters and gradually taking the controls for lesser operations, progressively building to full operations. The operations that the trainee attended were selected to give the greatest possible number and variety of experience. This gradual increase in the trainee's operation of the tug built until the roles reversed, with the incumbent master observing the trainee.
- 1.9.3 The performance of the trainee was observed by the various masters who then reviewed his performance with the Marine Operations Manager. If considered to be suitable, the trainee was then appointed as a regular master in sole charge of the tug. Depending on the performance of the individual trainee, the process took between two and four months.
- 1.9.4 The trainee operating the tug at the time of the collision had been in the training programme for two months. The peer reviews had been favourable with at least two masters being of the opinion that he was, "Almost ready to go solo". At the time of the collision, the Marine Operations Manager was considering the reviews and was satisfied with the trainee's progress and performance.
- 1.9.5 At his level of experience and his status in the training programme, it was not unusual for the trainee to have the conduct of the tug for unberthing and the passage out to meet an in-coming vessel. He had previously taken sole charge of unberthing but this was the first time that the incumbent master had not been in attendance to observe the passage across the harbour. The trainee master was confident of his ability to handle the tug alone for manoeuvres around the harbour.

1.10 Legislation: Canterbury Regional Council Harbour Bylaws 1996

- 1.10.1 Section 3.5 states:

Speed of vessels

- (1) The Master of any vessel shall not allow the vessel or any object towed by it to proceed at a proper speed greater than five knots when within:
- (a) 30 metres of any other vessel, raft or person in or on the water;
 - (b) 200 metres of the shore or any structure.

The speed restriction of 5 knots was prominently displayed on the eastern mole at the entrance to the Port of Lyttelton. The notice was in the form of a roundel similar to speed restriction notices on the road.

- 1.10.2 Section 3.12 states:

Collision Regulations to apply

No person shall operate any vessel in breach of the provisions of the Shipping (Distress Signals and Prevention of Collisions) Regulations 1988, as they apply to navigation.

1.11 Legislation: Shipping (Distress Signals and Prevention of Collision) Regulations 1988

1.11.1 Rule 5 states:

Look-out

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

1.11.2 Rule 6 states (preamble only):

Safe Speed

Every vessel shall at all times proceed at a safe speed so that she can take proper and effective action to avoid collision and be stopped within a distance appropriate to the prevailing circumstances and conditions.

1.11.3 Rule 14 states:

Head-On Situation

- a) When 2 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 each 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 a line or nearly in a 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.

1.11.4 Rule 15 states:

Crossing Situation

When 2 power-driven vessels are crossing so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way and shall, if the circumstances of the case admit, avoid crossing ahead of the other vessel.

1.11.5 Rule 16 states:

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.

1.11.6 Rule 17 states:

Action by Stand-On Vessel

- a) (i) Where one of 2 power-driven 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 it 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 such action as will best aid to avoid collision.
- c) A power-driven vessel which takes action in a crossing situation in accordance with paragraph (a) (ii) of this rule to avoid collision with another power-driven vessel shall, if the circumstances of the case admit, not alter course to port for a vessel on her own port side.

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

1.11.7 Rule 34 states (extracts only):

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";

Two short blasts to mean "I am altering my course to port";

Three 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.

1.12 Legislation: Port of Lyttelton

1.12.1 It is the required practice of the Port of Lyttelton that all vessels over 100 gross tonnes moving into, out of or within the port must contact the Tower for clearance. The Tower listens on VHF channels 12 and 16 throughout 24 hours of the day. When making a report to the Tower, a vessel will be advised whether or not clearance is granted and also receive advice about other vessel movements which may conflict with its own. Vessels are required to maintain a listening watch on VHF channel 12.

1.12.2 Local fishing vessels have also been instructed by the harbourmaster that they are required to comply with the VHF reporting and listening procedures in the same manner as vessels over 100 gross tonnes.

1.12.3 There is no formal requirement for small vessels to report their movements into, out of or within the port, although some of the local commercial vessels do so.

1.12.4 Under the Harbour Bylaws of the Canterbury Regional Council, a 5 knot speed restriction was in place for the inner harbour.

2. Analysis

2.1 General

2.1.1 After *Ngatiki* entered through the moles and the skipper was making his visual check for other vessel movements, the *Purau* would have just turned around prior to proceeding across the inner harbour. At this time the two vessels would have been about 450 m apart with *Purau* closer to the position of the collision than *Ngatiki*.

2.1.2 Allowing a speed of 8 knots for both *Ngatiki* and *Purau*, the distance between them would have been covered in 56 seconds. Therefore, for the masters of each vessel this was a critical time of appraisal as both had to cross the inner harbour and take account of any other vessel movements.

2.2 *Purau*

- 2.2.1 The trainee master who had the conduct of the tug at the time of the collision was familiar with the Port of Lyttelton. He had been pilot exempt and a regular caller into the port for the previous thirteen years; two years as first mate and eleven as master.
- 2.2.2 The trainee master had been in the training scheme for two months and the incumbent masters and through them, the Marine Manager considered that he was well advanced and close to “going solo”. He had unberthed the tug alone many times before and had had conduct of the tug across the harbour although the incumbent master had observed him on those occasions.
- 2.2.3 The unberthing of *Purau* and its passage out to meet an incoming vessel was not a manoeuvre that required knowledge or experience specific to tug operations. As a qualified master mariner and an experienced master, it was not unreasonable that the trainee master should be left alone to carry out the task. His training was at a stage of concentrating on the operations of ship handling. The fact that he was still under training as a tug master is not considered to have contributed to the accident.
- 2.2.4 The trainee master had been off duty the previous night and the accident trip was his first job of the day. His working week had involved daytime operations and he was adequately rested. Fatigue is not considered to have contributed to the accident.
- 2.2.5 The *Purau* left the berth at about 0805. This gave ample time to reach the rendezvous with the incoming vessel and the trainee master was not under any undue pressure due to time constraints.
- 2.2.6 The trainee master made the passage across the harbour with the engine controls “clutched in” in the ahead mode. This was consistent with his training but subsequent observations showed that a speed of about 8 knots was achieved. This speed was above the restrictions for the harbour and reduced the time available to the trainee master for assessment of other traffic and actions to avoid collision. The excess speed is considered to be a contributory factor in the accident.
- 2.2.7 Although the deckhand, who was on the bridge from shortly after unberthing, had not been required to be present, he did play a supportive role inasmuch as he was also a relief tug master and could have advised the trainee master if required.
- 2.2.8 When he sighted the *Ngatiki* as the *Purau* began the passage across the harbour, the trainee master was not immediately alarmed. The sight of the Diamond Harbour ferry was not unusual and he expected that the skipper of *Ngatiki* would alter course although there had been insufficient progress of either vessel to assess a trend in their relative bearings.
- 2.2.9 As the passage progressed, it became apparent to the trainee master, that the converging of the two vessels was not “normal” and that risk of collision existed. Because *Ngatiki* was fine on the bow, the trainee master considered it to be either a crossing vessel or a head-on or nearly head-on vessel. As there was some doubt, he decided appropriately that a head-on situation existed. In either case the trainee master expected the *Ngatiki* to alter course.
- 2.2.10 Having decided that a head-on situation existed, it was also a requirement that *Purau* alter course to starboard. It would have been appropriate for the trainee master to have made such an alteration and the required sound signal as soon as the risk of collision was identified. The delay in making the alteration to starboard is considered to have contributed to the accident.
- 2.2.11 The trainee master stated that he initially delayed his alteration because he felt that *Ngatiki* may alter course to port at any time in order to make for the berth. Witnesses confirmed that the ferry would normally keep clear, without necessarily adhering strictly to the Shipping (Distress and Prevention of Collision) Regulations 1988.

- 2.2.12 The trainee master further delayed making any alteration to the tugs course and in doing so, he came to consider *Purau* as the stand-on vessel and expected the *Ngatiki* to give way. This change in his appreciation of the situation was not appropriate and is considered to have contributed to the accident.
- 2.2.13 The sounding of five short and rapid blasts on the *Purau*s whistle was the appropriate signal of the master's concern at the time, but should have been made as soon as risk of collision was identified.
- 2.2.14 The trainee master made no attempt to contact the *Ngatiki* by VHF when his concern was first raised by the apparent lack of avoiding action by the skipper of *Ngatiki*. This would have been an appropriate method to attempt to alert the skipper of *Ngatiki* to the presence of *Purau* and afforded the potential for an agreement on a safe passing arrangement for the two vessels.
- 2.2.15 The trainee master eventually came to the conclusion that *Ngatiki* was not going to alter course and as he had decided that *Purau* was the stand-on vessel, he altered his own course to starboard, under Rule 17 (a) (ii) and (c) and attempted to take the way off by putting the propulsion controls to the full astern mode. The alteration to starboard was appropriate but he did not convey his intention to *Ngatiki* by sounding the required sound signal of one short blast on the whistle.

2.3 *Ngatiki*

- 2.3.1 The skipper of *Ngatiki* was familiar with the Port of Lyttelton and his vessel, having been driving the Diamond Harbour ferries for the previous seventeen years. He was operating single-handed, but this was normal practice and was the minimum required crewing under the safe ship management system .
- 2.3.2 The skipper was on his third trip of the day having commenced his daily routine with the 0600 crossing. He had worked his normal routine during the preceding days and had finished work each day at 1500. He was adequately rested and fatigue is not considered to have contributed to the accident.
- 2.3.3 The *Ngatiki* left Diamond Harbour on schedule at 0800. This gave ample time to reach the berth in Lyttelton and connect with the bus service. The skipper was not under any undue pressure due to time constraints.
- 2.3.4 As *Ngatiki* approached and entered the inner harbour, the skipper busied himself with appraising vessel movements that were known to him. He had seen the *Spirit of Freedom* coming into the harbour on his previous crossing; he had heard a VHF conversation with *Polar Star* and he knew that he had to pass the *Green Wave* which was berthed on Number 2 Wharf. It was appropriate that he verify that none of these particular vessels were moving within the harbour and indicated that at that stage he had good situational awareness.
- 2.3.5 At about the time *Ngatiki* had entered the inner harbour, the *Purau* would have just completed the manoeuvre to turn around off the tug berth and been virtually stopped in the water prior to commencing passage across the harbour. In the visual appraisal made by the skipper there would have been little or no movement to alert him to the fact that the tug had departed from its berth so he was of the opinion that no other vessels were moving in the area.
- 2.3.6 The skipper stated that he did not hear any VHF traffic between the *Purau* and the Tower on the morning of the accident. He further stated that the tugs normally did report their movements and that the Tower would normally confirm to the tug the whereabouts of the vessel which it was going to assist. As he did not hear any VHF movement reports, the skipper's attention was not drawn to the possibility of *Purau* moving across the harbour.

- 2.3.7 The skipper said the *Ngatiki* proceeded across the harbour at its usual speed, which he estimated to be 5 knots although there was no speed indicator available to him. Observations of subsequent passages made by the skipper in a similar vessel showed that passages across the harbour were made at about 8 knots. It was assumed that he would have operated *Ngatiki* at a similar speed. This speed was above the restrictions for the harbour and reduced the time available to the skipper for assessment of other traffic and actions to avoid collision. The excess speed is considered to be a contributory factor in the accident.
- 2.3.8 Once he had settled on his passage across the inner harbour, it is apparent that the *Purau* remained in the blind sector created by the mullion between the centre and starboard wheelhouse windows. The fact that the tug remained constantly on this bearing line would confirm that the two vessels were on a converging collision course.
- 2.3.9 As the skipper had been driving the *Ngatiki* over a period of 17 years, it is reasonable to expect him to be aware of the blind sector. It would have taken a very small head movement by him to overcome this restriction to his view. He should have kept a proper lookout by occasionally altering his viewing position in order to have eliminated the possibility of any vessel approaching within the blind sector. An earlier identification of *Purau's* movement would have enabled the skipper to make an alteration in ample time to have avoided the collision.
- 2.3.10 The skipper came to the conclusion that there was no conflicting traffic when he entered the inner harbour. Thereafter he appears to have presumed that his route would be clear all the way to the berth at B Pier. This presumption is considered to be a contributing factor in the accident.
- 2.3.11 The skipper of *Ngatiki* was unaware of *Purau's* presence until he heard the five short and rapid blasts on its whistle. At this time he estimated that *Purau* was two points on his starboard bow and 20 m distant. At a closing speed of about 16 knots, it would take about 2.5 seconds to cover 20 m, which would be insufficient time for the ensuing sequence of actions on each vessel to have been completed. It is probable that the skipper underestimated the distance due to the surprise of first seeing the tug close on the bow.
- 2.3.12 The skipper of *Ngatiki* considered that a turn to starboard was not possible due to the close proximity and instinctively altered course to port away from the perceived danger. Realising that he was crossing the bow of *Purau*, he also applied full power on the engine. Despite the close quarters situation, it would have been more appropriate to have altered course to starboard.

3. Findings

Findings and any safety recommendations are listed in order of development and not in order of priority.

- 3.1 Both the *Purau* and the *Ngatiki* were crewed and equipped as required for vessels of their class.
- 3.2 Both vessels were operating under safe ship management systems although exempted from having a Safe Ship Management Certificate.
- 3.3 There was no mechanical failure or malfunction of equipment that contributed to the collision.
- 3.4 The *Ngatiki* was under the conduct of its skipper who was properly qualified and familiar with the Port of Lyttelton.
- 3.5 The absence of the incumbent master of *Purau* on the bridge is not considered to have contributed to the collision.

- 3.6 The *Purau* was under the conduct of a trainee master.
- 3.7 The trainee master of *Purau* was adequately experienced and suitably qualified to have had conduct of the vessel for the operation being undertaken at the time of the collision and was familiar with the Port of Lyttelton.
- 3.8 The fact that the skipper of *Ngatiki* did not hear a VHF message reporting the departure of *Purau* was a contributing factor in the collision.
- 3.9 Although local legislation does not require that vessels such as *Ngatiki* advise their movements to the Tower, had the skipper of *Ngatiki* done so, it is likely that he would have been advised of *Purau*'s departure.
- 3.10 Under local bylaws both vessels were required to comply with the Shipping (Distress and Prevention of Collisions) Regulations 1988 as they applied to navigation.
- 3.11 Both *Purau* and *Ngatiki* were travelling at about 8 knots in contravention of the 5 knot speed restriction in the harbour.
- 3.12 The excess speed of both vessels reduced the time available for situational assessment and collision avoidance, and was a contributing factor in the collision.
- 3.13 The identification of risk of collision and the application of Rule 14 (Head-on situation) by the trainee master of *Purau* was appropriate.
- 3.14 The delay in taking early avoiding action under Rule 14 by the trainee master of *Purau* was not appropriate and was a contributing factor in the collision.
- 3.15 The apparent change of application from Rule 14 (Head-on situation) to Rule 15 (Crossing situation) by the trainee master of *Purau* was not appropriate and caused him to further delay any avoiding action.
- 3.16 The sounding of the warning signal of five short and rapid blasts by the trainee master of *Purau* was appropriate whether Rule 14 or 15 was applied.
- 3.17 The alteration of course to starboard made by the trainee master of *Purau* was appropriate.
- 3.18 It would have been prudent for the trainee master of *Purau* to have made the sound signal to indicate to *Ngatiki* his intention to alter course to starboard. Such a signal may have given the skipper of *Ngatiki* the confidence to alter his own course to starboard. The lack of this sound signal was a contributing factor in the collision.
- 3.19 The presumption by the skipper of *Ngatiki* that his route across the inner harbour would remain clear of conflicting traffic resulted in him not keeping a proper lookout.
- 3.20 The failure of the skipper of *Ngatiki* to keep a proper lookout, in contravention of Rule 5, prevented the early identification of risk of collision and was a contributing factor in the collision.
- 3.21 The turn to port across the bow of *Purau* made by the skipper of *Ngatiki* was inappropriate and was a contributing factor in the collision.

4. Safety Recommendations

- 4.1 On 5 June 1998 the Commission recommended to the Operations Manager of Lyttelton Harbour Cruises that:
- 4.1.1 Regardless of any legislative requirement to do so, he instruct the skippers of ferries to report their arrivals and departures to the Lyttelton Signal Tower on VHF channel 12, (034/98); and
 - 4.1.2 He remind skippers of ferries that when operating in any area with other vessels, they are to adhere to the provisions of the Shipping (Distress and Prevention of Collision) Regulations 1988 as per the Canterbury Regional Council Harbour Bylaws, (035/98); and
 - 4.1.3 He ensure that skippers of ferries adhere to the 5 knot speed restriction when within the inner harbour. In the absence of a speed indicator he should specify the engine rpm that corresponds to the required speed. (049/98)
- 4.2 On 16 June 1998 the Operations Manager of Lyttelton Harbour Cruises responded as follows:
- 4.2.1 **034/98**
After discussion with Lyttelton Harbour Master this morning, 9/6/98, we have both agreed with this recommendation. It will be put into practice immediately.
 - 4.2.2 **035/98**
Each skipper will be required to re-read and adhere to these regulations.
 - 4.2.3 **049/98**
Our main passenger vessel *Onawe* is to be fitted with a digital log to record accurate speed. This will happen by Friday 12th June. The *Waipapa's* speed will be recorded by engine revolutions alongside the *Onawe* at 5 knots.
- 4.3 On 5 June 1998 the Commission recommended to the Marine Operations Manager of Lyttelton Port Company that:
- 4.3.1 He extend the requirement to notify the Lyttelton Signal Tower of vessel movements into, out of or within the port to include all commercial vessels regardless of their size or nature of operation, (036/98); and
 - 4.3.2 He ensures that all vessels using the Port of Lyttelton are aware of, and adhere to, the 5 knot speed restriction in the inner harbour. (050/98)

4.4 On 16 June 1998 the Marine Operations Manager of Lyttelton Port Company responded as follows:

- 4.4.1 In my position as Lyttelton Harbourmaster I intend to adopt both safety recommendations and to have them implemented as soon as practicable.
- 4.4.2 The recommendation regarding communications with the Signal Tower (036/98) has been implemented and is now complete.
- 4.4.3 The recommendation regarding adhering to the five knot speed restriction (050/98) is intended to be implemented by 30th June 1998.

Report approved for publication 10 June 1998

Hon. W P Jeffries
Chief Commissioner

Glossary of marine abbreviations and terms

aft	rear of the vessel
beam	width of a vessel
bilge	space for the collection of surplus liquid
bridge	structure from where a vessel is navigated and directed
bulkhead	nautical term for wall
cable	0.1 of a nautical mile
chart datum	zero height referred to on a marine chart
command	take over-all responsibility for the vessel
conduct	in control of the vessel
conning	another term for “has conduct” or “in control”
deckhead	nautical term for ceiling
dog	cleat or device for securing water-tight openings
draught	depth of the vessel in the water
EPIRB	emergency position indicating radio beacon
even keel	draught forward equals the draught aft
freeboard	distance from the waterline to the deck edge
free surface	effect where liquids are free to flow within its compartment
focsle	forecastle (raised structure on the bow of a vessel)
GM	metacentric height (measure of a vessel’s statical stability)
GoM	fluid metacentric height (taking account the effect of free surface)
GPS	global positioning system
heel	angle of tilt caused by external forces
hove-to	when a vessel is slowed or stopped and lying at an angle to the sea which affords the safest and most comfortable ride
Hz	hertz (cycles)
IMO	International Maritime Organisation
ISO	International Standards Organisation
kW	kilowatt
list	angle of tilt caused by internal distribution of weights
m	metres
MSA	Maritime Safety Authority
NRCC	National Rescue Co-ordination Centre
point	measure of direction (one point = 11¼ degrees of arc)
press	force a tank to overflow by using a pump
45 Nm ⁻¹	Newton - meters

SAR	Search and rescue
SOLAS	Safety Of Life At Sea convention
sounding	measure of the depth of a liquid
SSB	single-side-band radio
statical stability	measure of a vessel's stability in still water
supernumerary	non-fare-paying passenger
telegraph	device used to relay engine commands from bridge to engine room
ullage	distance from the top of a tank to the surface of the liquid in the tank
VHF	very high frequency
windlass	winch used to raise a vessels anchor