

**Departmental investigation into the
contact with a submerged obstruction
by the Panamanian woodchip carrier
TAIO FRONTIER
while entering
the River Tamar, Tasmania
on 6 May 1997**



Report No. 117



Australia
Department of Workplace Relations
and Small Business

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**Navigation Act 1912
Navigation (Marine Casualty) Regulations
investigation into the contact with a submerged obstruction
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Summary

At 0600 on the morning of 6 May 1997, the Panamanian flag woodchip carrier *Taio Frontier* arrived at the pilot boarding ground off the entrance to the Tamar River, Northern Tasmania, to embark pilots to proceed to Bell Bay. Due to a north-easterly swell, the two pilots assigned the job were unable to get to the pilot ladder, rigged on the port side, and they requested the Master to go full ahead and hard to starboard, in order to make a lee.

The Master ordered hard to starboard, but because of concern about the closeness of Hebe Reef, only ordered slow ahead. As soon as both pilots were on board, he ordered full ahead and hard to port, then instructed the helmsman to steady on 160°. On gaining the bridge, the first pilot realised the ship was headed for West Reef and ordered full ahead, hard to port.

When the ship had swung to a heading of about 102°, there was a shudder as though the ship had struck the bottom, but the ship maintained its forward movement. Speed was reduced to half ahead and the pilot took the ship to anchor, close to the pilot boarding ground, where all tanks were checked and machinery and controls tested. Everything appeared normal and there was no ingress of water or sign of oil pollution, therefore the pilotage was resumed.

From the estimated position of the contact, the charted depth was around 16 m to 17 m, with a rise of tide of one metre, while the draught aft was 7.72 m. Subsequent inspection by divers revealed the tips of two adjacent propeller blades had been damaged and the heel of the rudder set upwards, indicating contact with an obstruction of relatively small area.

Sources of Information

The Master and Mate of *Taio Frontier*

The Harbour Master, Port of Launceston Authority.

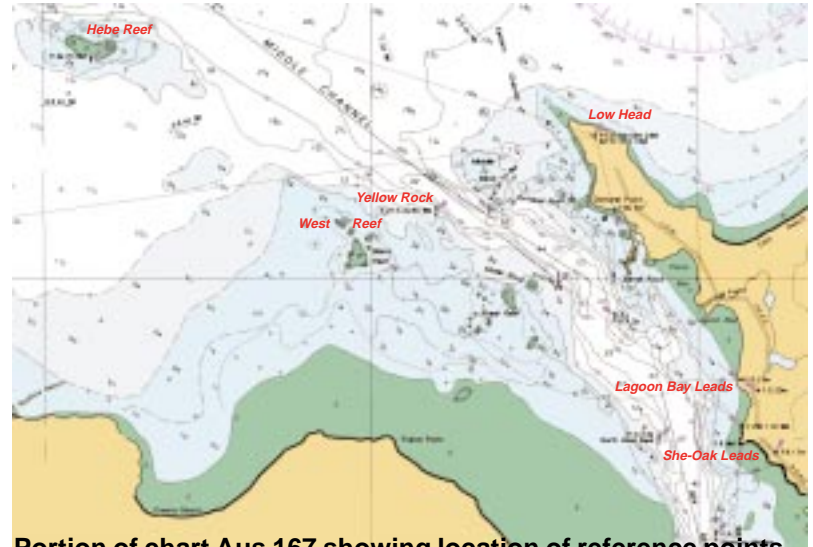
Acknowledgement

Portion of chart Aus 167 reproduced by permission of the Hydrographic Office, RAN.

Narrative

The 41,205 tonnes deadweight Panamanian flag *Taio Frontier* is a dedicated woodchip carrier, built at the Sanoyasu Corporation Mizushima shipyard, Japan in 1987. Owned by Taio Frontier, S. A. of Panama, the vessel is operated by Jupiter Corporation of Tokyo, who employ a Japanese master and chief engineer and Filipino officers and ratings.

The vessel has an overall length of 198.03 m, a beam of 32.2 m, a moulded depth of 21.85 m and a laden summer draught of 10.525 m. The vessel is powered by a single, six cylinder, 6193kW Sumitomo-Sulzer diesel engine, driving a fixed five bladed propeller, providing a service speed of 14 knots. Navigational equipment includes a JAS-800CMII ARPA radar and GPS linked to an electronic plotting table, which utilises the standard paper navigation charts.



Portion of chart Aus 167 showing location of reference points

On the evening of 5 May 1997, *Taio Frontier* sailed from the port of Burnie, Northern Tasmania, where it had loaded a part cargo of pine chips; the draught was 4.5 m forward and 7.72 m aft. The pilot was disembarked at 2315 and course was set at 090°, to take the vessel towards the pilot boarding ground off the Tamar River, as the balance of the cargo was to be loaded at Bell Bay. *Taio Frontier* is a regular caller at Bell Bay and this was to be the Master's third visit to the port in the six months he had been on board.

Shortly after midnight, when the Second Mate had taken over the watch, the Master left the bridge, leaving instructions to be called at 0200 - the pilot boarding time was not until 0600 and he intended stopping and drifting offshore, rather than taking the vessel to anchor. He returned to the bridge at 0200 and, at 0220, when the vessel was five miles north-west of West Head, the engine was stopped. The Master left the bridge again at 0230, leaving instructions for the Mate to call him at 0430.

At 0500, *Taio Frontier* was four miles from the pilot boarding ground and the Master proceeded inwards at slow speed to make the rendezvous at the required time. By 0535, the vessel was just 7½ cables north-west of the boarding ground, on a heading of 140° with the engine on dead slow and making good a speed of about four knots. The wind was from the east at about 10 knots, the sky was partly cloudy, the weather fine and clear, with good visibility.

The pilot launch cleared from its base at Low Head at 0541. On board were the Harbour Master, who was to conduct the pilotage, and a pilot, who was to trial the Port Authority's new Differential Global Positioning System. The Harbour Master noticed that the tide gauge was indicating one metre above datum.

The pilot launch approached *Taio Frontier* on the starboard bow and the Master adjusted course slightly to starboard, putting the main leads about 10° on the port bow. The launch passed down the starboard side, around the stern and arrived at the pilot ladder, rigged on the port side, two or three minutes before 0600. However, a north-easterly swell of about two metres prevented the launch from getting alongside and the pilot used the VHF to request the Master to make a lee. The Master adjusted course further to starboard, but the Harbour Master was still unable to make the ladder. Mindful of the fact that the vessel was bearing down on the river entrance and they were still unable to get aboard, the Pilot requested the Master to go hard to starboard, full ahead and to go around to starboard. The main, She-Oak Point, entry leads were visible from the pilot launch and were open to the east, so the Pilot considered there was room for the Master to complete such a manoeuvre.

The Master ordered hard to starboard, but because of the close proximity of Hebe Reef to starboard, he ordered slow ahead.

As *Taio Frontier* swung to starboard, the pilot launch was able to close alongside and the Harbour Master climbed aboard. As he gained the deck, he could not see Hebe Reef beacon light, but he saw that the She-Oak Point leads were right in line, so he ran for the bridge.

Still concerned about the closeness of Hebe Reef, the Master ordered full ahead and hard to port as soon as the Pilot had transferred from the pilot launch to the pilot ladder. The Master plotted the position on the chart, using a radar bearing and distance of Low Head, recording the time as 0606. Before swinging back to port, the vessel came around to a heading of about 220° and, being concerned that under hard to port rudder the stern might

swing into the shallows on the east side of Hebe Reef, the Master ordered the helmsman to steady on 160°.

The Harbour Master arrived on the bridge at 0607, at about the same time as the Pilot gained the deck. Ignoring pleasantries, he went straight to the con position and immediately saw that the ship's head was to the west of the Kelso radio towers, on a heading of about 170° and was swinging only slowly under 10° of port rudder. He also saw that both the She-Oak Point leads and the Lagoon Bay leads were open to the west, indicating the vessel was well to the south of where it should be and was headed straight for West Reef. He ordered full ahead and hard to port, to bring the vessel's bow around towards Low Head, so as to bring the vessel back towards the main line of the channel.

The Mate had gone to the port bridge wing as the pilot launch made its initial approach and had remained there until the Pilot was safely on deck. He then moved back into the wheelhouse, marked the vessel's position by GPS on the chart, recording the time as 0608, then left the bridge to make his way forward, at about the time the Pilot arrived in the chartroom.

Taio Frontier swung rapidly under the hard to port helm and the Harbour Master had ordered the helmsman to midships the wheel and to steady on 102°, when there was a sudden shock and rumble. The Harbour Master's immediate impression was that the vessel had touched bottom aft and he noticed that the Yellow Rock beacon light was in line with the Lagoon Bay leads. However, the vessel's forward momentum did not appear to have been affected, so rather than stop the engine, the Harbour Master ordered half ahead.

The Mate had only descended the first staircase, on his way down to main deck level, when the shock occurred, so he returned to the bridge.

The Pilot marked the vessel's position by GPS on the chart, recording the time as 0610. This showed the vessel as having been in about 17 m of water, indicating the vessel had stuck an uncharted obstruction. The decision was quickly made to take the vessel to anchor, close to the pilot boarding ground, where checks could be carried out to determine the vessel's condition. The Mate again left the bridge and went forward.

Dawn was approaching, so the Harbour Master recalled the pilot launch and requested the coxswain to check for signs of oil leaking from the vessel.

Taio Frontier was brought to anchor at 0630 and checks by members of the crew indicated no changes in the soundings of the ballast and fuel oil tanks. The coxswain of the pilot launch read the after draught, which showed no change from the original 7.72 m.

Satisfied that the hull had not been breached, the Harbour Master and Master agreed that the anchor should be weighed and a series of zigzag manoeuvres be conducted to check the main engine and steering gear. The anchor was aweigh at 0755 and the vessel was manoeuvred for a period of about 10 minutes, after which the Chief Engineer reported that the main engine and steering gear were operating satisfactorily. Satisfied there were no problems, the Harbour Master resumed the inwards pilotage.

Apart from some slight vibration as the vessel passed Middle Island, off Bell Bay, at 0915, no problems were experienced during the passage up river and the vessel was all fast alongside the Forest Resources (Boral) berth at 1020.

Subsequent investigation by divers revealed that the tips of two adjacent propeller blades had been broken off and the heel of the rudder had been set up about 200 mm. There were no scrape marks on the hull bottom plating, or on the bottom of the rudder.

The vessel was permitted to sail after loading, and after water had been expelled from the rudder and a split in the welding at the rudder heel repaired.

Comment and Analysis

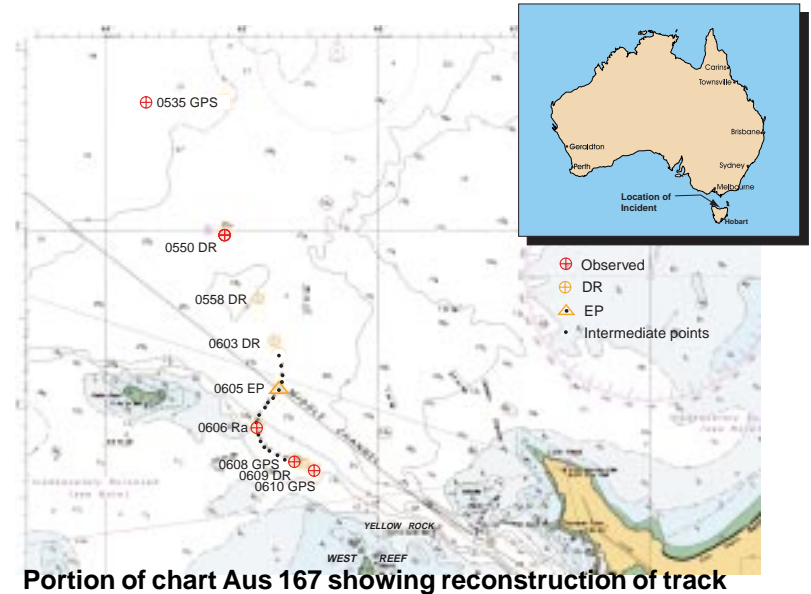
Taio Frontier made contact with a submerged obstruction in an area well to the south of the main entrance leads, in an area where large vessels do not normally go. It is therefore necessary to look at the factors that led to *Taio Frontier* being in such a position.

The correct pilot boarding position was located two miles seaward from the narrows of the river entrance. *Taio Frontier*, however, had passed inwards of that position and the pilot launch was unable to get alongside to put the Harbour Master and Pilot aboard, because the pilot ladder was rigged on the weather side. Without positive action by the Master to make a lee, *Taio Frontier* was likely to enter the river with no pilot on board.

Reconstruction

Reconstruction of the incident is extremely difficult, owing to the sparsity of positions plotted on the chart and the fact that the course recorder was not functional. The times of engine movements, provided by the data log print-out, appear to have a difference of about minus half a minute from events recorded in the deck log.

Consideration was given to the possibility of the positions plotted from the GPS being in error and that *Taio Frontier* made contact with the 6.1 m sounding depicted on the chart at the extreme of the south-eastern tip of Hebe Reef. That 6.1 m sounding is towards the end of a ridge which runs in an east-south-easterly direction with depths over it of between 5.9 and 6.7 metres. Had *Taio Frontier* passed over the ridge a more prolonged contact would have been likely. However, the vessel could not have made contact with that particular area on the heading



it was on at the time, as while making the turn it would have run hard aground, on a southerly heading, about 2¼ cables east-north-east of Hebe Reef beacon.

On 6 May 1997 the tides were at maximum spring levels, with low water having been at 0448, therefore, at the time the Harbour Master and Pilot boarded *Taio Frontier*, the tide was 1¼ hours into the flood. The tidal arrow on the chart indicates a spring tide rate of one knot in a southerly direction, with a westerly flow of half a knot to the south of Hebe Reef.

During the approach to the pilot boarding position and while picking up the Harbour Master and Pilot, *Taio Frontier* would have been experiencing a southerly set, due to the flooding tide.

When the Harbour Master arrived on deck, he saw that from where he was standing, the main leads were in line. The Master stated that he ordered full ahead and hard to port when the Pilot was on the ladder and when, from his position on the bridge, *Taio Frontier* was near to the line of the leads. He also stated that the vessel continued to swing to about 220°, or a little more, before swinging back to port. The Pilot would have transferred from the launch to the pilot ladder very shortly after the Harbour Master gained the deck, therefore, it is considered that *Taio Frontier* would have been close to the line of the leads when the Master gave his orders.

Working back from the positions recorded after the Harbour Master and Pilot had boarded and from the near middle channel position, using the vessel's manoeuvring diagram data, at the time the Master ordered slow ahead and hard to starboard to make a lee, 0603 (data log 0602½) *Taio Frontier* was probably only about 4½ cables from Hebe Reef.

Shipboard operations

On the bridge for the approach to the pilot boarding ground were the Master, who had the con, the Mate, as Watch Officer, and a seaman at the wheel, while the Third Mate went on deck to meet the pilot. The bridge, therefore, was adequately manned for the operation.

The normal procedure onboard was for the Second Mate to prepare the voyage plan and to lay off the courses on the charts, on a "pilot to pilot" basis. However, because the passage from Burnie to the Tamar River was

relatively short and because he intended stopping and drifting for two to three hours, the Master decided to lay off the courses himself.

Under the on-board procedures, the approaches to ports are not formally planned. As a result, safety clearance distances and bearings for the approach to the Tamar River entrance had not been calculated and marked on the chart, and so were not available for use with the radar, nor had there been any contingency planning.

Sailing from Burnie, with the wind from the east and the swell from the north-east, the appropriate side for the pilot ladder was the port side. However, when approaching the pilot boarding ground off the Tamar River, the Master does not appear to have taken into consideration the fact that on an approach course of 140° , with the existing conditions, the port side would be the weather side and, therefore, the appropriate side for the pilot ladder was the starboard side.

In the past, when the company employed Japanese officers, the Master would discuss operational and navigational procedures with them. However, since the introduction of the employment of Filipino officers, the Master no longer did this, with the result there was no cohesive bridge team.

When the pilot launch arrived alongside, the Mate went to the port bridge wing and remained there until such time as the Pilot had gained the deck. At a critical stage, when manoeuvring close to a reef, he was providing no active support to the Master by monitoring the vessel's progress, either by radar or by the electronic plotting table.

With no active support from the Mate, the Master had quickly plotted the position at a time he recorded as 0606, from which he realised there was a danger of the stern swinging into the eastern shallows of Hebe Reef. In instructing the helmsman to steady on 160° , however, he does not appear to have appreciated the developing situation with West Reef, created by that action.

Had the approach been formally planned and had proper Bridge Resource Management procedures been adopted, the appropriate side for the pilot ladder would have been determined, the Master would have had a confident awareness of the vessel's manoeuvrability and the turning distances and, the Mate would have been far

more gainfully employed, keeping the Master informed on the vessel's position relative to the Middle Channel line and to the reefs.

Actions of the Master

The Master was conning the vessel visually by the leads and by radar. He stated that he was not getting a good target echo from Hebe Reef beacon, was concerned about getting too close to Hebe Reef and was, therefore, uneasy at going to starboard to head for the reef.

From the manoeuvring data, the transverse shift for a "hard over" manoeuvre at slow ahead is 2.8 cables. Although there was sufficient room to make a full turn to starboard, the safety margin was only small and the Master's reluctance to make such a manoeuvre is understandable.

However, in increasing the engine speed to only slow ahead, the vessel's response to the hard to starboard rudder would have been slower, taking longer to provide the necessary lee. In then going hard to port, the vessel approached closer to the shallows of Hebe Reef than if he had made a full turn to starboard under full ahead.

As he was concerned about the closeness of Hebe Reef, it would have been more appropriate to have stopped the engine and gone full astern. Manoeuvring in that manner, the bow should still have paid off to starboard, to provide a lee, and the vessel would probably have come to a stop close to the line of the leads.

Communications

There was a difference in recollection of what was actually requested regarding the action the Master should take to provide a lee. According to the Pilot, he requested the Master to go full ahead, hard to starboard and to go right around to starboard, whereas according to the Master, he was only requested to go full ahead and hard to starboard. Then, having decided to only increase to slow ahead, because of the closeness to Hebe Reef, the Master did not inform the Pilot, thus the Pilot was not fully aware of what was happening.

It is essential that communications are clear and unambiguous, and instructions and actions fully confirmed, particularly where there may be language difficulties. As the Pilot's intention was that the Master should take a

turn out of the vessel, it possibly would have been clearer had he requested the Master to turn to starboard and head to the north.

Action by the Port of Launceston Authority

Following the grounding of Iron Baron on Hebe Reef on 10 July 1995, the Port of Launceston Authority assessed the navigational aids for the approaches to the Tamar River and the decision was made to install a sectored light on the west bank of the river. However, this had not been installed by May 1997. After the *Taio Frontier* incident, the Harbour Master realised that even had the new light been installed, it would have provided little benefit to the Master of *Taio Frontier*.

In order to avoid similar occurrences in the future and to prevent ships approaching too close to the river entrance without a pilot on board, the Port of Launceston Authority immediately moved the pilot boarding ground one mile seaward, in a north-westerly direction. Also, a limiting line, beyond which vessels should not proceed without a pilot, has been established one mile north of Hebe Reef.

The fact that only two, adjacent propeller blades and the heel of the rudder were damaged indicates the obstruction had only a relatively small area, such as a rock pinnacle or a part of a wreck. The absence of any geological material embedded in the rudder would point to the latter. After *Taio Frontier* had sailed from Bell Bay, the Port Authority carried out a preliminary survey of the area of the incident, but no obstruction was located. A more detailed survey of the area is planned for a later date, when prevailing sea conditions are expected to be more suitable for accurate survey work.

Conclusions

These conclusions identify the factors contributing to the incident and should not be taken as apportioning either blame or liability.

The main contributing factors are considered to be:

- The pilot ladder was rigged on the weather side, preventing the Pilots from boarding until a lee had been provided.
- The lack of any planning of the approach, with no delineation of danger areas or safety limits on the chart, or consideration of possible contingencies.
- A misunderstanding on the part of the Master of what the Pilot requested regarding the making of a lee.
- Inappropriate action to provide the necessary lee to enable the Pilots to board.
- The lack of Bridge Resource Management procedures, in that the Master did not inform the Mate of his intended actions or seek the Mate's support in monitoring and advising him on the progress of the manoeuvres; in that the Mate did not provide active support to the Master; and in that navigational equipment was either ignored or not used to full effect.
- The differing ethnic/cultural backgrounds of the Master and the deck officers, which inhibited the Master in his dealings with those officers.

Submissions

Under sub-regulation 16(3) of the Navigation (Marine Casualty) Regulations, if a report, or part of a report, relates to a person's affairs to a material extent, the Inspector must, if it is reasonable to do so, give that person a copy of the report or the relevant part of the report. Sub-regulation 16(4) provides that such a person may provide written comments or information relating to the report.

The final draft of the report was sent to the following:

The Master and Mate, *Taio Frontier*.

Harbour Master, Port of Launceston Authority.

Apart from a verbal indication from the Harbour Master, Port of Launceston Authority, that he had no comment to make, no comments were received.

Details of Vessel

IMO No.	8704432
Flag	Panama
Classification Society	NK
Ship type	Woodchip carrier
Owner	Taio Frontier S.A., Panama
Operator	Jupiter Corporation, Tokyo
Year of build	1987
Builder	Sanoyasu Corporation, Mizushima
Gross tonnage	35,663
Net tonnage	16,221
Summer deadweight	41,205 tonnes
Length overall	198.03 m
Breadth extreme	32.26 m
Draught (summer)	10.026 m
Engine	6 cylinder Sumitomo-Sulzer diesel
Engine power	6193kW
Crew	22 (Japanese/Filipino)

