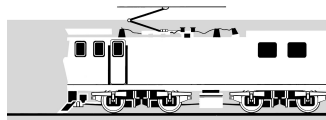
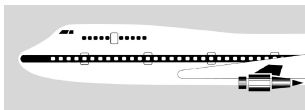


MARINE OCCURRENCE REPORT

01-214

Coastal cargo ship *Kent* and passenger freight ferry
Arahura, close-quarters incident, Tory Channel entrance

14 September 2001



**TRANSPORT ACCIDENT INVESTIGATION COMMISSION
NEW ZEALAND**

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Report 01-214

Coastal cargo ship *Kent* and passenger freight ferry *Arahura*

Close-quarters incident

Tory Channel entrance

14 September 2001

Abstract

On Friday, 14 September 2001, at about 0325, 2 trans Cook Strait ships, the passenger and freight ferry *Arahura* and the cargo ship *Kent*, encountered each other at the eastern entrance to Tory Channel. The outward-bound *Kent* had given the inward-bound *Arahura* permission to enter, in order that they might pass each other inside the entrance. The master of the *Kent* subsequently had difficulty maintaining control at slow speed and ventured into the area of restricted navigation at the entrance to Tory Channel, which hindered the safe navigation of the *Arahura*. While neither ship sustained any damage nor were there any injuries, the potential existed for a collision or grounding that could have resulted in substantial damage or large numbers of injuries or fatalities.

Safety issues identified included:

- adherence to the advice contained in the New Zealand Pilot book
- the standard of bridge resource management on both ships
- the standard of passage planning and monitoring on both ships
- the robustness of the system for managing traffic transiting Tory Channel entrance

Safety recommendations were made to the Chief Executive Officer at Marlborough District Council, the operators of each ship and the Director of Maritime Safety, to address the safety issues.

Contents

- Abbreviations..... ii
- Glossary iii
- Data Summary iv
- 1 Factual information 1
 - 1.1 History of the voyages 1
 - 1.2 Tory Channel and Tory Channel Entrance..... 5
 - 1.3 Weather and Tidal Conditions 6
 - Analysis 1 6
 - 1.4 Ship Manning and Personnel 8
 - The *Arahura* 8
 - The *Kent*..... 9
 - 1.5 Ships and Equipment 10
 - Analysis 2 11
- 2 Findings 12
- 3 Safety Actions 12
- 4 Safety Recommendations 13

Figures

- Figure 1 Entrance to Tory Channel showing the tracks of the *Arahura* and the *Kent* as determined by the information supplied by the crew of the *Kent*..... 3
- Figure 2 Entrance to Tory Channel showing the tracks of the *Arahura* and the *Kent* as determined by the information supplied by the crew of the *Arahura*..... 4

Abbreviations

AIS	automatic identification system
ARPA	automatic radar plotting aid
cm	centimetre(s)
ECDIS	electronic chart display and information system
ECS	electronic chart system
ETA	estimated time of arrival
ETD	estimated time of departure
GPS	global positioning system
GRT	gross registered tonnage
IMO	International Maritime Organization
m	metre(s)
MSA	Maritime Safety Authority
nm	nautical mile(s)
NZST	New Zealand Standard Time (UTC + 12 hours)
Ro-Ro	roll on-roll off
rpm	revolutions per minute
SSM	safe ship management
SSMS	safe ship management system
UTC	universal time (co-ordinated)
VDR	voyage data recorder
VHF	very high frequency

Glossary

abeam	direction at right angles to the length of a ship
advance	the distance a ship advances along an extension of its original course during a turn, measured from the wheel-over position.
aft	rear of the ship
athwartships	transversely across a ship
beam	width of a ship
bow thruster	a small athwartships propeller mounted in a tunnel at the forward part of a ship used to manoeuvre a ship at slow speeds
bridge	structure from where a ship is navigated and directed
cable	0.1 of a nautical mile (185 m)
command	take overall responsibility for the ship
course	the direction in which a ship is travelling or intends to travel.
ebb tide	falling tide
flood tide	rising tide
gross tonnage	a measure of the internal capacity of a ship; enclosed spaces are measured in cubic metres and the tonnage derived by formula
heading	the actual course of the vessel at any given time
helm	the wheel controlling the rudder
knot	one nautical mile per hour
leading light(s)	light(s) that identify the safest track in a channel
neap tide	the highest low water and lowest high water in a lunar cycle
point	measure of direction (one point = 11¼ degrees of arc)
port	left hand side when facing forward
quarter	that part of a ship between the beam and the stern
range of tide	difference in height between successive high and low waters
set	allowance applied to the course steered to counteract the effect of tide or current
starboard	right hand side when facing forward
spring tide	the highest high tides and lowest low tides in a lunar cycle
steady as she goes	a helm order given while a ship is turning , which requires the helmsman to hold the ship on the course it was on when the order was given
track	the path intended or actually travelled by a ship
under way	not attached to the shore or ground in any manner, but not necessarily making way through the water
wheel-over position	the point at which the helm order is given to make a turn

Data Summary

Ship Particulars:

Name:	<i>Arahura</i>	<i>Kent</i>
Type:	Passenger/freight ferry	Coastal cargo
Class:	II (coastal passenger)	100A1
Classification:	Det Norske Veritas ✦1A1, R2 (NZ coastal waters) Car and Train Ferry A	Lloyds Register of Shipping
Length (overall):	148.4 m	122.95 m
Breadth (extreme):	20.5 m	21.0 m
Gross tonnage:	13 621 t	6862 t
Built:	1983 in Denmark	1977
Propulsion:	Four diesel-driven 3800 kW generators supplying power to 4 electric propulsion motors	Pielstick 2 x 2685 kW
Service Speed:	19 knots	14 knots
Owner:	Tranz Rail Limited	Berwick Bay Limited
Operator:	Interisland Line Limited	Strait Shipping Limited
Port of Registry:	Wellington, New Zealand	Castletown, Isle of Man
Maximum Passenger Capacity:	997	12 Passengers and 5 Stockmen
Persons on Board at the time:	Crew: 68 Passengers: 63	Crew: 17 Passengers: 6
Injuries:	Crew: nil Passengers: nil	Crew: nil Passengers: nil
Date and time:	14 September 2001, at 0327 ¹	
Location:	Tory Channel entrance	
Damage:	nil	nil
Investigator-in-charge	Captain D Monks	

¹ All times in this report are New Zealand Standard Time (UTC +12 hours) and are expressed in the 24-hour mode.

1 Factual information

1.1 History of the voyages

- 1.1.1 There is a constant flow of vessels transiting Tory Channel, primarily on passage between Wellington and Picton. On this occasion, 2 vessels met just inside the eastern entrance to Tory Channel and a perceived close quarter situation developed.
- 1.1.2 The interisland rail ferry *Arahura* departed from Wellington at 0136 on 14 September 2001, bound for Picton via Tory Channel.
- 1.1.3 At 0142, the coastal cargo ship *Kent* departed from Picton bound for Wellington via Tory Channel. The *Kent* was operating on only the port main engine, because the turbo charger for the starboard engine was being replaced during the passage. The usual service speed of 14 knots was reduced to about 9 knots, giving an estimated time of arrival (ETA) of 0325, at East Head (see Figure 1).
- 1.1.4 At 0200, the master of the *Kent* handed over to the mate/master. During the changeover they discussed whether they would continue to use Tory Channel while they were operating on one engine. It was decided that the prevailing weather conditions were sufficiently good to use Tory Channel safely on this voyage.
- 1.1.5 At 0250, the second mate of the *Arahura*, who was the officer of the watch, contacted Picton Harbour Radio on very high frequency (VHF) radio channel 19. He was informed of the weather conditions at Picton and that three ships had departed Picton and would be using Tory Channel. They were:
- the fishing vessel *Thomas Harrison*, which had departed at 0125
 - the cargo ship *Kent*, which had departed at 0142
 - the rail ferry *Aratere*, which had departed at 0212
- 1.1.6 On the way down Queen Charlotte Sound the *Aratere* overtook the *Kent* and the *Thomas Harrison*.
- 1.1.7 At 0258, the crew of the *Aratere* gave a 10-minute warning on VHF channels 16 and 19, of their intention to transit the Tory Channel entrance.
- 1.1.8 At approximately 0300, the second mate of the *Arahura* contacted the *Thomas Harrison* and the *Kent*, to confirm that the *Arahura* would wait outside the entrance until the other ships were clear. To facilitate this he reduced the ferry's speed.
- 1.1.9 At about 0306, the *Kent* rounded Te Uira-Karapa Point (known as Clay Point by frequent users of Tory Channel). The mate/master of the *Kent* (Refer to paragraph 1.4.9 for the description of this designation) realised that the ship was not making its expected speed and the ETA at East Head would now be 0330. He called the *Arahura* on VHF channel 19 and told the second mate of the changed ETA. The two officers mutually agreed that the *Arahura* would enter Tory Channel and the ships would pass each other inside the heads. During the conversation, the mate/master of the *Kent* requested and received confirmation that the *Arahura* would maintain its 0323 ETA at East Head.
- 1.1.10 At about 0307, the crew of the *Thomas Harrison* gave a 10-minute warning of their intention to transit Tory Channel entrance. Shortly afterwards, the *Aratere* cleared the entrance.

- 1.1.11 At about this time, the master of the *Arahura* went onto the bridge and at about 0311 he suggested that the engine speed be increased to full; the second mate actioned this suggestion. The increased engine speed resulted in a speed of about 20 knots.
- 1.1.12 Also about this time, the mate/master of the *Kent* reduced speed to between 7.5 and 8 knots, to increase the “window” for the ships to pass each other to the south-west of Scraggy Point.
- 1.1.13 At 0315, the second mate of the *Arahura* gave a 9-minute warning on VHF radio of their intention to transit Tory Channel entrance and an ETA at East Head of 0324. This call was recorded by the marine operations centre to have been timed at 0313. This ETA was one minute later than that predicted at 0306, some 9 minutes earlier. On hearing this, the mate/master of the *Kent* realised that the minor delay in the *Arahura*'s ETA would result in his ship passing Scraggy Point before the *Arahura* had cleared the entrance, so he further reduced speed to about 5 knots. He was concerned that at that speed the ship might not have sufficient steerageway, so he requested the engineer to prepare the bow thruster.
- 1.1.14 At 0317, the *Thomas Harrison* cleared East Head and proceeded clear of the inward-bound *Arahura*.
- 1.1.15 At 0318, the marine operations centre recorded the *Kent* giving the 10-minute warning call advising that she was outward-bound through Tory Channel, and gave her ETA at East Head as 0330.
- 1.1.16 At about 0320, as the way came off the *Kent*, the ship took a sheer to starboard towards the shore. The mate/master used the bow thruster to assist the rudder to regain the ship's course. The ship was on automatic pilot throughout the incident and, with the exception of this use of the bow thruster, was reported to have maintained her course to within 5° of that ordered.
- 1.1.17 At 0324, the *Arahura* was abeam of East Head and on the leads. The second mate broadcast a message on VHF radio to this effect. The mate/master of the *Kent* stated that the time of this transmission was 0325. The flood tide set the *Arahura* towards the starboard side of the leads and the course was adjusted to port to counter this. Shortly before this time the *Kent* had passed abeam of Scraggy Point on its starboard side, at a distance of just over one cable .
- 1.1.18 Shortly after he had passed East Head, the master of the *Arahura* saw the *Kent* close on his port side and noted that it was to the north-east of Scraggy Point. He perceived that the other ship was in the centre of the channel, or slightly to the north of it.
- 1.1.19 According to the mate/master of the *Kent*, his ship was over one cable off the shore and about 1.5 cables past Scraggy Point when the *Arahura* came into sight. The mate/master stated that his ship had just moved into the green sector of East Head directional leading light at that time. This position placed the *Kent* to the starboard side of the channel.
- 1.1.20 The passage plan of the *Arahura* required that its turn into Tory Channel be started (the wheel-over position) when the ship was abeam of West Head. At this point the master of the *Arahura* had just sighted the *Kent* on his port side, so he delayed starting the turn. He soon realised that if he waited until he had crossed ahead of the *Kent* before starting the turn, his ship's advance during the turn would bring it close to the rocky shore at Whekenui Point. Consequently, he started the turn to port before he had passed ahead of the *Kent*. The helmsman recalled that he was given a series of helm orders to port, interspersed with corrective “steady as she goes” orders. Once the *Arahura* had passed ahead of the *Kent*, the master of the *Arahura* recalled that he ordered the helm to port 20 until his ship was on a heading of approximately 240° (T) and parallel to the course of the *Kent*.

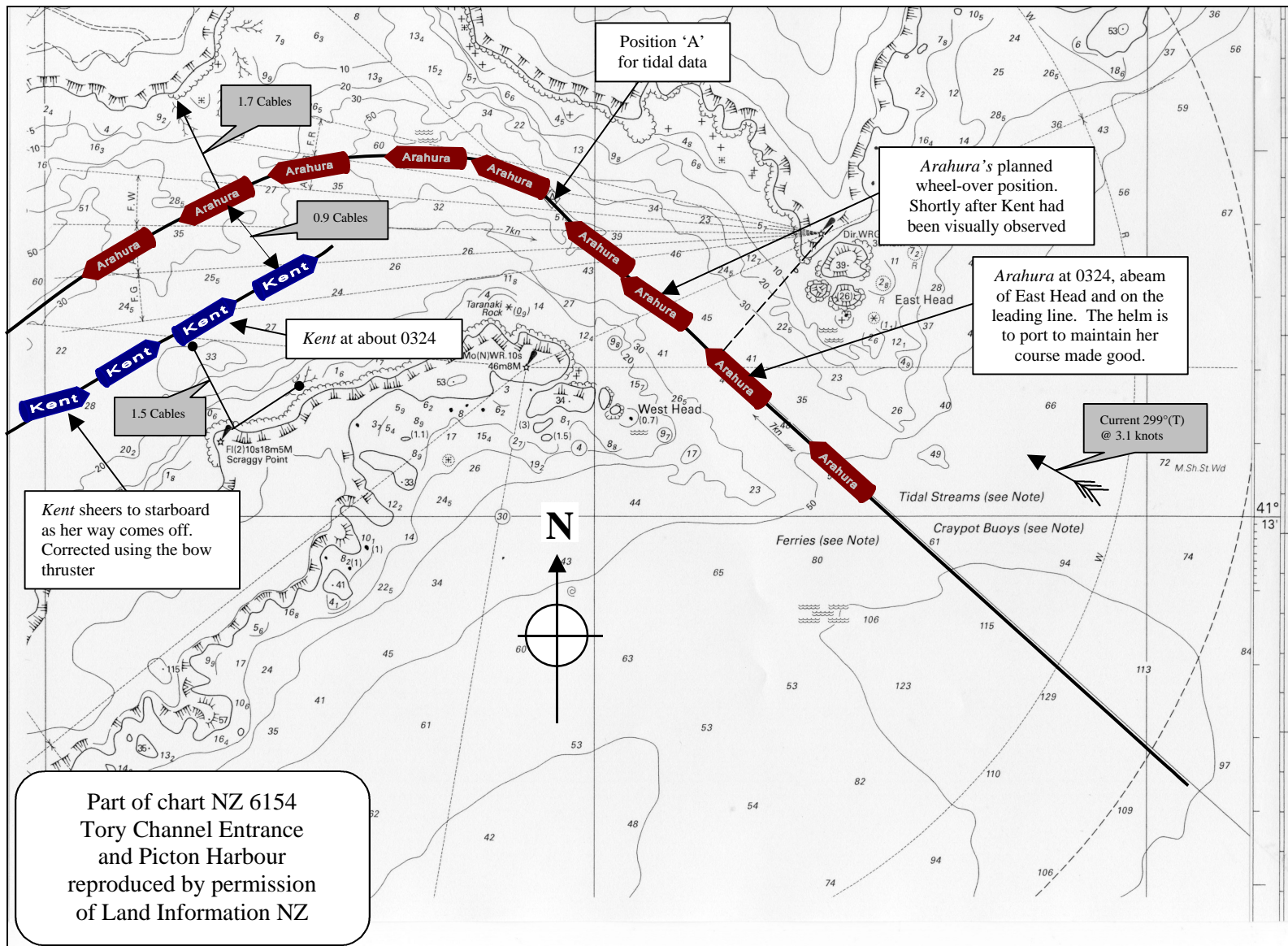


Figure 1
Entrance to Tory Channel showing the tracks of the *Arahura* and the *Kent*
as determined by the information supplied by the crew of the *Kent*

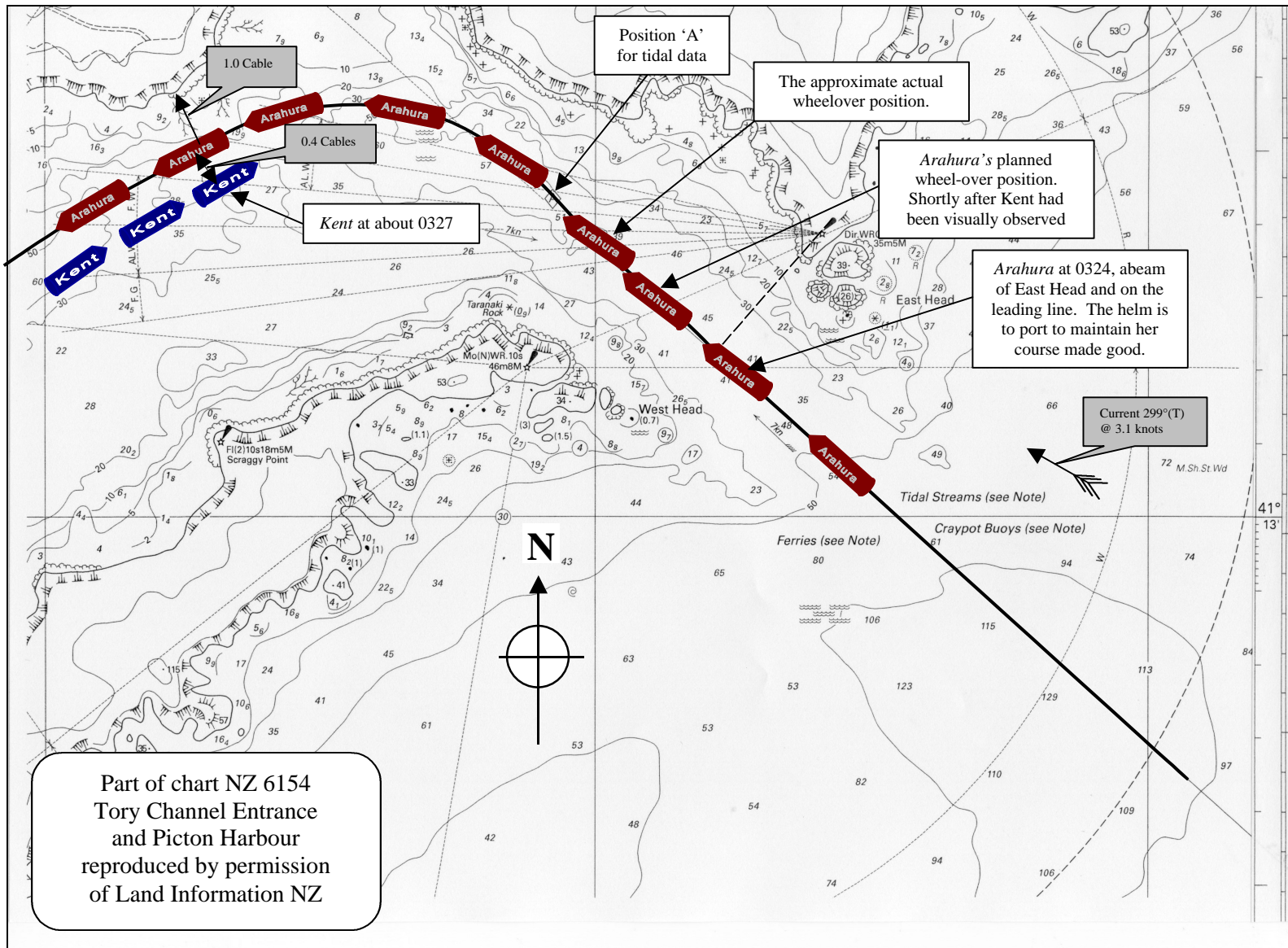


Figure 2
Entrance to Tory Channel showing the tracks of the *Arahura* and the *Kent* as determined by the information supplied by the crew of the *Arahura*

- 1.1.21 The two ships passed port to port. The bridge team of each ship differed in their estimation of the distance between the ships at the closest point of approach. The estimates of the crew of the *Arahura* varied between 0.3 and “less than one cable”, and the *Kent* crew estimated between 0.8 and one cable. The ships’ tracks, as estimated by each crew, are depicted in Figures 1 & 2. The difference between each ship’s account can be clearly seen by comparing the two charts.
- 1.1.22 After the ships had passed, the mate/master of the *Kent* increased to full speed on the port engine, and altered course to starboard as the ship came into the alternating green and white sector of East Head light, before coming round onto the leads on a course of 132° (T), passing East Head at 0332. The *Arahura* continued through Tory Channel towards Picton, where it berthed at 0434.

1.2 Tory Channel and Tory Channel Entrance

- 1.2.1 Queen Charlotte Sound can be entered from Cook Strait, either through the northern entrance between Cape Jackson and Cape Koamaru, or through Tory Channel to the south. Tory Channel provides the shorter distance between Wellington and Picton and is the usual route for trans Cook Strait ferries and cargo ships. The entrance to Tory Channel is narrow, steep-sided, and with considerable tidal streams. Tory Channel was used by a large number of vessels including large cargo ships, conventional and high speed ferries, fishing boats and pleasure craft. The surrounding topography makes it impossible for a ship approaching the entrance to see any opposing traffic until it is committed to the turn.
- 1.2.2 Tory Channel is about 9 miles long and is 4 cables wide at the narrowest points. There are three blind corners along its length. It is usual for vessels to pass or overtake at distances of one cable or less. Immediately inside the entrance, the width of the channel is about 4 cables, with about 3 cables of navigable water.
- 1.2.3 Owing to the difficulties the channel entrance poses, and the inability to see approaching traffic, a radio reporting system was established. The New Zealand Pilot required:

Ten minutes before passing East Head Light at the entrance to Tory Channel, all vessels, whether inward or outward bound, are required to transmit a message on VHF Ch 16, addressed to “All Ships” advising of the vessel’s approaching transit through the entrance. Radio reporting points are indicated on the charts.

- 1.2.4 The New Zealand Pilot also required that:

Where it is established that two vessels are likely to pass each other in the vicinity of Tory Channel E entrance, the outward bound vessel shall have priority and the inward bound vessel shall wait clear of the entrance until the outward bound vessel is clear.

This requirement shall not apply where the master of the outward bound vessel has advised the inward bound vessel to proceed inward. Under such conditions the outward bound vessel shall not proceed seaward of a line drawn in a 320° direction from Scraggy Point Light, 5 cables to the W of West Head, until the inward bound vessel has cleared the entrance.

The area of restricted navigation therefore lies between East Head and a line bearing 320° (T) from Scraggy Point. The requirement above does not define the meaning of “clear of the entrance”.

- 1.2.5 Both ships had written procedures for general navigation and specific instructions for Tory Channel entrance. They also had passage plans for voyages between Wellington and Picton. The passage plans had detailed positions, wheel-over positions, courses, distances on specific courses, distances to go, closest approach distance and bearing to hazards, and general information on radio frequencies, reporting positions and tides. Neither ship's passage plan detailed critical points of no return, latest possible wheel-over positions, or how to adjust the parameters of a turn should it be necessary to delay the wheel-over position.
- 1.2.6 At the time of the incident, the Marlborough District Council bylaws in force had come into effect on 1 April 1990. They did not include any specific requirements for the navigation of ships in the waters under their jurisdiction. There had been a number of amendments and navigational directions issued during the intervening period. These included the 10-minute radio warning on VHF channel 16 for ships transiting Tory Channel Entrance, the use of VHF channel 19 as the dedicated operational channel for the Marlborough Sounds, and the requirement for high speed craft to be fitted with an automatic location communicator.

1.3 Weather and Tidal Conditions

- 1.3.1 The tidal stream at Tory Channel was predicted to change to the west at 2335 on 13 September 2001. The predicted high tide at Wellington (the reference position for predicted tidal streams for Tory Channel on chart NZ 6154) was 1.6 metres at 0101. The tide was mid-range between neaps and springs. The predicted tidal stream at position "A" (see Figure 1) for 0330 was 299° at 3.1 knots. At position "B" (outside the boundary of Figures 1 & 2), about 2.5 miles outside the entrance, the predicted tidal stream at the same time was 048° at 1.3 knots. As the water flows into the Tory Channel entrance it is continually changing direction and rate of flow. In addition, the tidal streams in and around Cook Strait vary considerably with the prevailing weather conditions.
- 1.3.2 The weather was reported by the bridge teams to have been light northerly winds with a low sea and swell.
- 1.3.3 The moon was in its last quarter and provided little or no light. The visibility of lights was good.
- 1.3.4 A person with local knowledge stated that he had experienced counter-current flows along the southern shoreline of Tory Channel, in the vicinity of Scraggy Point, during flood tides.

Analysis 1

1. The masters of the *Arahura* and the *Kent* were navigating by eye. The master of the *Arahura* was also referring to radar. Neither master was able to recollect with any certainty, the distance off the land or the relative position of the other ship, neither could they confirm their ship's courses at specific instances. The duty officers were monitoring their respective ship's progress visually and by radar, but could not provide accurate positional information of their ship or the other ship during the incident, nor could they remember the courses their ship was steering. In the absence of accurate data, the report is based on the estimated information provided by each of the officers. Their recollections may be tainted by differing perceptions caused by being confronted by another large ship, at night, at close quarters in a restricted waterway. To assist casualty investigations, the International Maritime Organization (IMO) is progressively requiring ships to be fitted with voyage data recorders (VDRs) and automatic identification systems (AISs). Had the ships involved in this incident been fitted with a system to record their course and speed, a more thorough analysis of their relative positions at the time of the incident would have been possible. The Commission does not seek to apportion blame. Consequently, the actual positions of the ships is of less importance than the fact that the situation developed and placed each ship, and the people on board, at unnecessary risk.

2. Once it was agreed that the inward-bound ship should proceed, the obligation was on the outward bound ship to remain outside the area of restricted navigation, which the mate/master of the *Kent* was unable to do without losing directional control of his vessel.
3. The traffic control system for Tory Channel required that the ETA of each ship be calculated for East Head, which could lead a mariner to overlook the fact that the area of restricted navigation extended between East Head and Scraggy Point, a distance of 9 cables. Nine cables would take almost 3 minutes to travel at 20 knots, 6 minutes at 9 knots, and 9 minutes at 6 knots.
4. For the two ships to maintain their ETAs, namely 0324 for the *Arahura* and 0330 for *Kent*, it was inevitable that they would meet in the area of restricted navigation. At 9 knots the *Kent* needed to pass Scraggy Point at 0324. The *Arahura* would not have cleared Scraggy Point until 0327 had she maintained her 0324 estimate. Each master should have been aware that a conflict would arise.
5. The requirements for vessels using the Tory Channel entrance are not prescriptive and leave their interpretation in the hands of the operators using the entrance. The requirement does not define what “clear of the entrance” means, but good seamanship would dictate that the inward-bound ship should have completed the turn into Tory Channel and be steady on its new course before the outward-bound ship progressed past Scraggy Point.
6. The wheel-over position for the *Arahura* to turn into Tory Channel was documented in the passage plan as abeam of West Head light. To alter course at this point, with the *Kent* on his port side, would have been contrary to all the master’s training. He therefore delayed starting the turn, but realised that if he waited until he was ahead of the *Kent*, he would place his ship in danger of running aground on the rocks at Whekenui Point.
7. The appearance of the *Kent* on the seaward side of Scraggy Point would have been daunting for the master of the *Arahura*. In spite of this, he did manage to safely negotiate the turn into Tory Channel without collision or grounding.
8. Darkness makes it difficult to accurately assess the relative position of lights that combined with the placement of the lights on the *Kent*, may have made the ship appear larger and closer than it actually was.
9. There was a moderate tidal stream flowing, which would have set the *Arahura* initially to the north and then to the north-west. The ship was set to the north of the leading line and the course had to be adjusted to port to counteract that set. As the ship progressed through the turn, it would have been pushed towards the shore at Whekenui Point.
10. The *Arahura* was a minute late on its first ETA, which further increased the time for the *Kent* to encroach into the area of restricted navigation.
11. The *Kent*, on the southern side of the channel, possibly experienced a reduction in the adverse flood tide, or even encountered a counter-current, and so was further advanced than he expected.
12. There was no synchronisation of the two ships’ clocks, nor was there any guarantee that the positional radio calls were made exactly at the specified positions. Consequently, errors of a few minutes could be anticipated.

13. The times of the radio calls recorded by the marine operations centre were two minutes earlier than those recorded on the ships.
14. The volume and diversity of traffic using Tory Channel had increased over recent years, resulting in a greater number of ships meeting at, or close to, the entrance. Around the time of this incident, for example, there were 4 ships transiting the entrance within 23 minutes. The requirements laid down in the New Zealand Pilot concerning the conduct of ships in this vicinity need greater attention, particularly from outward-bound ships that, depending on their speed, may only be a few minutes, and a short distance, from Scraggy Point when they give their 10-minute warning.
15. The difficulties the mate/master of the *Kent* had in controlling his vessel at low speed to avoid entering the area of restricted navigation before the *Arahura* was clear demonstrates why the outbound vessel was routinely given right of way. Tory Channel is narrow with strong tidal streams, and is no place to attempt to manoeuvre a vessel with limited directional control. While the mate/master's generosity in allowing the *Arahura* to enter first was in some way commendable, it resulted in placing both his and the other vessel at unnecessary risk.
16. What this incident demonstrates is that the system for controlling traffic through the entrance to Tory Channel was informal and did not have sufficient safety margins to prevent an unintended meeting of 2 vessels in the area of restricted navigation. One vessel's ETA being out by one minute, served to exacerbate the situation. A mandatory system that acknowledges the different speed of vessels transiting the zone, and that has sufficient safety margins to allow for minor errors in ETAs and unsynchronised clocks on opposing vessels, is needed. A safety recommendation has been made to the Marlborough District Council to address this safety issue.
17. On this occasion it may have been reasonable for the *Kent* to use Tory Channel with one of the main propulsion engines inoperational. In anything other than good weather conditions, it may be prudent not to navigate through Tory Channel with a vessel that is operating below optimum.

1.4 Ship Manning and Personnel

The *Arahura*

- 1.4.1 The deck officers were divided into 2 watches, a day watch between the hours of 0430 and 1630, and a night watch covering the opposing 12 hours. The day watch comprised the master, the chief officer and a third mate, while the night watch comprised the night master, the second mate and another third mate. Within these watches the masters were on active duty during the pilotages, and at any other time that they were required. In between these periods they carried out routine tasks, including paperwork, but remained on immediate stand-by. The deck officers, with the exception that one of them kept a "watch below"² during the strait crossing, worked continuously during their 12-hour watch, either keeping a navigation watch at sea, or a cargo watch in port. The officers worked a 7-day on and 7-day off work/leave roster.
- 1.4.2 On the bridge of the ship, at the time of passing through the entrance, were the master, the second mate and a helmsman. The master was conning the vessel from the starboard side, close to the radar. The second mate was on the port side, close to that radar, and the helmsman was on the centre line at the helm. The master stated that he was piloting the vessel, cross-referencing with the information on the radar. The second mate was monitoring the ship's progress on the port radar.

² A "watch below" requires that officer to carry out security rounds but allows him to relax in between those rounds. The duty officers (and watch keeping ratings) are in constant ultra high frequency radio contact with the bridge.

- 1.4.3 The night master started his seagoing career in 1957. Initially, he had served on foreign going ships until 1966, when he joined the Wellington Harbour Board as a pilot. He remained a pilot until 1978, when he joined the interisland ferries operated by Tranz Rail (formerly New Zealand Railways). During his time on the ferries, he had served in the capacity of third mate, second mate, extra officer and chief officer. He had sailed on the *Arahura* in these positions since 1984. He held a Foreign Going Master's Certificate, which had been issued in 1965. He also held pilotage exception certificates for Wellington and Picton. He had returned from one week's leave on 13 September 2001, and took up his first roster as master of the *Arahura*.
- 1.4.4 The second mate had been at sea since 1954, with the exception of 6 years outside the shipping industry. He held a Foreign Going Master's Certificate. He joined Tranz Rail in 1994 and had sailed as third mate, second mate and chief officer during that period. He had joined the ship on the day before the incident, following a week's leave.
- 1.4.5 The helmsman had been at sea since 1965, and had been on the ferries since 1972. He had served in the *Arahura* since June 2001.
- 1.4.6 The night master and second mate had completed a bridge resource management course prior to the incident.

The Kent

- 1.4.7 The deck officer complement comprised a master, a mate/master, a second mate, and a third mate. Two watches were formed; one included the master and second mate, and the other the mate/master and third mate. The navigational and cargo duties were divided between the two watches. They worked a roster of 4 hours on, 8 hours off, 8 hours on, 4 hours off. The changeover times were 1400, 1800, 0200 and 1000. At the time of this incident the mate/master and third mate were on duty. The officers worked a 2-week on and 2-week off work/leave roster.
- 1.4.8 On the bridge of the ship, at the time of passing through the entrance, were the mate/master and the third mate. The master was piloting the vessel from the forepart of the bridge, just to starboard of the centreline. In this position the radars were behind the mate/master, and so were not visible. The ship was on autopilot, which was adjusted by the master. The third mate was monitoring the ship's progress on the radar.
- 1.4.9 The designation of mate/master allowed the incumbent to fulfil the role and obligations of master when the assigned master was on his rest period. The position was similar to that of the night master on the *Arahura*.
- 1.4.10 The mate/master had been at sea since 1981. He held a Foreign Going Master's Certificate that had been issued in 1992, and pilotage exemption certificates for Wellington and Picton. In 1999 he had joined Fast Cat Ferries Limited, which operated a high-speed wave-piercing catamaran between Wellington and Picton. On that ship he initially served as mate and was promoted to master in 2000. After that service ceased trading in 2001, he joined Strait Shipping in May 2001, as mate/master. He had rejoined the ship after 2 weeks' leave on 12 September, 2 days before the incident.
- 1.4.11 The third mate had spent 11 years as a naval deck officer, before joining general cargo merchant ships. He had then been master of a Voith Schneider harbour tug. He held a Second Mate's Certificate. He had undertaken delivery voyages and had been a relieving watchkeeper on a trans-Tasman Ro-Ro cargo ship, prior to joining the *Kent* in July 2001, as permanent third mate.
- 1.4.12 The mate/master had completed a bridge resource management course prior to the incident, but the third mate had not.

1.5 Ships and Equipment

- 1.5.1 The *Arahura* was a purpose built Ro-Ro passenger and freight ferry, which plied between Wellington and Picton. It had been built in Denmark and delivered to New Zealand in 1983, where it had been used continuously and exclusively on a scheduled 24-hour service across Cook Strait. It was owned by Tranz Rail Limited and operated by Interisland Line Limited. The cargo decks were capable of carrying road vehicles and rakes of rail wagons and the ship was certificated to carry 997 passengers, with a crew of 68. At the time of the incident there were 63 passengers on board.
- 1.5.2 The *Arahura* was 148.4 m in length and 20.5 m extreme breadth. The bridge was situated about 20 m from the bow and was fitted with the following equipment:
- 2 x Racal Decca ARPA radars, 1 x 10 cm and 1 x 3 cm
 - 2 x VHF radios, one monitoring channel 16 and one monitoring channel 19
 - 1 x Leica GPS navigator
 - 1 x Simrad echo sounder
 - 1 x Simrad Doppler log
 - 2 x Sperry gyro compasses
 - 2 x Rudder angle indicators
- 1.5.3 The *Kent* was a Ro-Ro cargo ship that had been built in 1977. It had been chartered by Strait Shipping Ltd and brought to New Zealand in 2001, and used on a 24-hour freight service across Cook Strait since then. The cargo decks were capable of carrying road vehicles and it was certificated to carry 12 passengers and 5 stockmen. It usually had a crew of 16. At the time of the incident there were 6 passengers and 17 crew on board.
- 1.5.4 The *Kent* was 122.95 m in length and 21.0 m extreme breadth. The bridge was situated about 15 m from the bow and was fitted with the following equipment:
- 1 x Tokyo Keiki gyro compass connected to the autopilot
 - 1 x S G Brown SGB1000 gyro compass connected to the radars
 - 1 x Navman Tracker 900 GPS navigator
 - 1 x 3 cm Racal Decca Bridge Master radar
 - 1 x 10 cm Racal Decca ARPA S1690 radar
 - 1 x Furuno FE-D 314 A Echo Sounder
 - 1 x Furuno Colour Video echo sounder
 - 2 x VHF radios
- 1.5.5 The bridge equipment on each ship was reported to be operating at the time of the incident.
- 1.5.6 The turbo charger for the starboard engine of the *Kent* had suffered damage the week before the incident. In the interim, the engine had been run naturally aspirated at reduced revolutions. Shore contractors were replacing the turbo charger at the time of the incident, so the ship was only operating on the port engine. The port engine alone gave the ship a maximum speed of approximately 9 knots.
- 1.5.7 The after masthead light of the *Kent* was situated above the funnels, almost right aft. The forward masthead light was above the accommodation, well forward. The sidelights were on

the bridge wings just below and approximately one meter abaft the forward mast light. The lights being close to the extremities of the ship gave the impression at night that the ship was larger than it actually was.

Analysis 2

1. The shortcomings of the traffic control system for Tory Channel entrance have been discussed in Analysis 1 of this report. Because the *Arahura* and the *Kent* having got into an unusual close quarters situation, it is appropriate to analyse how the situation was resolved without accident, so that lessons can also be learned from this aspect.
2. The night master of the *Arahura* was suitably qualified and trained for the position he held, and the operation he was undertaking. He had only piloted the ship into Tory Channel at night as master on one previous occasion, but had piloted the vessel as chief officer a number of times. To be confronted by the other ship on his port side, closer than he was expecting, would have been daunting.
3. The mate/master of the *Kent* was suitably qualified and trained for the position he held, and the operation he was undertaking. He had been piloting ships through Tory Channel for about 3 years, and was used to passing or being passed by other ships at close quarters. He did not expect that his advancing past Scraggy Point into the restricted area would cause a problem for the master of the *Arahura*.
4. A good passage plan is only as good as its implementation. Bridge resource management becomes critical to its successful outcome. Although the respective watchkeepers were monitoring certain equipment during the incident, there was no evidence that either of them was relaying helpful information to the masters, who were each, therefore, working in effective isolation.
5. The principles of good bridge resource management were not used to best effect by either bridge team, which resulted in the masters being vulnerable to one-man error, the very thing bridge resource management seeks to address. A particular strategy that may have alleviated the situation was challenge and response, which required the bridge team to question and check that the master was making the correct decisions for a safe operation. It was evident that monitoring of the passage plan and the ship's progress was less than ideal.
6. Good bridge resource management relies not only on good communication on the bridge, but also good inter-ship communication. Had the master/mate of the *Kent* told the master of the *Arahura* that he had encroached some way into the area of restricted navigation, it would not have come as such a surprise to the master of the *Arahura* to see the *Kent* so close. Had he informed the master of *Arahura* that his speed was only about 5 knots, the master of the *Arahura* may not have been so concerned about how close he thought the *Kent* was.
7. A study of the passage plans for both vessels, and the way each vessel was manoeuvred during the incident, indicated that there was room for improvement in both plans, particularly for the inbound vessel. While the respective plans were adequate for a normal situation, neither catered for a necessary delay in making the turn, other than relying on an ad hoc method of navigating by eye, and estimating how late the turn could be started before being in danger of not being able to complete the turn without grounding on rocks ahead.

8. Techniques are available for monitoring and adjusting a turn to a predetermined outcome, even if the turn is delayed or interrupted, such as happened in this case. A number of parameters can be set that identify critical points of no return, such as the latest wheel-over point where a successful turn could be made, for example. Such techniques, if properly used, can assist the bridge team to make the correct decisions at critical times when the workload is high.
9. With the increasing traffic passing through Tory Channel, ship operators and their crew will need to take a more structured approach to navigating in confined waters than demonstrated during this incident.

2 Findings

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

- 2.1 Incomplete communication between the *Arahura* and the *Kent* contributed to both ships entering the area of restricted navigation at the same time, and for an unusual close quarter situation to develop.
- 2.2 Once the close-quarter situation had developed, the simplicity of the passage plans and a low standard of bridge resource management increased the risk of collision or grounding for both vessels.
- 2.3 The arrival times for each ship were for East Head, and did not allow for the time that they would be in the area of restricted navigation between East Head and Scraggy Point.
- 2.4 The traffic management system for vessels transiting Tory Channel was not sufficiently prescriptive to prevent this type of incident, particularly when operators did not comply fully with the requirements laid down in the New Zealand Pilot.
- 2.5 Although not contributory to the incident, the lack of recorded data on both vessels hindered the investigation.

3 Safety Actions

- 3.1 Following the incident, Strait Shipping Limited upgraded the navigation equipment on the *Kent*, by adding an improved GPS receiver and video plotting aid. This has allowed more accurate calculation of ETAs while proceeding along the Sounds.
- 3.2 By February 2003, the Marlborough District Council advised that it intends to update its navigation bylaws to comply with new primary and secondary legislation that was coming into effect at the time of writing this report. The new bylaws were going through the consultative stage before being submitted to the council for approval.
- 3.3 The Marlborough harbourmaster has issued a navigation reminder to regular users of Picton and the Sounds, which requires the master of any vessel operating below optimum performance in the Marlborough Sounds to advise the harbourmaster of the fact.

4 Safety Recommendations

4.1 On 29 July 2002, the Commission recommended to the Chief Executive Officer of The Marlborough District Council that he:

- 4.1.1 Mandate and enforce a traffic management system for vessels transiting Tory Channel that is unambiguous and takes account of the different types and speeds of vessels typically using the passage. When designing the system, consider defining the area of restricted navigation, determine when the inward-bound vessel is clear of the entrance and make the reporting points near the entry to the zone at each end (025/02).
- 4.1.2 Require that all ships of over 500 GRT, that are not fitted with a voyage data recorder, that use the Marlborough Sounds on a regular basis be fitted with an automatic location communicator (026/02).

4.2 On 9 August 2002, the Marlborough District Harbourmaster replied to final safety recommendations (025/02 and 026/02), in part, that:

At this time, the necessary bylaw clauses for inclusion in the Marlborough Navigation Safety Bylaws have been drafted reflecting the recommendations.

The Navigation Safety Bylaws are presently in the Special Order Process and subject to public submission. The Submission period closed on 6 August with Council intending to consider the adoption of the Navigation Safety Bylaws on 7 August. However, at its meeting on 7 August, Council determined to adjourn the meeting until 29 August. It is the intention at that meeting to adopt the bylaws after having considered all submissions and making appropriate decisions on 23 August.

I am aware that this falls outside the date of 19 August set by the Commission but can only suggest that once the Council has adopted the bylaws that I advise the Commission office formally of the outcome.

4.3 On 29 July 2002, the Commission recommended to the Marine Operations Manager of Interisland Line Limited that he:

- 4.3.1 Conduct a risk assessment of navigation in confined waters, and upgrade the passage plans to make use of techniques such as monitored turns and critical decision points, and foster the use of good bridge resource management to implement and monitor the passage plans (027/02).

4.4 On 16 July 2002, the Operations Manager of Interisland Line Limited replied to preliminary safety recommendation (027/02), which remained unchanged and became final, in part, that:

The Interisland Line accepts this recommendation. All Interisland deck officers and some engineer officers have had Bridge Resource Management training, and recently 2 masters have attended an Advanced Marine Pilot course in Sydney. The Interisland Line intends to progressively put all masters through the Advanced Marine Pilot course as slots on it become available.

The Interisland Line has 40 years' experience on the Wellington/Picton route, and its ships have well tried and tested passage plans; however, recognising the technological advance in navigational systems on board its vessels, and the new navigational techniques associated with that technology, it will conduct a review and make any improvement it can to ensure it is achieving the highest possible level of safety, with minimum risk. Part of the review will focus on how bridge

resource management can be optimised to ensure safe and efficient implementation of any passage plan. The Interisland Line expects to complete the review by the end of September 2002, and make any necessary changes soon after.

4.5 On 29 July 2002, the Commission recommended to the Marine Operations Manager of Strait Shipping Limited that he:

4.5.1 Conduct a risk assessment of navigation in confined waters, and upgrade the passage plans to make use of techniques such as monitored turns and critical decision points, and foster the use of good bridge resource management to implement and monitor the passage plans (028/02).

4.6 On 22 August 2002, the Commission recommended to the Director of Maritime Safety that he:

4.6.1 Investigate and carry out a cost benefit analysis on any requirement that New Zealand ships carry an Automatic Identification System. In carrying out this analysis due regard shall be had to the mandatory requirements promulgated by the International Maritime Organization for SOLAS ships (045/02).

4.7 On 8 August 2002, the Director of Maritime Safety agreed with final safety recommendation (045/02). His response became the response to the final safety recommendation, in which he said that he:

Intends to review, including carrying out any necessary cost benefit analysis, the possible carriage of AISs by a broader section of New Zealand ships.

Approved for publication 07 August 2002

Hon. W P Jeffries
Chief Commissioner



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