Departmental investigation into the momentary grounding of the Cypriot flagged bulk carrier AIKATERINI L while entering Geraldton,WA on 13 March 1997

Report No. 111

Contents

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Navigation (Marine Casualty) Regulations

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of the Cypriot flagged bulk carrier

AIKATERINI L

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Summary

Early on 13 March 1997, the Cypriot flag bulk carrier *Aikaterini L* was lying at anchor off the Western Australian port of Geraldton, where it was to load a cargo of mineral sand and barley. In ballast, the 20,297 tonnes deadweight vessel had a calculated draught of 4.1 m forward and 5.67 m aft. The anchor was weighed at 0640 and at 0700 the Duty Harbour Master boarded to pilot the vessel to its berth.

After an exchange of greetings and brief formalities, and with the telegraph on full manoeuvring speed, the Harbour Master steadied the vessel on a south-easterly course, to pass about 300 m seaward of the Pimple Buoy, an orange marker buoy protecting the wave-rider buoy to the north of the entrance channel. His intention was to alter course to port tightly around the Pimple Buoy, into the entrance channel.

Due to a loss of concentration, the Harbour Master overshot the intended alter course position, and as soon as he realised this, he ordered “hard a port”. However, when the ship had turned through about 45°, a shudder went through the vessel, followed by a second shudder a few seconds later.

The vessel continued to make way and tests showed that both the steering gear and the main engine were fully functional, so the vessel was berthed as planned. However, underwater inspections by divers on 14 March revealed substantial damage, with hull penetration into double bottom ballast tanks beneath holds 2 and 4. There had also been an ingress of water into No. 4 fuel oil tank, but no pollution occurred.

After temporary underwater repairs had been carried out, Aikaterini L sailed from Geraldton in ballast on 19 March, bound for Singapore to undergo permanent repairs.

Sources of Information

Duty Harbour Master, Geraldton

Master, Third Mate and helmsman of Aikaterini L

Burns Philp Shipping Agencies (Australia), Geraldton

Franmarine Underwater Services Pty Ltd, Henderson, WA

Acknowledgement

Portion of navigation chart Aus 81 reproduced by permission of the Hydrographic Office, RAN.

Narrative

Port of Geraldton

Shipping in the port of Geraldton is managed by two Harbour Masters, who work a routine of 10 days on duty and four days off duty. Each Harbour Master is off duty from Thursday to Sunday inclusive on alternate weeks. In addition to the normal, day to day duties of a harbour master, both Harbour Masters perform the pilotage duties for the port and both conduct draught surveys. A freelance relief pilot is usually available to assist in the pilotage duties during periods of leave.

The main export commodities loaded at the port are grain, mineral sand and livestock and, on average, 22 ships pass through the port each month.

The number of ships calling at Geraldton during the months of January and February of 1997 was relatively small, the grain berth was under reconstruction with a new loading system being installed and only a few vessels called to load mineral sand. However, the grain season had been a good one and the harvest was stockpiled, waiting for shipment. By the time the grain facility was re-opened on 26 February, there were a number of ships waiting at anchor, the total increasing to six within a few days of the re-opening. As the world grain prices were buoyant, there was a certain amount of pressure to get the ships loaded and away as quickly as possible.

The prevailing wind pattern for Geraldton during the summer months is for initial quite strong easterlies first thing in the morning, rising to 25 knots, veering to south-westerlies up to 35 knots in the late morning, early afternoon. For this reason, the Harbour Masters prefer to take ships into the port in the early morning, before the easterlies freshen to such an extent that they cause problems to the light draught vessels on the southerly heading of the inner reaches of the dredged channel.

On the morning of Monday 10 March, the Senior Harbour Master was injured on an outbound ship and was incapacitated. As the relief pilot was committed to relieving in other ports that week, the Junior Harbour Master had to handle operations alone and, to avoid becoming unduly tired, he restricted his hours of work to between 0600 and 2100.

Aikaterini L

Aikaterini L, a four hold bulk carrier, was built as the Keiyo Maru at Onishi, Japan in 1977. In 1994, the vessel underwent a third ownership change and was transferred to the Cypriot flag as the Aikaterini L. It has an overall length of 149.9 m, a beam of 22.92 m and a summer deadweight of 20,297 tonnes at a draught of 9.72 m. At the time of the incident, the vessel had a Greek master, a mixture of Greek, Russian, Estonian and Filipino officers and Filipino ratings.

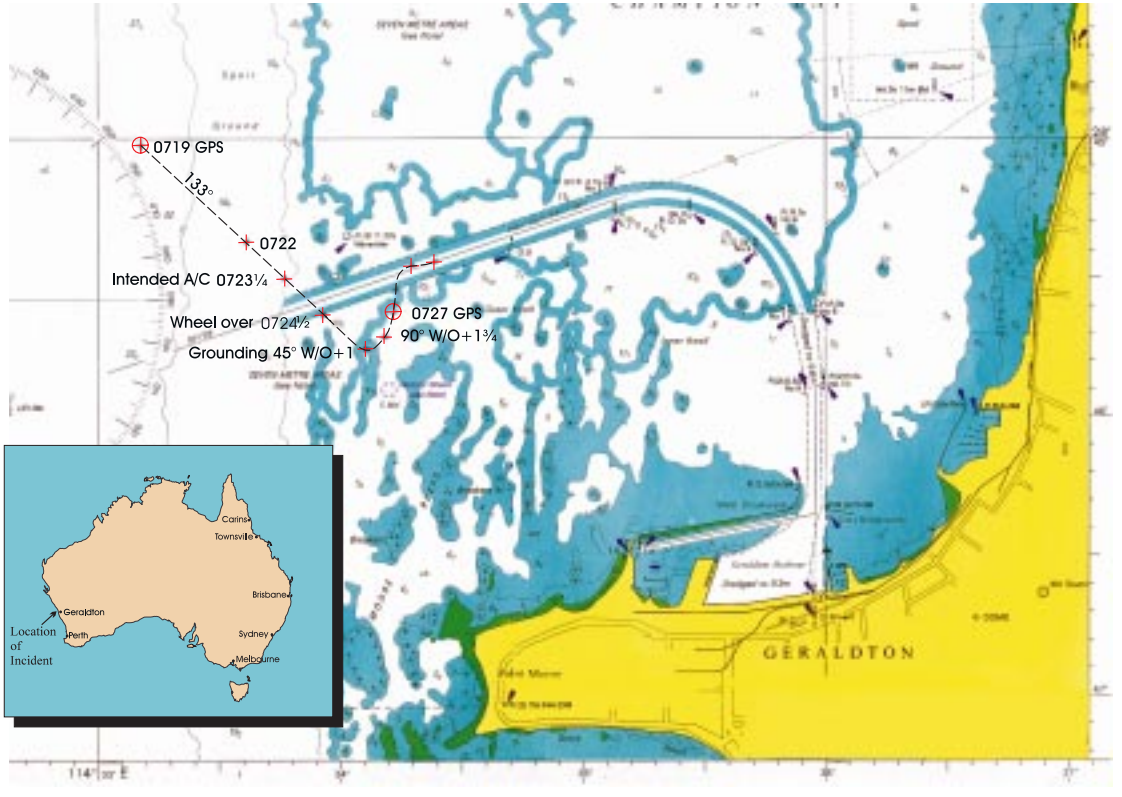
Aikaterini L sailed from Manila, where it had discharged a cargo of cement clinker, on 26 February 1997, and proceeded to Singapore for bunkers before continuing to Geraldton, where it was to load mineral sand and barley. The vessel arrived off Geraldton on the evening of 11 March, anchoring in a position 2¼ miles north-north-west of the Fairway Buoy at 2200.

The next day the Master received a telex message from the agent, informing him that the vessel would be berthing the following morning, the 13th, and that the Pilot would be boarding at 0700. In the evening he received a call from the Harbour Master on the VHF, confirming that he would be boarding at 0700, but that he would call again in the morning, to advise which side for the pilot ladder.

At 0615 on Thursday 13 March, the Harbour Master called the ship from his office, on VHF, confirmed that he would be boarding at 0700 and asked the Master to heave up the anchor. As the easterly wind was already freshening, he asked the Master to rig the pilot ladder on the starboard side and to head for the Fairway Buoy.

The Master immediately called the crew to anchor stations and the anchor was aweigh 0630. As the pilot ladder had already been prepared on the port side, as soon as the anchor was up and clear, at 0640, the Master brought the vessel around to a north-north-easterly heading. As soon as the Harbour Master had climbed to the deck, at a time logged as 0700, the Master ordered “hard to starboard”, to start bringing the ship around to head towards the south.

When the Harbour Master arrived on the bridge, he and the Master immediately recognised each other from the vessel's call at the port in December. After exchanging greetings and being advised that the wheel was on hard a starboard, the Harbour Master asked for "Full Ahead", then asked the Master if everything was in order and working properly, at the same time handing the Master the Port Authority's printed questionaire on the state of the vessel's equipment. The Master confirmed that everything was in order, then went to the chart table to complete the questionaire. The Third Mate stationed himself by the engine telegraph, to respond to orders and from where he could monitor the helmsman.



Portion of chart Aus 81 (1983 edition) showing reconstruction track of Akaterini L

The Harbour Master was concerned that the strengthening easterly wind would be a problem in the inner reaches of the channel, when the ship's speed would be reduced to four or five knots and the ship vulnerable to leeway and steerage problems. To save a little time, instead of taking a wide sweep towards the Fairway Buoy, he intended to cut in towards the Pimple Buoy, a small orange marker buoy on the north side of the channel entrance, and to make a tight turn to port around that buoy. He steadied the ship up on a south-easterly heading, with the Pimple Buoy fine to port and so as to pass it at a distance of about 300 m.

The Harbour Master stationed himself on the centre line, up against the bridgefront windows, while the Master stood to his left, to listen for orders and to see that they were carried out. As the vessel headed towards the Pimple Buoy, the Harbour Master asked the Master where the ship had been since sailing from Geraldton in late December.

To check on his bearings, the Harbour Master went to the port bridgewing to locate the channel leads. The sun, which had risen at 0620, was still reasonably low over the land, making it difficult to pick out the leads, the Harbour Master using a small “V” in the hills to locate the rear lead. Having located the leads, he returned to his position at the bridgefront windows.

At 0719, the Third Mate plotted the ship’s position on the chart, using the GPS derived position, which placed Aikaterini L eight cables (1480 m) from the entrance channel. However, he did not inform the Harbour Master that he had put the position on the chart.

Aikaterini L was approaching on line, with the Pimple Buoy about two points on the port bow, the Harbour Master’s intention being to start the alteration of course for the channel when the buoy was at four points on the bow. Suddenly, he realised that he had lost sight of the buoy, that it wasn’t where he expected it to be. From the relative position of the tugs, waiting in the channel by nos. 1 and 2 buoys, he felt that he must be south of the channel and immediately ordered “hard a port”. The vessel swung quickly and as the Harbour Master located the leading marks and the Outer Knoll Buoy, he realised the vessel was further to the south than he had thought. Well aware of the reef to the south of the channel, he knew that to go hard to starboard at that point would put the ship straight up on the reef. By maintaining the swing to port, he hoped to gain the channel.

Suddenly, when the ship had swung through about 45°, through east, a shudder went through the ship, followed by a second shudder a few seconds later. The Harbour Master ordered “Dead Slow Ahead” and the ship continued to make way and to swing to port. The vessel was quite close to the Pimple Buoy and the Harbour Master gave helm orders to stop the swing and to get the vessel back into the channel. The Master asked “Did we hit?” and the Harbour Master responded that he hoped not, that they had just closed the bottom, and both went to the port bridge wing from where they saw mud churned up in the wake.

After the ship had shuddered, the helmsman had remarked to the Third Mate that they must have run aground. The Third Mate recorded the time of telegraph order as 0725, then moved across to the port side, looked aft through the window, saw mud in the wake and reported the fact to the Master. He returned to stand by the telegraph, but then moved to the chart table and plotted a GPS derived position on the chart, recording the time as 0727. This position placed the ship 0.8 cables (148 m) to the south of the channel and 1.8 cables (334 m) inwards from the Pimple Buoy.

After observing the mud astern the Harbour Master returned to the wheelhouse, lined the ship up in the channel and called the tugs to come and make fast.

The rudder appeared to be functioning properly and the Chief Engineer informed the Master that there were no problems with the engine. However, as a precaution, with the tugs made fast, as soon as the ship passed between Nos. 1 and 2 buoys the Harbour Master took the ship to port, out of the channel, into the inner anchorage area. Here the engine was tested, working up to full manoeuvring rpm both ahead and astern, and the rudder tested hard over both to port and starboard. The Harbour Master asked the Master about the situation with the ballast tanks, and the Master informed him that all the ballast tanks were full, so there was no point in checking the soundings. They checked the surface of the water around the vessel and saw no visual indications of oil leaking from the bunker tanks.

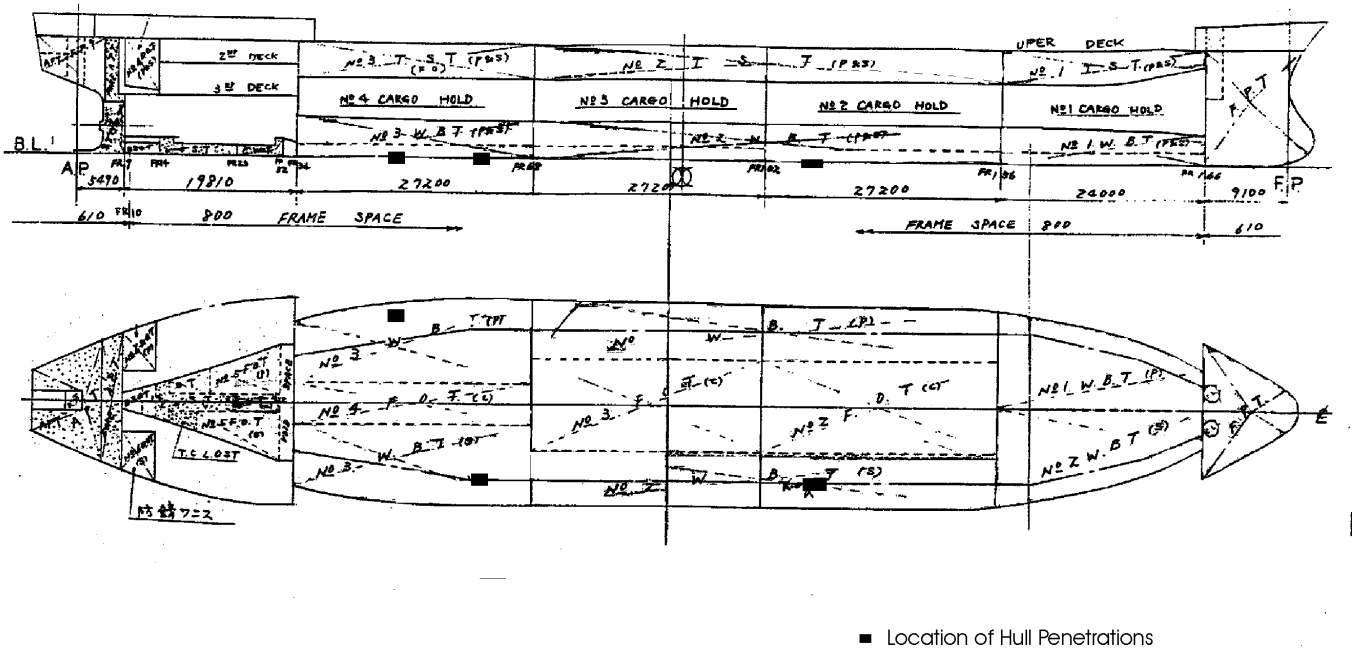
When the Master and Chief Engineer were both satisfied there were no mechanical problems, the Harbour Master manoeuvred the ship back into the channel and resumed the passage to the berth. The strength of the wind was now marginal for berthing, so the Harbour Master positioned one tug on each bow, to help keep the ship on course at slow speed. Before the ship entered the breakwater, the Harbour Master used his mobile telephone to contact the Harbour Office, to arrange for divers to be on hand to conduct an underwater survey as soon as the vessel was alongside.

The port entry and berthing proceeded without further incident and Aikaterini L was all fast at the loading berth at 0855. However, the initial inspection by the Port Authority divers revealed a small crack in both no. 3 port and no. 3 starboard double bottom ballast tanks. Also, the Chief Engineer reported that there was water in no. 4 double bottom fuel oil tank. Aikaterini L was therefore moved to a lay by berth, to undergo a more thorough underwater survey.

An underwater survey of the hull, conducted by Franmarine Underwater Services Pty. Ltd., confirmed the cracks in Nos. 3 port and 3 starboard double bottom tanks and also found a small crack plus a large, 2.7 m gash in no. 2 starboard double bottom tank. After temporary repairs had been carried out, Aikaterini L was permitted to sail in ballast on 19 March, in order to proceed to Singapore for permanent repairs.

Subsequent port operations

Due to the incapacitation of his colleague, the Harbour Master remained in sole charge of all port operations for a further seven weeks. All during this period the workload due to shipping movements was heavy, but he was able to call on the relief pilot on just two occasions.



General arrangement of Akaterini L showing location of bottom plate damage

Comment and Analysis

Reconstruction

It is apparent that Aikaterini L most probably made contact with the northern point of a rock ridge that lies 270 m to the south of the entrance channel and 480 m east-south-east of the Pimple Buoy.

The vessel's probable track was reconstructed from the two positions plotted on the chart, the vessel's manoeuvring diagram and the recorded time of grounding, 0725. Based on this reconstruction, Aikaterini L would have been at the alter course position, with the Pimple Buoy four points on the port bow, at 0722¾ and the wheel would have been put hard to port at 0724, when the vessel was on the southern boundary of the entrance channel.

The Pimple Buoy would have been two points on the port bow at about 0721½, about 1¼ minutes before the intended alteration of course.

Consideration of the cause of the late alteration

The Harbour Master stated that he was possibly distracted by conversation with the Master, discussing the vessel's movements since its previous call at Geraldton. However, the Master stated that this conversation had taken place earlier and that they were not talking as they approached the Pimple Buoy. The Master's statement was supported by those of the Third Mate and the helmsman.

It is therefore considered that the Harbour Master lost concentration and awareness for between 1½ and 2½ minutes.

The Harbour Master had returned to duty on the Monday morning, refreshed after four days rostered-off. However, he had risen at 0400 on the Monday morning, for an 0500 start, and had worked a 16½-hour day. On the Tuesday and Wednesday he had worked 11 hours and 13 hours respectively and had risen at 0500 on the Thursday (13th) morning, after a little under seven hours sleep, for an 0600 hours start.

Based on his hours of rest, it would be difficult to establish any significant sleep deprivation. However, when he boarded Aikaterini L, the Harbour Master had a slight sleep dept and, after only three working days, already had 40½ hours work behind him.

Under normal circumstances, the body's natural circadian rhythms could be expected to counteract any effects of this slight sleep dept. However, in combination with the long hours worked over the previous three days, with no periods of relaxation, it is possible the slight sleep dept, may have had a detrimental effect on his alertness.

It is considered probable that the Harbour Master's loss of concentration and awareness during the minute just before the course alteration point was reached may have been caused by the distraction of his thoughts moving to the other duties to be performed that day. However, as he felt that he had been distracted by the conversation with the Master, it is also possible his thoughts slipped into daydream, or reminiscent mode. In either case, the Harbour Master's eyes may have lost focus, causing him to lose sight of the Pimple Buoy, particularly once it came into the reflected glare of the sun. At this time the sun had an altitude of 12° and an azimuth of 086°, so the Pimple Buoy would have been in the reflected glare of the sun at the course alteration point.

Bridge Resource Management

When the Harbour Master recognised the Master as being the master on board on the previous visit, he did not think it necessary to discuss the port entry with him in detail, simply saying that it was the same berth as the previous visit and the same side alongside. For his part, the Master, from his experience of the previous visit, had full confidence in the Harbour Master and was content to let him take over the conduct of the vessel fully.

As the proposed entry plan was not discussed, neither the Master nor the Third Mate were aware that it was the Harbour Master's intention to go hard to port when the Pimple Buoy was bearing four points on the port bow. As a result, neither was in a position to monitor the Harbour Master's actions and draw his attention to the fact when Aikaterini L had passed the course alteration position without action being taken.

The Third Mate had plotted the vessel's position on the chart at 0719, at which time Aikaterini L was only 8 cables from the entrance channel. However, he did not lay off the vessel's course, nor did he measure the distance and calculate the time to the next course interception point. Had he followed these, what should be standard, procedures and kept the Master informed, the Master would have been in a position to monitor the situation and so realise the Harbour Master had not acted at the appropriate time.

Consideration of the Harbour Master's actions

Due to the increased workload occasioned by the incapacitation of his colleague, the Harbour Master sensibly restricted his working period to ensure that he obtained a reasonable amount of sleep, so as not to become exhausted.

When he suddenly realised that he had overshot his wheel-over position to alter course around the Pimple Buoy, to enter the channel, he instinctively ordered "hard a port". He was well aware of the shoals lying to the south of the channel and, because of these, he realised there was insufficient time to check the vessel's position.

This instinctive reaction was probably not only moulded by the fact that that was the direction of the entrance channel, but also by situational pressures. The Harbour Master had already cut closer to the Pimple Buoy, rather than make a wider approach, in order to save time, because of the increasing wind strength. There was also a pressure to get the ship alongside as early as possible, in order that the preloading hold inspections could be completed with as little delay as possible to the loading, the grain loading shift normally starting at 0700.

Under such circumstances, with doubt as to the vessel's actual position and with known restricted searoom directly ahead, an alteration of course to starboard, into known clear waters, to make a complete turn and make a new approach, would be more appropriate.

Conclusions

These conclusions identify the different factors contributing to the incident and should not be read as apportioning blame or liability to any particular organisation or individual.

Aikaterini L came in contact with a charted rock ridge to the south of the entrance channel after the Harbour Master overshot the intended alter-course position to the west of the Pimple Buoy.

The following factors are considered to have contributed to the incident:

1. A loss of concentration and awareness by the Harbour Master.
2. A reduced alertness on the part of the Harbour Master, due to the combined effects of his work regime and a slight sleep dept.
3. The Harbour Master's instinctive order of "hard a port" when he realised he had overshot the wheel-over position.
4. The pressures induced by the local environmental conditions and the local commercial climate.
5. The absence of Bridge Management procedures, as a result of which:
    i. the pilotage plan was not discussed;
    ii. the Master and Third Mate were not fully informed of the Harbour Master's intentions and so were unable to monitor his actions;
    iii. the Master and his officers had not drawn up their own pilotage plan and the vessel's progress was not monitored properly, so the overshoot was not recognised.

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 Harbour Master, Geraldton

The Master and Third Mate of Aikaterini L.

A written submission was received from the Harbour Master.

Details of Aikaterini L

Previous names	Kkeiyo Maru, Ionian Sailor, Tropeoforos
IMO No.	7610749
Flag	Cyprus
Classification Society	NK
Ship type	Bulk carrier
Owner	Nostrum Shipping Co. Ltd, Limassol
Operator	Geomar Shipping, Piraeus
Year of build	1977
Builder	Kurushima Dockyard, Onishi
Gross tonnage	11,866
Net tonnage	7,105
Summer deadweight	20,297 tonnes
Length overall	149.9 m
Beam	22.92 m
Draught (summer)	9.72 m
Engine	7 cylinder Mitsubishi diesel
Engine power	6841kW
Crew	25 (Greek, Russian Estonian officers, Filipino ratings)