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INTRODUCTION

At about 0340 hours Eastern Standard Time on 25 March 1985 the Australian registered ship 'TNT Alltrans' grounded on Lady Musgrave Island in the Capricorn Group, Great Barrier Reef, while on a voyage from Gladstone, Queensland to the port of Bluff in New Zealand. A chartlet of the area is at Attachment 1.

The ship suffered extensive bottom damage in the incident. There was no loss of life or injury to persons and no pollution of the marine environment attributable to the incident has been reported. The ship was refloated with the aid of a tug on 26 March 1985 and anchored off the island until 29 March for divers' inspection of the damage and temporary repairs. The ship then proceeded under its own power at reduced speed to Newcastle, New South Wales for assessment of the damage and, subsequently, permanent repairs.

On 26 March 1985 an officer of the Federal Department of Transport was appointed under section 377A of the Navigation Act 1912 to make a preliminary investigation into the circumstances of the grounding. A copy of the instrument of appointment, setting out the terms of reference for the investigation, is at Appendix I of Attachment 2.

In the course of the investigation and between 2 April and 15 May 1985 statements were taken from 9 members of the ship's complement and one member of the shore management, namely

Master	Chief Engineer Officer
Chief Officer	Fourth Engineer Officer
Second Officer	2 Able Seamen
Third Officer	General Manager, Queensland Bulk
Shipwright	Carriers Pty Ltd

The conclusions which follow are based upon those statements; on ship's records; on Departmental papers; and on material provided by the ship's managers. All times given in this report are Eastern Standard Time and distances are expressed in nautical miles. A detailed report is at Attachment 2

CONCLUSIONS

1. That the 'TNT Alltrans' grounded on the reef off Lady Musgrave Island at about 0340 hours 25 March 1985, becoming hard fast on the reef in a position with the island's light bearing 075 degrees true distant about 0.35 miles; that the ship's engines continued to run ahead until about 0400 hours when they were stopped by the Chief Officer; and that the fact of grounding was not determined conclusively by those on board until about 0410 hours, 25 March 1985.
2. That the grounding was directly caused by the failure of the officer of the watch to control the navigation of the ship over an extended period, from about 0030 hours 25 March 1985 to the time of grounding, and specifically his failure to alter course at a position off Bustard Head in accordance with the courses laid down on the chart in use.

3. That the Able Seaman on duty on the bridge apparently, after reporting the light on Lady Musgrave Island to the officer of the watch, did not appreciate that the ship was standing into danger and did not warn the officer of the watch or other responsible person of the situation.
4. That the Master left the Second Officer in charge of the bridge at about 0020 hours 25 March 1985; that at that time the Second Officer was instructed in the course to be steered; and that he appeared to understand those instructions.
5. That it has not been possible in this investigation to establish conclusively the actions of the bridge watchkeepers between about 0100 hours and 0330 hours on 25 March 1985.
6. That the reasons for the ship having-entered the area recommended to be avoided in the Capricornia Section of the Great Barrier Reef Marine Park are the same as those set out in 2 above in respect of the grounding.
7. That a possible reason for the failure of the officer of the watch to control the navigation of the ship is that he suffered some temporary impairment of his normal mental capabilities.
8. That the weather at the time of grounding and for about 3½ hours previously was fine, with good visibility.
9. That the light on Lady Musgrave Island was functioning properly.
10. That the delay on the part of ship's personnel in appreciating that the ship was aground did not materially affect the outcome of events.
11. That the action taken by the Chief Officer between about 0400 hours and 0410 hours 25 March 1985, was appropriate in the circumstances.
12. That the action taken by the Fourth Engineer on answering the engine room alarm at about 0341 hours 25 March 1985 and subsequently was appropriate in the circumstances.
13. That the action taken by Master and crew immediately after the grounding to determine the extent of damage and the position of the ship with respect to the reef was appropriate and seamanlike.
14. That the actions of Master, crew, owners and salvors in assessing damage, effecting temporary repairs and refloating the ship were appropriate and effective in protecting life, property and the environment.
15. That no pollution of the marine environment occurred other than any which may have been caused by contact of the paintwork on the ship's bottom with the reef.
16. That at the commencement of the voyage at Gladstone on 24 March 1985 the ship was seaworthy as regards its structure, machinery and equipment and that the manning of the ship met the requirements of the Navigation Act 1912 and subordinate legislation as regards numbers and qualifications of crew.
17. That there are a number of questions for the appropriate authority to determine in relation to the operation of the ship.

DETAILS OF THE SHIP

The 'TNT Alltrans' is a diesel engined bulk carrier of 35218 tonnes deadweight, built in 1983. The ship was designed for the carriage of alumina in bulk, is fitted with cargo handling equipment which enables it to discharge its own cargoes and has been employed continuously since commissioning in the carriage of alumina from Gladstone, Queensland to Bluff, New Zealand and from Bunbury, Western Australia to Bell Bay, Tasmania.

The owners of the ship are

Bulkfridge Proprietary Limited

[REDACTED]

[REDACTED]

[REDACTED]

REDFERN NSW 2016

The managers are

Queensland Bulk Carriers Proprietary Limited

[REDACTED]

SPRING HILL QLD

At the time of the incident the ship was time chartered to

COMALCO Aluminium Limited

[REDACTED]

MELBOURNE VICTORIA

Full particulars of the ship are given at Appendix 2.

The 'TNT Alltrans' is under Federal Department of Transport survey and is classed with Lloyd's Register. At the time of the incident all survey and other certificates required under the Navigation Act 1912 (the Act) were valid and the ship was in class. A list of certificates held is at Appendix 3.

The ship was manned with a total complement of 32, all engaged in Australia in accordance with the relevant provisions of the Act. A list showing numbers of crew categories as well as qualifications held by officers is at Appendix 4. This complement meets requirements under the Act as regards numbers and qualifications.

THE EVENTS PRECEDING THE GROUNDING

The 'TNT Alltrans' arrived at South Trees East berth, Gladstone at about 1740 hours on 23 March 1985 to load a cargo of alumina in bulk for Bluff. The cargo was duly loaded on 23 and 24 March; during that time normal port activities took place and no untoward incidents were reported as regards ship or crew.

Loading was completed at 2058 hours 24 March when the ship had on board

28500	tonnes	cargo
2779	tonnes	water ballast
805	tonnes	fuel oil
196	tonnes	diesel oil
171	tonnes	fresh water
480	tonnes	stores and sundries

The actual draught on completion of loading and on departure was 9.48 metres forward, and 10.01 metres aft and the metacentric height was 3.32 metres.

By 2130 hours 24 March all navigational equipment as well as the steering gear, main engines and control systems had been tested and found in order and at 2238 hours the ship left the wharf and proceeded seawards.

Main engines were on bridge control and remained in that mode throughout the period under consideration. The Master, who holds a pilotage exemption for the port, piloted the ship outwards through the Port Curtis channel.

At 2400 hours on 24 March the ship, proceeding at full harbour speed of about 10 knots, passed between the fairway buoys and cleared the channel. At that time the main engines were rung 'Full Away' and the automatic load programme was engaged by the engineers in the engine control room to bring the main engine speed progressively up to full sea speed, 126 revolutions per minute (RPM).

At about 0005 hours 25 March the Chief Engineer, having seen the run up programme established, left the control room leaving the Fourth Engineer in charge.

On the bridge at 2400 hours 24 March the Chief Officer, instructed by the Master, commenced to bring the ship on to a heading of 092 degrees gyro and when that was done switched the steering control from manual to automatic pilot, releasing the helmsman who remained on the bridge.

The Second Officer had arrived on the bridge at 2400 hours 24 March and once the ship was settled on a course of 092 degrees, on auto pilot, took over from the Chief Officer who left the bridge at about 10 or 15 minutes past midnight. According to his statement, the Chief Officer in handing over advised the Second officer that the ship was steady on a course of 092 degrees; that the auto pilot was engaged; that the ship had cleared the last two beacons at midnight; and that 'Full Away' had been rung. The Second Officer confirms that he received that advice.

The Master was then still on the bridge, in overall charge. According to his statement, between 2400 hours 24 March and 0020 hours 25 March he wrote up his night orders, spoke to the Second Officer, saw him sign the night order book and checked the course with him. According to the Second Officer's statement the Master gave him verbal instructions, as well as written instructions in the night order book, to 'keep to the course lines laid down on the chart'. A copy of the relevant entry in the Master's night order book is at Appendix 5. The Master states that he left the bridge at about 0020 hours, leaving the Second Officer in charge of the navigation of the ship.

Assigned to the bridge watch as lookout, in accordance with the ship's practice, was an able seaman (AB). From his statement, it would appear that the midnight to 0400 (12 to 4) AB came on the bridge at about 0015 hours on 25 March, when he relieved the AB who had acted as-helmsman in the channel. Once clear of the port, therefore, the navigational watch of the ship consisted of two persons, the Second Officer and the AB/lookout.

The chart in use for the first part of the passage was AUS 819 'Bustard Head to North Reef'. The first course laid down on this chart leads 092 degrees true from the fairway buoys for about 14.2 miles to a position with Bustard Head light bearing 180 degrees distant 7 miles, at which point an alteration of course is indicated to 101 degrees true. This second course leads for a distance of about 79.6 miles to a position with Breaksea Spit Light Vessel bearing 189 degrees true, distant 11.4 miles and passes about 6.4 miles to the south of Lady Musgrave Island. These courses had been laid down on a previous occasion at the Master's direction, had subsequently been followed on a number of voyages and were ruled in ink on the charts to avoid the necessity of laying them off afresh on each voyage.

Inspection of the copy of chart AUS 819 in use on board the 'TNT Alltrans' shows a position annotated '0030' marked about 3 cables to the north of the first course line and about 6 miles to the eastward of the fairway buoys.

The master who, as noted above, had left the bridge at about 0020 hours has stated that he turned in and read for a while and went to sleep some time after 0100 hours.

In the engine room, the Fourth Engineer Officer had continued to monitor the run up to full sea speed and, according to his statement, at about 0050 hours on 25 March, when the load programme was complete, and again at about 0100 hours, telephoned the bridge and spoke to the Second Officer to request an adjustment of the engine telegraph to bring the revolutions to 126 per minute, which adjustment appears to have been carried out.

At about 0120 hours 25 March, when all engine room conditions were normal, main engines turning at 126 RPM, all automatic control systems functioning and engines still on bridge control, the engine room personnel left the control room.. The Fourth Engineer reported to the Chief Engineer that all was in order below and went to bed at about 0135 hours. He was the designated duty engineer for the night.

From about 0020 hours onwards on 25 March and until about 0400 hours, no authoritative, comprehensive record of the navigation of the ship or of what occurred on the ship's bridge is available, apart from the position on the chart marked '0030' referred to above.

An entry, untimed, on the first line of the page of the deck log book for 25 March indicates a course of 092 degrees true, 092 degrees gyro, 084 degrees standard magnetic compass, nil gyro error, 8 degrees east error on standard magnetic compass and nil allowance for set or leeway. In addition the name of the lookout is entered in the column provided for the purpose. The handwriting has been identified by the Second officer as his. There are no other entries for the midnight to 0400 watch.

The following account of the probable sequence of events is derived from the individual statements of crew members together with whatever ship's records are available.

The first event for which verbal evidence is available is said to have occurred at 0300 hours, 25 March. The 12 to 4 AB has stated that he kept his watch mostly on the port bridge wing. At 0300, he says, he sighted a light about a point on the port bow which he reported to the Second Officer who acknowledged the report. It appears that the Second Officer was on the starboard wing of the bridge at this time. The light which the AB states he sighted turned out to be the light on Lady Musgrave Island.

The AB then, he says, resumed his lookout and at 0330 hours called his relief, the AB who was to stand the 0400 to 0800 watch, by telephone from the wheelhouse. He again resumed his lookout and at about 0340 hours felt what he describes as a 'slight bump'. He was, he says, at this time on the port bridge wing. In his words, the ship 'listed slightly to starboard, then settled down and steamed ahead'; a few minutes later the bridge alarms started ringing. He described the slight bump as 'very like the ship coming alongside' a wharf. The AB then saw the Second Officer at the wheelhouse console trying, he assumed, to stop the alarms. The AB remained in the wheelhouse until his relief arrived at about 0355 hours.

The 0400 to 0800 (4 to 8) AB who, as described above, had been called at 0330 hours, states that at about 0340 hours when he was walking from his cabin up to the crew's recreation room he felt a 'bump,'. The ship, he says, heeled over to starboard then righted itself and 'kept on steaming along'. It was 'such a slight bump'.

When the 4 to 8 AB arrived on the bridge at about 0355 hours he noticed the Second Officer at the console. He walked up to the 12 to 4 AB on the port side of the wheelhouse and took over the lookout. In handing over, the 12 to 4 AB advised his relief that there was a light 1 1/2 or 1 points to port and that he had felt a slight bump earlier and the relief remarked 'we are awful close to that light'. The 12 to 4 man then left the bridge at about 0358 hours, went below and subsequently turned in. Both AB's say that they saw the Chief Officer come on to the bridge just before or at 0400 hours.

As noted above, the Fourth Engineer was the nominated duty engineer on the night of 24/25 March. As such it was his duty, while the engine room was unmanned, to respond to and investigate any alarms indicating malfunction or abnormal condition of main engines, auxiliary machinery, engine room equipment, tanks or other spaces. This duty is performed by engineers in turn and alarms are fitted in their cabins and in public rooms.

The Fourth Engineer states that at about 0340 hours on 25 March he had woken up and was in the bathroom attached to his cabin when he felt what he thought was a bump attributable to the movement of the ship in the sea. Very shortly afterwards the engine room alarm in his cabin sounded and he went immediately to the engine control room where he found that the alarm condition was a low level in the main engine luboil drain tank. He answered the alarm and the condition cleared itself. These events, the alarm and reset, are indicated on the engine data logger printout as occurring at 0345 hours. The logger was subsequently found to be 4 minutes fast of ship's time so that the corrected time of the event is 0341. A copy of the data logger printout for the period 2342 hours 24 March to 0407 hours 25 March is at Appendix 6.

The Fourth Engineer then checked the drain tank level by means of the remote tank sounding readout and found that there was in fact sufficient Oil in the tank. He commenced to check all main engine temperatures and pressures by means of the monitoring system to satisfy himself that all was in order and while he was doing that, at about 0343 hours, a further alarm came on, namely 'main engine overload'.

Noticing that the main engine revolutions had fallen from 126 to 98, the Fourth Engineer forthwith telephoned the bridge and spoke to the Second Officer to request a reduction in the setting of the engine telegraph in order to clear the overload condition. That reduction was carried out, the Fourth Engineer states.

Some time after telephoning the bridge the Fourth Engineer formed the opinion that the probable cause of the engine overload condition was a change in wind or sea or alternatively a large alteration of course. He noticed that the rudder indicator in the control room was showing 19 degrees to port and again telephoned the bridge and spoke to the Second Officer to enquire about weather conditions and the reason for the rudder being 19 degrees to port. The Second Officer said that 'he would look into the matter'.

It is not possible to establish the time of the two telephone calls but the Fourth Engineer states that they took place between 0343 hours and 0353 hours, that there was an interval of 1 1/2 to 2 minutes between them and that he recognized the Second Officer's voice.

The next significant event in the engine control room occurred at 0353 hours when the speed set limiter alarm appeared on the monitor, indicating that the main engine governor had opened up to its maximum alarm setting in an endeavour to maintain the set power on the engine. The Fourth Engineer cancelled the alarm and the condition was cleared.

No further alarm conditions appeared until at 0359 hours the monitor indicated that the starboard steering motor, which was the motor in use, had stopped and the port motor had started. A series of stops and starts followed with alternatively port and starboard steering motors running, and ending at 0403 with both motors running. These events were apparently initiated from the bridge control console.

At 0404 the Fourth Engineer observed that the main engines had gone half astern, under bridge control. He immediately called the Chief Engineer who came to the engine room and took charge there. Shortly after calling the Chief Engineer the Fourth Engineer again telephoned the bridge and was told that the ship had run aground.

The Chief Officer, who was to keep the 0400 to 0800 bridge watch, had gone to bed sometime after 0015 hours on 25 March. He states that at 0345 hours he was wakened by his alarm clock or watch. The normal method of calling a watchkeeping officer in this ship is apparently for the officer of the watch on the bridge to telephone to the cabin of his relief and wake him in this way. As far as the Chief Officer is aware that did not happen on this occasion.

The Chief Officer dressed and left his cabin at about 0358. On arriving on the bridge he went into the chartroom and looked at the chart in use and found 'no recent positions on it'. The most recent position in fact laid down on the chart was the one referred to earlier annotated "0030"

The Chief Officer then looked into the radar situated alongside the chart table and saw there the echo of an island and a reef close to. He proceeded, in his words 'fairly smartly', into the wheelhouse where he found the Second Officer standing at the steering motor controls apparently, he says, attempting to start the steering motors. He asked the Second Officer what was happening and he replied with words to the effect that 'everything was alright'. The Chief Officer observed that the doppler log was indicating 8.8 knots ahead and that the engine room telegraph was at 'Full Ahead'. He checked the ship's head from the steering compass and at about 0400 hours stopped the engines. He then instructed the Second Officer to put the wheel hard-a-starboard which that officer did, both steering motors having been started at about 0403 hours.

The Chief Officer states that it was at about 0400 hours that he began to suspect that the ship was aground. The light on Lady Musgrave Island was, he says, 'very bright', illuminating the interior of the wheelhouse with 'a faint flash . . . like someone shining an ordinary hand torch on you from 30 to 40 yards away'.

At about 0404 hours the Chief Officer put the engine telegraph to Full Astern and called the Master by telephone, who arrived on the bridge a very short while later.

The Master who, as noted above, had gone to sleep some time after 0100 hours, states that he was called by the Chief Officer by telephone at about 0404, who requested him urgently to come to the bridge. The Master went immediately to the bridge, entered the chartroom, looked at the chart, looked at the radar and went into the wheelhouse. There he noted that the engines were on Full Astern and that the Second Officer was at the wheel and he observed Lady Musgrave Light one point on the port bow, very close. When his eyesight had adjusted to the darkness the Master could, he says, see breakers. The Master spoke to the Chief Officer who said 'I think we are aground'. The Master and Chief Officer continued to assess the situation and at 0410 hours concluded that the ship was indeed aground and stopped the engines. Lady Musgrave Island light was found to be bearing 075 degrees true distant 0.35 miles, the ship's head 094 degrees true.

The Officer appointed to keep the midnight to 0400 bridge watch on 25 March has the Second Officer. As noted above, this officer came on to the bridge at about 2400 hours 24 March. He took over from the Chief Officer shortly after midnight and recalls, he says, that officer advising him that Full Away had been rung, that the course was 092 degrees and that the automatic pilot was engaged. He was aware, he says, that the main engines were running up to 126 RPM, normal sea speed and that there was an alteration of course to be made to 101 degrees off Bustard Head. The Second Officer recalls speaking to the Master, being instructed by him to keep the ship to the course lines laid down on the chart and signing the Night Order Book.

The Second Officer recalls placing the '0030 position referred to above on the chart and walking back into the wheelhouse after doing so. He states that he can remember nothing of what happened thereafter until he found himself at the wheel, responding to an-order from the Chief Officer to put the wheel hard-a-starboard.

That would have been at about 0403 hours. The Second Officer remained on the bridge until about 0500 hours but took no effective part in the activities there.

DETERMINATION OF THE TIME AND POSSIBLE CAUSES OF GROUNDING

It has been established that shortly after 0400 hours on 25 March the 'TNT Alltrans' was found to be hard aground on the reef off Lady Musgrave Island, in a position with the island's light bearing 075 degrees true distant 0.35 miles. The time of grounding, however, has not been recorded.

The Master and the Chief Officer decided at about 0410 hours, on the basis of their observations, that the ship was aground, the Chief Officer having begun to suspect that that was the case at about 0400 hours. The doppler log in indicating a speed of 8.8 knots ahead was misleading; it was later found to have been giving a false reading. The 12 to 4 AB apparently was not aware that the ship was aground when he left the bridge at about 0358 hours after being relieved. The first he knew of the situation, he says, was when he was called at about 0600 hours by the bosun. The 4 to 8 AB apparently was not aware that the ship was aground until he heard the Chief Officer say, at about 0404, 'I think we're aground'. The Fourth Engineer apparently was not aware that the ship was aground until, shortly after 0404 hours he telephoned the bridge and 'was told the vessel had run aground and they were in the process of trying to get her off'. The Second Officer was not aware that the ship was aground, he says, until he heard the Master and Chief Officer discussing the situation on the bridge some time after 0403 hours.

All other persons on board were off duty at the time of grounding and, presumably, asleep.

While it appears therefore that no-one on board was aware that the ship had run aground at the time it happened, it is possible to establish that time from a consideration of the engine data logger printout and the course recorder graph.

The alarm which called the Fourth Engineer Officer to the engine control room at about 0341 hours on 25 March indicated a low level condition in the main engine lubricating oil drain tank. This, according to the ship's engineers, was an unusual condition to occur and a check carried out by the Fourth Engineer after the alarm was answered showed that the tank level was normal. The level sensor is reported to be situated at the after end of the tank and the temporary lowering in level which would appear to have occurred there could be accounted for by the contents of the tank surging to the forward end as a result of the ship pitching heavily in a seaway or alternatively slowing rapidly to a stop from 14 knots. In the favourable weather conditions prevailing at the time the latter explanation is considered the most likely.

The engine data logger records times to the nearest whole minute and there is said to be a 30 to 60 seconds delay on the drain tank alarm to prevent as far as possible false alarms caused by pitching of the ship. The low level condition is indicated on the printout as having occurred at 0341 hours, corrected time. The event itself therefore could have occurred between 0339 1/2 and 0341 hours.

Inspection of the ship's course recorder graph for the period following departure from Gladstone, a copy of which is at Appendix 7, shows a handwritten notation '1100 25/3/85' entered on the graph alongside the printed time interval '2120'. From that notation, assuming that it is correct, it is possible to derive the ship's time of events indicated on the graph.

At about 0339 hours 25 March the graph indicates an alteration of course of 2 degrees to starboard. It is said that the ship had been steering prior to the rounding 092 degrees gyro and after the grounding was found to be heading 094 degrees, an alteration of 2 degrees to starboard.

Again, the graph shows at about 0339 hours an application of 6 degrees starboard rudder, followed immediately by 8 degrees port rudder increasing to 16 degrees port at about 0348 hours and 17 degrees at about 0358.

These recorded events are consistent with a time of grounding of 0339 hours and are not significantly inconsistent with the Fourth Engineer's observation of '19 degrees port rudder' on the engine control room rudder indicator at some time between 0343 and 0353 hours.

The distance from the Port Curtis fairway buoys, which the ship passed at 2400 hours 24 March, to the position on the Lady Musgrave Island reef where the ship grounded is 48.8 miles. Allowing an average sea speed of 14 knots and an estimated 12 knots for the period from midnight to 0120 hours when the engines were running up to full sea speed from full harbour speed, the ship should have covered that distance in 3 hours and 40 minutes, giving an estimated arrival time at the reef of 0340 hours.

Three crew members, the Fourth Engineer, the 12 to 4 AB and the 4 to 8 AB each say that they felt a 'slight bump' or a 'bump' at about 0340 hours 25 March; two of them describe the ship as listing to starboard and then righting itself.

Taking the above factors into account and given the limitations of the instrumentation involved and the likely degree of accuracy of the personal observations, it is concluded that the time of grounding was between 0339 hours and 0341 hours 25 March.

It is now necessary to consider the cause of the grounding. Unfortunately, the officer responsible for the navigation of the ship at the material time can remember nothing, he says, of events preceding the grounding so that it is necessary to establish what actually happened from other sources.

It has been established that at about 0020 hours 25 March the Second Officer was left in charge of the navigation of the 'TNT Alltrans', the ship then steering 092 degrees by gyro compass on automatic pilot, the fairway buoys being by estimation 3 to 4 miles astern, and main engines working up to full sea speed of about 14 knots. He was, according to his own statement, fully aware of the courses to be steered throughout the watch and of the alteration of course to be made off Bustard Head.

The position found to have been placed on the chart in use annotated '0030' is about 6 miles to the eastward of the fairway buoys, a distance not inconsistent with the speed of the ship and the time of passing the fairway buoys.

The Second Officer has stated that he placed that position on the chart and that it was obtained by means of radar ranges. No reason is seen not to accept that statement.

No subsequent positions are to be found on the chart. The Master, in his statement, refers to 'no bearings after 0030' and the Chief Officer says that when he looked at the chart just before or at 0400 hours he saw 'no recent positions'. From this it is concluded that from 0030 hours and until shortly after 0400 hours 25 March the position of the ship was at no time determined.

Inspection of the ship's course recorder graph shows a course of 090 1/2 degrees gyro indicated from about 0006 hours to about 0339 hours 25 March while ship's officers have stated that the course set after clearing the fairway buoys was 092 degrees gyro. Two possible explanations for this apparent inconsistency are that either the ship did in fact steer 090 1/2 degrees throughout the period or that the ship steered 092 degrees and the course recorder was 1 1/2 degrees out of alignment with the gyro compass. In view of the fact that both the master and the chief officer have stated that they checked the course and in the absence of opportunity for this investigation to check the alignment of the course recorder underway, the second explanation is considered on balance the most likely.

No observations were taken to determine the error of the compass between midnight and the time of grounding on 25 March. The most recent errors recorded in the ship's compass error register book vary from 1 degree high to 1 degree low for the gyro compass. It is considered likely therefore that there was no significant error on the gyro compass at the time in question. A subsequent observation recorded in the compass book indicates a deviation of the magnetic compass of 3 degrees west on a heading of 094 degrees magnetic compass, substantially the same as the course steered. A deviation of 3 degrees west with variation for the area of 10 degrees east gives a compass error of 7 degrees east and that error applied to the magnetic course of 084 degrees recorded in the ship's deck log book gives a true course of 091 degrees.

It is apparent then that throughout the midnight to 0400 watch on 25 March and up to the time of grounding the ship steered a course of 091 or 092 degrees true. It is clear that the intended alteration of course to 101 degrees true off Bustard Head was not made.

A true course of 091 degrees from the Port Curtis channel fairway buoys would have taken the ship some 2 cables to the north of the position of grounding on Lady Musgrave Island; a true course of 092 degrees would have taken the ship some 5 cables to the south. In either case the ship would have struck the reef. It is estimated that the set and drift of the current for this period would have been minimal.

The weather at the time of grounding was fine, with some cloud, a moderate south easterly wind and a moderate sea. The visibility was good. Similar conditions had prevailed at the time the ship cleared the Port Curtis channel and, it is reasonable to assume, throughout the midnight to 0400 watch.

It is apparent from the foregoing that there was no one in effective charge of the navigation of the ship from 0030 hours (at the latest) on 25 March to about 0400 hours when the Chief Officer came on to the bridge. No check on the ship's progress was made; no observations taken; no positions charted; no compass errors recorded; no entries made in the deck log book. The planned alteration of course off Bustard Head was not carried out. Apart from the lookout duties which the 12 to 4 AB states he performed, no watch appears to have been kept in regard to dangers to navigation, movements of other ships, weather conditions or occurrences on board the ship itself.

According to their several statements a number of people saw the Second Officer on the bridge at different times between midnight and 0400 hours 25 March. The Chief Officer saw him there between 0010 and 0015 hours; the Master left him, in apparent full control, at about 0020 hours; the Fourth Engineer spoke to him on the telephone at about 0050 hours and again at about 0100 hours; the 12 to 4 AB spoke to him when, between about 0015 hours and 0030 hours, he stood by the gyro compass at the Second Officer's direction to check the functioning of the auto pilot; the 12 to 4 AB observed him 'walking up and down on the starboard wing' during the course of the watch, reported the Lady Musgrave Island light to him at 0300 hours and received an acknowledgement, saw him 'on his feet' subsequently and saw him at the wheelhouse console after 0340 hours; the Fourth Engineer spoke to him twice by telephone from the control room between 0343 hours and 0353 hours; and the Chief Officer found him at the steering motor controls in the wheelhouse between 0358 and 0400 hours.

While, from these statements, it appears that the Second Officer, the appointed watchkeeping officer, was present on the bridge there is nothing to show that he took any part in the navigation of the ship during that time. From the fairway buoys at the entrance to Port Curtis, the ship proceeded on automatic pilot on a course of 091 or 092 degrees and with the engines on bridge control at full sea speed until it struck the reef off Lady Musgrave Island.

There are a number of possible reasons for this failure on the part of the Second Officer to carry out his duties

that he was professionally incompetent

that he was wilfully negligent

that he was asleep

that he was under the influence of alcohol or drugs

that he suffered some impairment of his physical or mental capabilities

These are now considered in turn.

The Second Officer holds a Certificate of Competency as Master of a Foreign Going Steamship issued by the Commonwealth Department of Transport on 12 October 1977. The requirements of the examination for that qualification are more than adequate to ensure proficiency in the duties required of the officer of the watch in 'TNT Alltrans' on the morning of 25 March 1985. The Second Officer also holds a Swedish Master's Foreign Going Certificate. There is nothing to show that he was professionally incompetent.

The Second Officer has served continuously in the 'TNT Alltrans' as Third and Second Officer since March on April 1983 with breaks for leave and a short interval as Chief officer in another ship of the company. His work performance was never reported on adversely in that time and the company management, the present Master and the Chief Officer of the 'TNT Alltrans' all hold high opinions of his ability and his diligence. His employers apparently thought well enough of him to appoint him as relieving Chief Officer. There is nothing to suggest that the grounding was caused by the Second Officer's wilful negligence.

As regards the possibility of the Second Officer being asleep, there is evidence that he spoke, apparently lucidly, to the Master at about 0020 hours, to the Fourth Engineer at about 0050 and 0100 hours and again twice between 0343 and 0353 hours, and to the AB at about 0300 hours. It is considered, however, that this evidence is not sufficient to reach a firm conclusion on the question one way or the other.

As regards the possibility of the Second Officer being under the influence of alcohol or drugs, there is nothing to show that he had been in the habit of drinking to excess or of using drugs or to show that he did so on this occasion. He states that on 24 March, between about 1500 hours and 1730 hours he drank two cans of beer in the officers' bar and purchased 2 or 3 more for other persons. The Master and Third Officer, who both saw and spoke to the Second Officer at the time he took over his watch say that they had no reason to believe that he was in any way unfit to perform his duties; the Chief Officer states that there was nothing unusual about his appearance or behaviour.

As regards the possibility of the Second Officer suffering some impairment of his physical or mental capabilities, three responsible persons saw and spoke to him before the watch, as noted above, and noticed nothing wrong and the AB states that he observed him walking about during the watch. It is considered unlikely then that he was ill in the physical sense.

The Second Officer has however stated that he remembers nothing of what happened from about 0030 hours on 25 March to about 0403 hours. The Second Officer further says that he suffered a similar 'lapse of memory' while on watch at sea in the 'TNT Alltrans' on a previous occasion, on 19 March 1985 between about 0305 hours and 0325 hours ship's time. He did not, he says, report that occurrence until the 26 March 1985 that is, after the grounding, when he told the Master of the ship about it. He did not report the occurrence at the time, he says, because he was concerned that it would affect his prospects of continued employment at sea.

While it is not possible to say definitely that a temporary mental impairment was the cause of the Second Officer's failure to control the navigation of the ship it is nevertheless considered to be a possible cause.

COMMENT

Actions of persons other than the Second Officer involved in the operation of the ship at the time of and immediately preceding the grounding are now examined.

The Master

The interests of safety at sea require that a ship's officer on taking charge of a watch shall not be excessively fatigued. This requirement is formalised in 3.2.2 of Part 28 of Marine Orders which prescribes that 'watchkeeping duties shall be so arranged that the first watch at the commencement of a voyage and the subsequent relieving watches are sufficiently rested and otherwise fit for duty'. In the 'TNT Alltrans', as in most Australian ships, the Second officer is responsible to the Master for navigational, clerical and administrative duties and to the Chief Officer for cargo duties. There was therefore an obligation on the ship's Master and on the Chief Officer to ensure that during the 24 hours at least before the ship's departure from Gladstone the Second Officer had sufficient opportunity to rest.

The Second Officer in his statement has set out what he says were his hours worked on 23 and 24 March and the Master has set out the hours during which, he says, the Second Officer was actually required for duty. Details are at Appendix 8.

In the 48 hours from 2400, 22 March to 2400, 24 March the Second Officer had, by his account about 20 1/2 hours off duty, by the Master's account about 24 1/2 hours. The discrepancy between the two totals appears, from an examination of both statements, to be attributable to the Second Officer voluntarily undertaking work he was not required to do.

Although the Second Officer had in this period 20 1/2 to 24 1/2 hours when he could in theory have slept, he was actually able to sleep, he says, for no more than about 6 1/2 hours. He was, he says, on one occasion disturbed by the testing of the ship's alarm bells and at other times was 'unable to relax'.

6 1/2 hours rest in 48 would appear to be inadequate to ensure alertness on taking over the first sea watch of the voyage. It is for the appropriate authority to determine whether the Master was justified in assuming that the Second Officer had taken full advantage of the opportunities to sleep afforded him or whether the Master should have taken action to ascertain the amount of sleep which that officer had actually had.

On this point it is relevant to mention that in the course of his interview the Second officer was asked whether he felt tired when he came on the bridge to take his watch at 2400 hours 24 March. He replied 'Not really'. He further stated that he did not feel concerned at the time that he might be too tired to perform his duties efficiently. As noted above, the Chief Officer and Third Officer, as well as the Master, who saw the Second Officer on the bridge at the beginning of his watch have said that they had no reason to believe he was not at that time fit to perform his duties. The Master has stated that if he had thought the Second Officer was excessively fatigued he would have stood the watch himself.

On the day of sailing, 24 March, the Second Officer after working from midnight to 0700 hours on cargo watch was apparently required again to assist with engagement and discharge of crew from 1100 to 1430 or 1500 hours. While this work pattern is consistent with industry practice, the appropriate authority may wish to consider whether watchkeeping officers should be required to perform clerical and administrative tasks which may prevent them from obtaining proper rest.

It is now necessary to consider whether the Second Officer was properly briefed and whether appropriate supervision was given to the performance of his watchkeeping duties.

The courses which were laid down on the chart have been examined and are considered to be proper and safe. The Second Officer was instructed by the Master, verbally and in writing, to 'keep the ship to the courses laid down'. The Second Officer has stated that he was aware on taking over the watch of the courses to be steered and that an alteration of course was to be made off Bustard Head.

To avoid possible ambiguity it is considered that it would have been preferable for the Master's instructions to have specified the actual courses to be steered and to have given the alteration positions in terms of bearings of and distances off lights or other geographical features. There is nothing to show however that had the Master done so on this occasion it would in any way have affected the outcome.

While the grounding was caused by a complete breakdown in watchkeeping functions, the critical factor in that breakdown was the failure of the Second Officer to carry out the alteration in course off Bustard Head.

The Master has stated that he did not directly supervise that alteration. It appears that at about 0100 hours on 25 March he was in bed reading when he felt what he describes as a 'slap' on the ship's side and assumed the ship had altered course, attributing the 'slap' to a change in the aspect of sea or swell. The estimated time of the ship's reaching the alteration position is between 0105 and 0110 hours.

It is for the appropriate authority to determine whether the Master should have supervised the alteration of course or whether he was justified in the circumstances in entrusting the operation to the Second Officer.

The AB/Lookout

The actions of the second member of the bridge watch, the AB/lookout, are now considered.

The 12 to 4 AB has stated that he sighted the light on Lady Musgrave Island at 0300 hours, that he reported it to the Second Officer who acknowledged the report and that he then resumed his lookout. He then apparently watched the light coming closer and closer, he felt a bump at about 0340 hours when the ship listed to starboard and at about 0358 hours, having been relieved, he went below, the light on Lady Musgrave Island then being 3 1/2 cables away and of a brightness sufficient, it has been said, to illuminate faintly the interior of the wheelhouse.

At no time, the 12 to 4 AB says, did he feel concern regarding the safety of the ship; the light remained on the port bow and he believed the ship was going to pass it to port. He did not realize, after 0340 hours, that the ship was aground.

The Master has stated that in the 'TNT Alltrans' the lookouts are instructed to report 'all lights, all ships or anything unusual'. The 12 to 4 AB, who was new to the ship, having joined 14 days previously, he stated that he was given no specific instructions regarding his duties as lookout. The Second Officer has stated that he gave the 12 to 4 AB no instructions in this regard.

The Second Officer has stated that between midnight and 0030 hours 25 March he did not see or speak to the 12 to 4 AB but assumed that he was present because he had heard him relieve the AB who had acted as helmsman. This statement is inconsistent with the 12 to 4 AB's statement to the effect that the Second Officer had instructed him to check the functioning of the automatic pilot between about 0015 and 0030 hours.

It has not been possible to resolve this inconsistency, but it does, taken with the conflicting statements regarding instructions to lookouts, point to some slackness in bridge organisation.

Accepted practice in Australian ships, with which the 12 to 4 AB could be expected to be familiar, is for the lookout to report sightings of lights, other ships, small craft, land or unusual occurrences. Both the master and the Chief Engineer have stated that shortly after 0400 hours 25 March they could see breakers ahead on the reef. It was a clear night, with good visibility. It is for the appropriate authority to determine whether in this instance the lookout should have realized firstly that the ship was standing into danger and subsequently that it was aground and whether, having so realized, he should have taken some action.

The Ship's Managers

Queensland Bulk Carriers' written instructions to Masters take the form of a 'Master's Guidance Manual', the requirements of which are brought to the attention of each Master in his letter of appointment. The Manual deals with matters such as responsibilities, in general terms, of Master and officers; Company procedures; maintenance; safety; navigation; cargo handling. The manual does not deal with bridge organisation or the responsibilities of watchkeeping ratings; it is for the appropriate authority to determine whether the managers should have provided instruction on these points for the ship's Master.

It is understood in this connection that a new 'Navigation and Bridge Organisation Manual' is being prepared which will deal with these issues.

Upon the ship's departure from Gladstone on 24 March no significant defect was apparent in the ship's structure, machinery or equipment and none has subsequently been found, other than damage caused by the grounding. At about 0359 hours on 25 March there occurred a series of stops and starts on the port and starboard steering systems a possible, though unlikely, cause of which is a fault in one or other system. All systems were tested while

the ship was subsequently on passage from Lady Musgrave Island to Newcastle and again on 1 April 1985 at Newcastle in the presence of a Departmental Surveyor and found in order on both occasions. It is concluded that the stopping and starting of the steering motors was initiated from the bridge, most probably by the Second Officer who by his account at that moment did not know what he was doing.

The General Manager of Queensland Bulk Carriers has stated that it is the Company's practice, when selecting officers for employment in its ships, to establish as far as possible that an officer's previous performance in the maritime industry has been satisfactory. Subject to that condition and the officer having the appropriate statutory qualification, the officer is engaged and after 3 months satisfactory service is offered pensionable employment. That procedure was followed in the case of the Second Officer of "TNT Alltrans" and, according to the General Manager, he had subsequently given the Company no cause to believe that he was not a competent officer.

The Company does not call for any medical inspection of officers other than any inspection which may be required under Part 9 of Marine Orders or other legislation.

As noted previously, the manning of the ship on the voyage in question, as regards numbers and qualifications, met applicable requirements under the Act.

EVENTS FOLLOWING THE GROUNDING

As variously noted above, it was at about 0410 hours 25 March when the Master and Chief Officer concluded that the ship was aground on the reef surrounding Lady Musgrave Island and the engines, which had been running astern, were stopped. All tanks and spaces were sounded and soundings taken over the side.

Soundings indicated that the ship was aground from about the mid length of No. 2 cargo hold forward and that the fore peak and No. 1 port and starboard double bottoms were holed. All tanks containing oil were intact. No oil pollution was observed and none has been reported. Measures were taken to ensure that no garbage was dumped.

Throughout the day fuel oil was transferred from No. 3 port and starboard fuel oil tanks to No. 5 tanks and Nos 1, 2 and 3 upper wing ballast tanks were emptied and No. 4 port and starboard double bottom ballast tanks were filled.

Unsuccessful attempts to refloat the ship were made by running the engines astern between 0722 hours and 0749 hours and again around high water between 0930 hours and 1002 hours.

At 1518 hours 25 March the assistance of salvors was accepted. A further attempt to refloat the ship with the assistance of a tug was made between about 2100 hours and 2323 hours 25 March. That attempt too was unsuccessful.

On 26 March the damage was assessed by divers and No. 1 port and starboard double bottoms were pressurised with compressed air. At about 2152 hours on that day the ship was refloated with the assistance of a tug and anchored off Lady Musgrave Island.

On 27 and 28 March bottom damage was further inspected by divers and temporary repairs carried out. At about 0930 hours on 29 March the ship got under way and left the anchorage off Lady Musgrave Island and proceeded at reduced speed to Newcastle NSW where it arrived on 1 April 1985. At Newcastle the ship was drydocked for full assessment of the bottom damage and permanent repairs were subsequently carried out.

List of Appendices

Appendix 1	Instrument of appointment of investigating officer
Appendix 2	Particulars of the ship
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NAVIGATION ACT 1912

APPOINTMENT OF PERSON UNDER SECTION 377A

In pursuance of the powers and functions conferred on the Minister by sub-section 377A(1) of the Navigation Act 1912, and delegated by him to the person for the time being occupying or performing the duties of First Assistant Secretary Maritime Safety Division, I, [REDACTED], hereby appoint [REDACTED] to make a preliminary investigation under that section into the circumstances of the grounding of the MV "TNT Alltrans at Lady Musgrave Island on the 25th of March 1985, and in particular:

the factors which caused or contributed to the grounding

reasons for the vessel having entered the area recommended to be avoided in the Capricornia Section of the Great Barrier Reef (includes Lady Musgrave Island)

the actions taken by the Master and crew to protect life, property and the environment after the grounding.

[REDACTED]

[REDACTED]
First Assistant Secretary
Maritime Safety Division

26th March 1985

PARTICULARS OF THE SHIP

Name	:	TNT Alltrans
Owners	:	Bulkfridge Pty Ltd.
Managers	:	Queensland Bulk Carriers Pty Ltd.
Home Port	:	Sydney NSW
Flag	:	Australian
Type	:	Self-discharging bulk carrier
Built	:	1983, Innoshima, Japan
Tonnage, gross	:	27662
net	:	8461
deadweight	:	35218
Length overall	:	189.06 metres
Breadth, extreme	:	29.44 "
Depth, moulded	:	16.31 "
Main engines	:	Hitachi-Sulzer, RLB66, 6 cylinder, 660 x 1400 mm 10,500 bhp, provision for UMS operation and bridge control
Signal letters	:	VKBE
Navigational equipment	:	Gyro compass, with bridge wing repeaters Auto pilot Echo sounder S- band radar, 60 miles range true motion, X- band radar, 48 miles range Weather facsimile receiver Doppler speed and distance log Standard magnetic compass Anemometer Satellite navigation system Rudder angle indicator Propellor shaft revolution indicator

SHIP'S CERTIFICATES.

<u>Certificate</u>	<u>Issued by</u>	<u>Date</u>
Registration Certificate	Registrar of ships	30 March 1983
Cargo ship safety equipment certificate	Dept. of Transport	19 March 1984 expires 12 April 1985
Cargo ship safety radio-telegraphy certificate	Dept. of Transport	19 March 1984 expires 11 April 1985
Loadline certificate	Lloyd's Register	12 July 1984
Annual survey		16 June 1984
Cargo ship safety construction certificate	Lloyd's Register	30 August 1983
Certificate of class, hull	Lloyd's Register	26 August 1983
" " machinery " "	" "	26 August 1983
International Tonnage certificate	Dept. of Transport	25 February 1983
Compass certificate	Dept. of Transport	18 March 1985

SHIP'S COMPLEMENT

<u>Rank</u>	<u>Certificate of Competency</u>
Master	Master, Foreign Going, Steamship
Chief Officer	Master, Foreign Going, Steamship, (DE)
Second Officer	Master, Foreign Going, Steamship
Third Officer	Second Mate Class 1
Shipwright	-
Radio Officer	Radio communication Operator's General Certificate of Proficiency
Chief Engineer	First Class, Steam and Motor
Second Engineer	First Class, Motor
Third Engineer	Second Class, Motor
Fourth Engineer	Engineer Watchkeeper, Motor
Fifth Engineer	-
Electrical Engineer	-
Bosun	-
Bosun's Mate	-
5 x AB's	-
Deck Boy	-
2 x Crew Attendants	-
3 x Donkeymen/Greasers	-
Trainee/Wiper	-
Chief Steward	-
3 x Assistant Stewards	-
Chief Cook	-
Second Cook	-
Total: 32	

(10)

Monday 23rd March 1950

Headstone to Staff

Keep to the track kind down. With and allow for any currents. Tell me if in any doubt.

[Redacted]

2/0

[Redacted]

3/0

[Redacted]

CH2607 03-24 03:47
FEED WATER TANK R
A LEVEL

CH2607 03-24 03:47
FEED WATER TANK R

CH2655 03-25 00:00
PORT STEER GEAR R
STOP

CH2607 03-25 00:17
FEED WATER TANK R
A LEVEL

CH2607 03-25 00:25
FEED WATER TANK R

CH2607 03-25 00:43
FEED WATER TANK R
B LEVEL

CH2607 03-25 00:43
FEED WATER TANK R

CH2904 03-25 03:45
L O DRAIN TANK R
L LEVEL

CH2904 03-25 03:45
L O DRAIN TANK R

CH2106 03-25 03:47
R/E
OVERLOAD

CH2139 03-25 03:57
SPEED SET R
LIMIT

CH2139 03-25 03:57
SPEED SET R

CH2654 03-25 04:03
STBD STEER GEAR R
STOP

CH2655 03-25 04:03
PORT STEER GEAR R

CH2654 03-25 04:04
STBD STEER GEAR R

CH2655 03-25 04:04
PORT STEER GEAR R
STOP

CH2655 03-25 04:04
PORT STEER GEAR R

CH2654 03-25 04:04
STBD STEER GEAR R
STOP

CH2655 03-25 04:04
PORT STEER GEAR R
STOP

CH2106 03-25 04:04
R/E

CH2654 03-25 04:07
STBD STEER GEAR R

CH2655 03-25 04:07
PORT STEER GEAR R

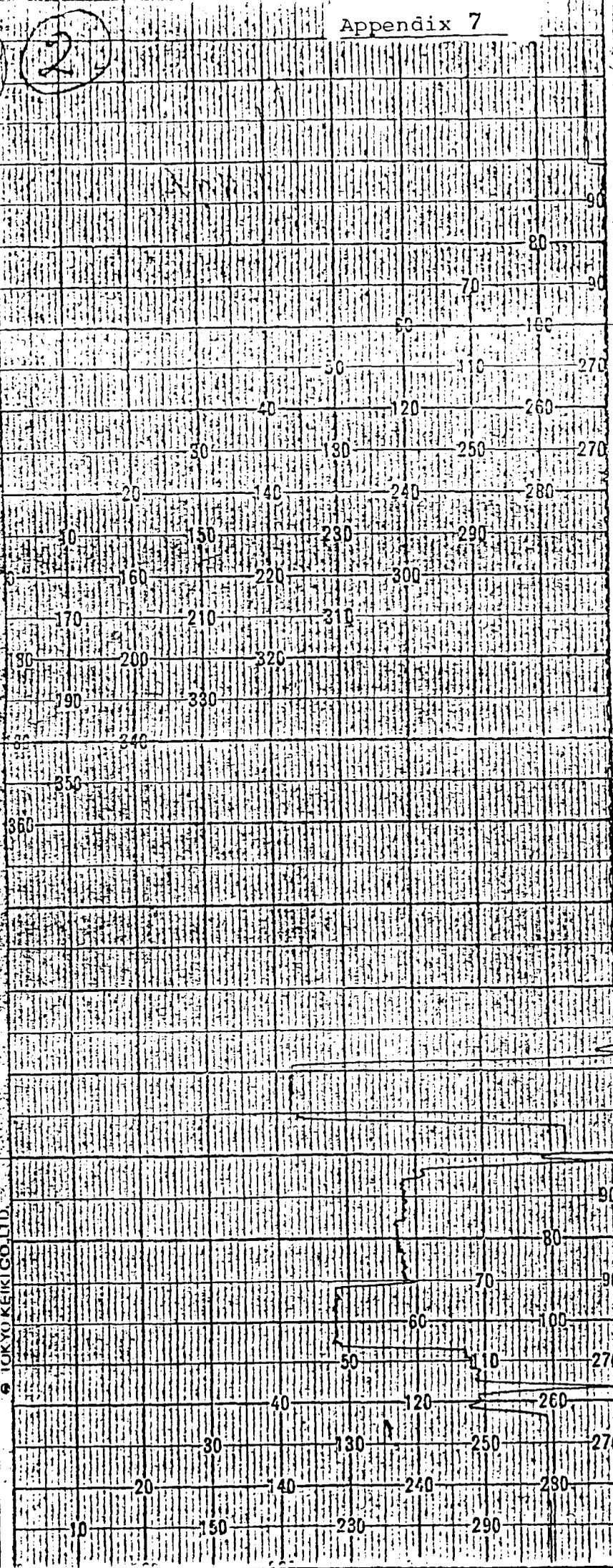
Note: These times are 4 minutes
fast of ship's time.

Appendix 7

5
2

5 TOKYO KIKICU LTD.

6 IOKYO KEIKI GO. LTD.



PORT

STARBOARD

LEFT

RIGHT

14.00

13.00

12.00

10.00

09.00

Second Officer's Hours of Duty

From Master's Statement

23 March

midnight - 0400	sea watch
1030 - 1130	clerical
1200 - 1600	sea watch
1700 - 1800	arrival Gladstone
1800 - 1930	administration

24 March

midnight - 0700	cargo watch
1100 - 1430	administration
2130 - 2300	departure Gladstone

total: 23½ hours

From Second Officer's Statement

23 March

midnight - 0400	sea watch
0900 - 1130	clerical
1200 - 1600	sea watch
1600 - 1630	clerical
1700 - 1800	arrival Gladstone
1800 - 2100	administration

24 March

midnight - 0700	cargo watch
1100 - 1500	administration
2130 - 2300	departure Gladstone

total: 27½ hours