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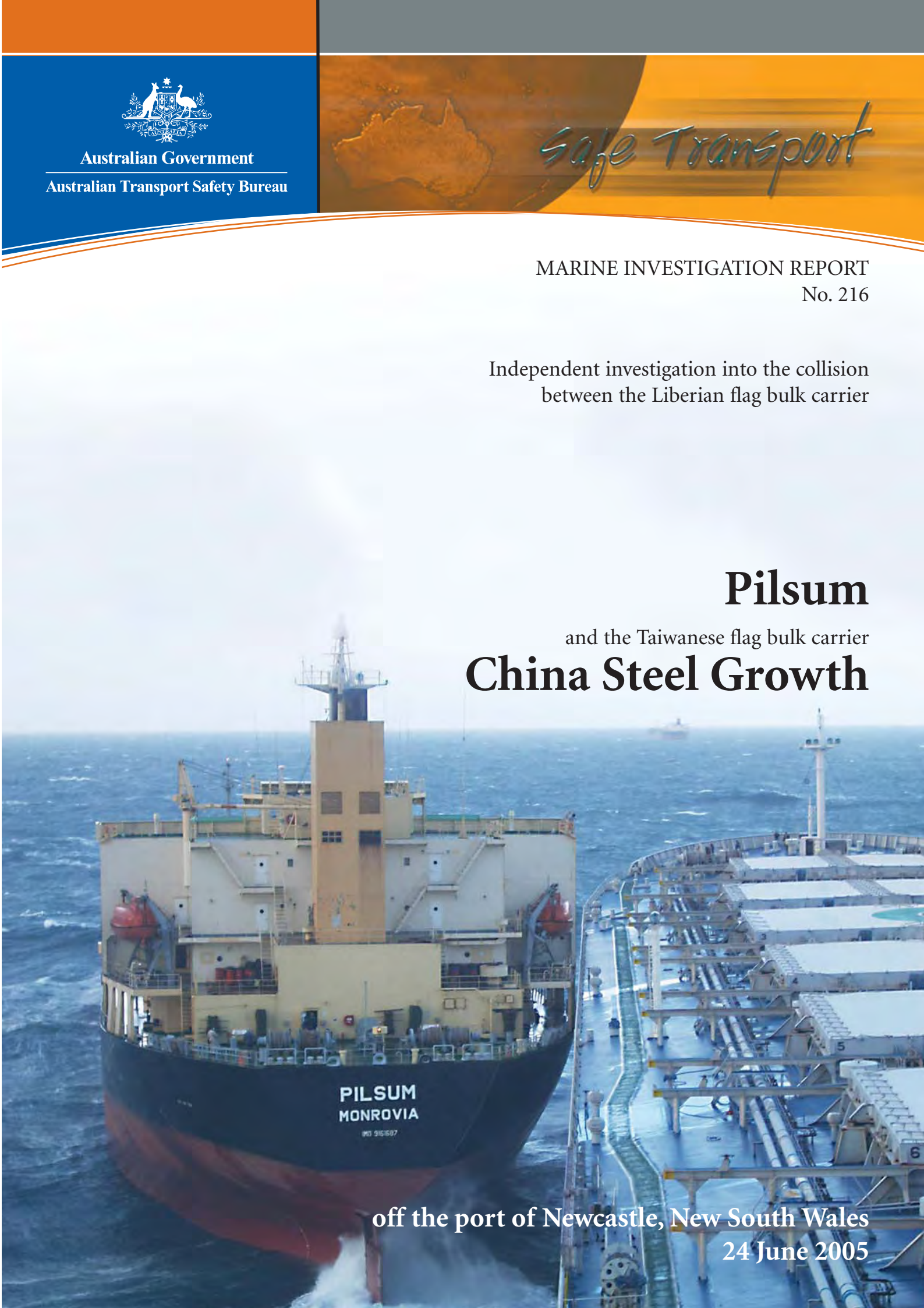
MARINE INVESTIGATION REPORT
No. 216

Independent investigation into the collision
between the Liberian flag bulk carrier

Pilsum

and the Taiwanese flag bulk carrier

China Steel Growth



off the port of Newcastle, New South Wales
24 June 2005

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MARINE SAFETY INVESTIGATION REPORT
No. 216

Independent investigation into the collision between the Liberian flag bulk carrier *Pilsum* and the Taiwanese flag bulk carrier *China Steel Growth* off the port of Newcastle, New South Wales

24 June 2005

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MEDIA RELEASE

Australian Government
Australian Transport Safety Bureau

Media Release

Bulk carriers collide in the anchorage off Newcastle, New South Wales

Anchoring too close to each other and without due regard to the changeable weather conditions in the anchorage off Newcastle were the major causes of the collision between two bulk carriers, according to an Australian Transport Safety Bureau (ATSB) investigation report released today.

The ATSB report into the incident states that at 0939 on 24 June 2005, the bulk carrier *Pilsum* collided with another bulk carrier, *China Steel Growth*, while dragging its anchor. The two ships were anchored off the New South Wales port of Newcastle.

On the morning of 24 June, a southerly weather front came through the anchorage. At 0900 on 24 June, the officer of the watch on *Pilsum* detected that the ship was dragging its anchor. The master was informed and he decided to weigh anchor and depart the anchorage.

Pilsum's crew encountered difficulties recovering the anchor. While trying to weigh anchor *Pilsum* drifted towards *China Steel Growth*, which was anchored to the north.

At 0935 *Pilsum* pitched heavily, the propeller came clear of the water and the main engine was shut down by the overspeed trip. *Pilsum*'s main engine was restarted, however at 0939 *Pilsum* collided with *China Steel Growth*. The two ships moved apart and made contact a second time before *Pilsum* finally made its way clear.

The report concludes that the ships in the anchorage off Newcastle on 24 June 2005 were anchored too close to each other. *Pilsum* did not have enough anchor cable laid out, and the officer of the watch did not fully utilise all available equipment while keeping the anchor watch.

The report also concludes that the advice to masters in the Australian Pilot publication does not sufficiently highlight the shortcomings of the Newcastle anchorage in adverse weather conditions.

Copies of the report can be downloaded from the ATSB's internet site at www.atsb.gov.au, or obtained from the ATSB by telephoning (02) 6274 6478 or 1800 020 616.

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Photographs of the collision courtesy of the crew on board *China Steel Growth* at the time of the incident.

Abstract

At 0939 on 24 June 2005, the bulk carrier *Pilsum* collided with another bulk carrier, *China Steel Growth*, while dragging its anchor. The two ships were anchored off the New South Wales port of Newcastle.

On the morning of 24 June, a southerly weather front came through the anchorage. At 0900 on 24 June, the officer of the watch on Pilsum detected that the ship was dragging its anchor. The master was informed and he decided to weigh anchor and depart the anchorage.

Pilsum's crew encountered difficulties recovering the anchor. During the anchor retrieval process *Pilsum* drifted towards *China Steel Growth*, which was anchored to the north.

At 0935 *Pilsum* pitched heavily, the propeller came clear of the water and the main engine was shut down by the overspeed trip. *Pilsum*'s main engine was restarted, however at 0939 *Pilsum* collided with *China Steel Growth*. The two ships moved apart and then made contact a second time before Pilsum finally made its way clear.

PREFACE

This report is the result of an independent investigation carried out by the Australian Transport Safety Bureau (ATSB). The ATSB is an operationally independent multi-modal Bureau within the Australian Government Department of Transport and Regional Services. The ATSB's objective is safe transport. It seeks to achieve this through independent investigation of transport accidents and other safety occurrences; safety data research and analysis; and safety communication and education.

The ATSB operates within a defined legal framework and undertakes investigations and analysis of safety data without fear or favour. Investigations, including the publication of reports as a result of investigations, are authorised by the Executive Director of the ATSB in accordance with the *Transport Safety Investigation Act 2003* (TSI Act).

ATSB investigations are for the sole purpose of enhancing transport safety. Consequently, Bureau reports are confined to matters of safety significance and may be misleading if used for other purposes. Reports released under the TSI Act are not admissible in any civil or criminal proceedings.

As the ATSB believes that safety information is of greatest value if it is passed on for the use of others, readers are encouraged to copy or reprint this report for further distribution, acknowledg¬ing the ATSB as the source.

1 SUMMARY

At 0939 on 24 June 2005, the bulk carrier *Pilsum* collided with another bulk carrier, *China Steel Growth*, while dragging its anchor. The two ships were anchored off the New South Wales port of Newcastle.

Weather at the anchorage was generally from the north northwest, until the morning of 24 June, when a southerly weather front came through. By 0800 24 June the wind was from the south, force eight (34 to 40 knots) with five to six metre seas.

At 0900 the officer of the watch on *Pilsum* detected that the ship was dragging its anchor. The master was informed and he decided to weigh anchor and depart the anchorage.

Pilsum's crew encountered difficulties recovering the anchor. The master made a number of rudder and engine movements to assist with weighing the anchor. During these manoeuvres *Pilsum* continued to drift towards *China Steel Growth*, which was anchored to the north.

At 0935 *Pilsum* pitched heavily, the propeller came clear of the water and the main engine was shut down by the overspeed trip. *Pilsum*'s main engine was restarted at 0937, however at 0939 *Pilsum* collided with *China Steel Growth*. The two ships moved apart then made contact a second time before *Pilsum* finally made its way clear under power.

Immediately after the collision each ship reported that they suffered only minor damage with no breaches of the shell plating. *Pilsum* also reported that it would be making its way to sea.

The report concludes that:

- The ships in the anchorage to the south of Nobbys Head on 24 June 2005 were anchored too close to each other.
- *Pilsum*'s master did not increase the scope of cable laid out.
- The advice to masters in the Australian Pilot publication does not sufficiently highlight the short comings of the Newcastle anchorage in adverse weather conditions.
- *Pilsum*'s third mate did not fully utilise all available equipment while keeping the anchor watch on the morning of 24 June.
- *Pilsum*'s drift towards *China Steel Growth* was arrested at 0927, when the two ships were 40 metres apart. It was not until the main engine oversped, that the drift resumed.
- *Pilsum*'s master and chief engineer did not adequately address the main engine's operational limitations due to the failed governor and the need to operate the main engine from the engine side emergency control stand.

The report recommends that:

- The Newcastle Port Corporation should consider a modification to the instructions given by the vessel traffic information centre to ships that intend anchoring off the port, with a view to increasing the clearing distances between ships in the anchorage.
- The Newcastle Port Corporation should consider modifying the advice contained in the Australian Pilot. This advice should highlight the risks associated with the Newcastle anchorage in adverse weather conditions.
- Ships' masters and crews formulate and implement plans that take into account equipment failures and other identified risks.

2 SOURCES OF INFORMATION

The master and officers of *Pilsum*.

The master and officers of *China Steel Growth*.

Newcastle vessel traffic information centre.

References

The International Convention for the Safety of Life at Sea, 1974, and its Protocol of 1988 (SOLAS), the International Maritime Organization (IMO).

Admiralty Sailing Directions, Australian Pilot Volume III, ninth edition 2002.

Guide to Port Entry, Shipping Guides Limited, 2005 / 2006 edition

The Theory and Practice of Seamanship – Graham Danton, eleventh edition 1996.

3 NARRATIVE

3.1 *Pilsum*

Pilsum is a Liberian registered, 'panamax'[1] sized bulk carrier (Figure 1). The ship is managed by Reederei F Laeisz GmbH of Rostock, Germany and classed with Det Norske Veritas (DNV).

Pilsum was built in 1997 by Sumitomo Heavy Industries in Yokosuka, Japan. The ship has an overall length of 225 m, a beam of 23.25 m and a depth of 19 m. It has a deadweight of 73 762 tonnes at its summer draft of 13.871 m.

The ship is of standard gearless bulk carrier design with seven cargo holds located forward of the accommodation superstructure.

Propulsive power is provided by a seven cylinder Sulzer 7RTA48T, single acting, direct reversing two-stroke diesel engine of 12 070 kW. The main engine drives a single fixed pitch propeller which gives the ship a service speed of 13.8 knots.

Figure 1: *Pilsum* berthed in Newcastle



Pilsum is equipped with navigational equipment consistent with SOLAS[2] requirements. This includes two radars, a JRC JMA-9000 three-centimetre, x-band radar and a JRC JMA-9000 ten-centimetre, s-band radar. The bridge is also fitted with a JRC JRL-7700mkII global positioning system (GPS) receiver, an electronic charting system (ECS) and an automatic identification system (AIS).

At the time of the incident, *Pilsum* had a crew of twenty two. The master and chief engineer were German. The chief mate and second engineer were Russian, the junior officers and engineers were Filipino and the crew were Kiribati nationals.

1 Size limited to the dimensions of the Panama Canal

2 The International Convention for the Safety of Life at Sea 1974 as amended, Chapter V

Pilsum's deck and engine room officers maintained a watchkeeping routine of fours hour on, eight hours off.

The master had 38 years seagoing experience and held a foreign-going master's certificate of competency, which was first issued in Germany in 1975. He had been master on *Pilsum* for six weeks and was completing his first swing on the ship.

The chief mate held a foreign-going chief mate's certificate of competency and had 14 years seagoing experience, the last four years as chief mate. He had been on board *Pilsum* for four months.

The third mate, the officer of the watch at the time of the incident, held a foreign-going third mate's certificate of competency and had 16 years seagoing experience. He had been on board *Pilsum* for six months.

The chief engineer held a first class certificate of competency and had 29 years experience at sea, the last 11 years as chief engineer. He had been on board *Pilsum* for six weeks.

3.2 *China Steel Growth*

China Steel Growth is a Taiwanese registered 'cape-sized'[3] bulk carrier (Figure 2). The ship is owned and managed by China Steel Express, Taiwan, and is classed with Lloyds Register of Shipping (LR).

China Steel Growth was built in 2001 by China Shipbuilding Corporation, Kaohsiung, Taiwan. The ship has an overall length of 289 m, a beam of 45 m and a depth of 24.1 m. It has a deadweight of 175 775 tonnes, at its summer draft of 17.8095 m.

The ship has nine cargo holds located forward of the accommodation superstructure.

Propulsive power is provided by a six cylinder MAN B&W 6S70MC, single acting, direct reversing two-stroke diesel engine of 21 800 kW. The main engine drives a single fixed pitch propeller which gives the ship a service speed of 14.8 knots.

Figure 2: *China Steel Growth* berthed in Newcastle



3 Dimensions larger than that allowable for transit of the Panama Canal

China Steel Growth is equipped with navigational equipment consistent with SOLAS requirements. This includes two radars, a Tokimec BR 3440MA-X27 three-centimetre, x-band radar and a Tokimec BR 3440MA-S314 ten-centimetre, s-band radar. The bridge is also fitted with an electronic charting and display information system (ECDIS), GPS and AIS.

At the time of the incident, *China Steel Growth* had a crew of 16, all Taiwanese nationals. All of the ship's officers held certificates of competency issued in Taiwan.

The deck officers maintained a watchkeeping routine of four hours on, eight hours off. The engineers followed a 24 hour duty roster with the engine room un-manned outside normal working hours.

The master held a foreign-going master's certificate of competency, and had 30 years seagoing experience, the last 16 years in command. He had been master of *China Steel Growth* for two months and was completing his first tour of duty on the ship.

The chief mate held a foreign-going master's certificate of competency and had 14 years seagoing experience, the last four years as chief officer. He had been on board *China Steel Growth* for four months.

The third mate, the officer of the watch at the time of the incident, had held a foreign-going third mate's certificate of competency for two years. He had been onboard *China Steel Growth* for six months.

3.3 Newcastle

Newcastle is located at a latitude of 32° 56′ S, on the east coast of New South Wales, Australia. Newcastle is predominantly a bulk cargo port, with coal making up approximately 90 percent of all cargo movements. Coal exports from Newcastle currently exceed 71 million tonnes per anum .

Ships arriving off Newcastle are required to give 24 hours notice of their arrival to the vessel traffic information centre (VTIC). The ship's arrival time is then confirmed four hours prior to arrival off the port. At this time, VTIC requests ships that intend to anchor do so at the master's discretion, south of latitude 32° 58′ S and at least two nautical miles from the coast.

The anchorage off Newcastle provides reasonable holding ground in fair weather but is exposed, and subject to pronounced swells, particularly from the south. Depths in the anchorage vary between 30 and 50 metres.

The Newcastle VTIC monitors ships at anchor and broadcasts regular weather reports and warnings via VHF radio and provides an information service for ships at anchor. Newcastle VTIC records all vessel traffic system (VTS) information, including VHF radio communications on channels nine and 16 and the radar surveillance system (Figure 3).

When a ship reports that it is anchored, VTIC marks the ship's position on the VTS and sets an alarm that annunciates if the ship moves more than half a nautical mile from its initial reported anchoring position. This alarm setting makes allowances for

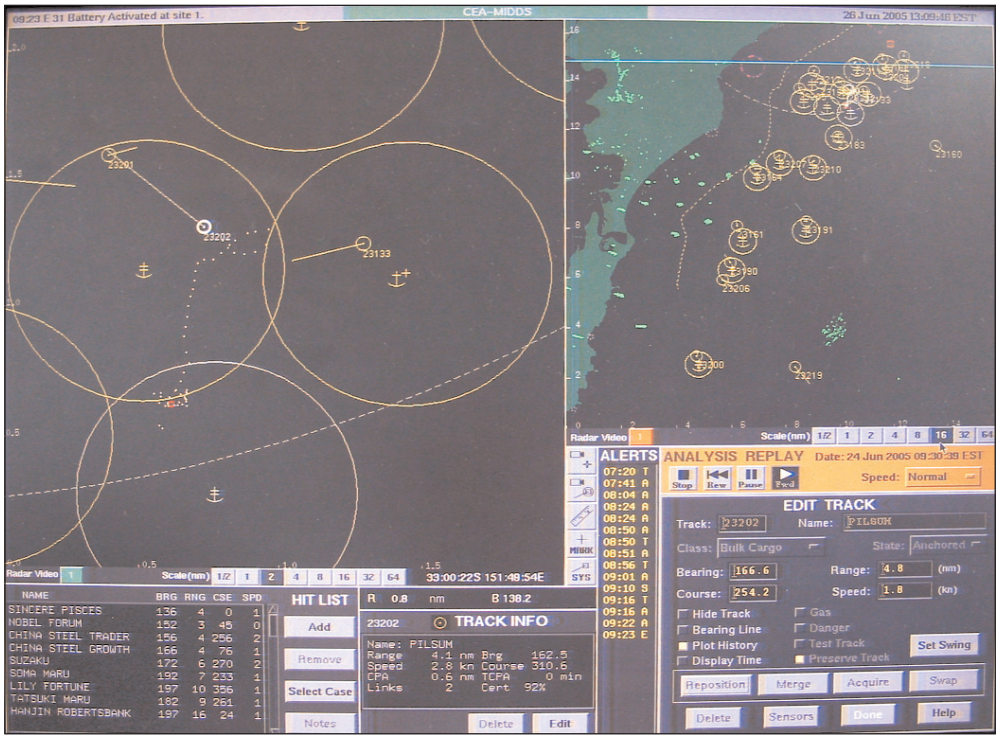
4 Inquiry into port infrastructure, New South Wales, June 2005

the ship's swing radius and is used as an indication that the ship may be dragging its anchor.

In the anchorage off Newcastle it is common for ships to anchor in a relatively small area just south of 32° 58′ S. Ships anchor as close as possible to the pilot boarding ground to minimise any inconvenience if their pilot boarding is delayed.

On 24 June there were 10 ships anchored in the vicinity of *Pilsum* in the anchorage to the south of Nobbys Head (Figure 4). There were another nine ships anchored further south. In all, VTIC was monitoring 19 ships anchored to the south of Nobbys Head.

Figure 3: Vessel traffic information centre radar surveillance screen



3.4 The Incident

3.4.1 *Pilsum*'s arrival

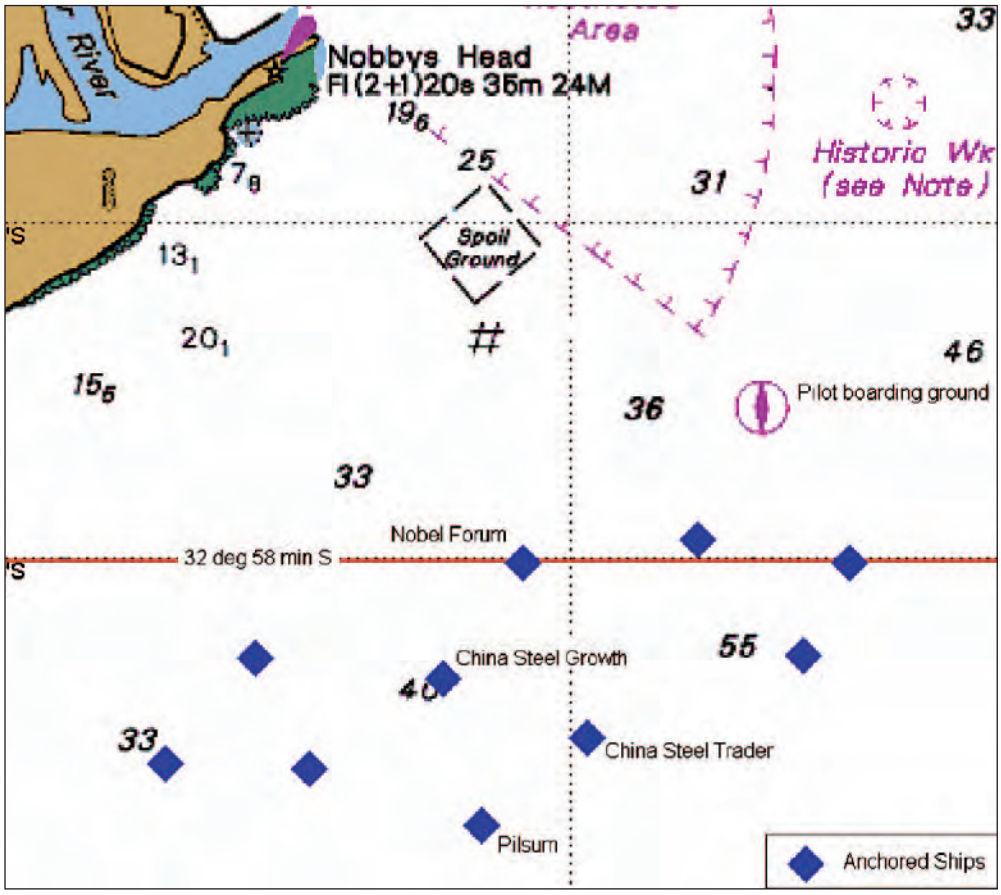
Pilsum arrived off Newcastle at 0530 on 16 June 2005 after a voyage from the port of Ho Ping in Taiwan. The ship had de-ballasted prior to arrival at the anchorage and was due to load a cargo of coal for export to Port Kelang in Malaysia. The arrival draughts were 3.95 metres forward and 6.80 metres aft. The master expected that the ship would be at anchor for at least a week.

The ship anchored in approximately 45 metres of water using the port anchor and eight shackles[5] of cable, a scope[6] of 4.89. The anchoring position was with Nobbys Head Lighthouse bearing 345°(T) at a range of 4.6 nautical miles (Figure 4). When brought up, *Pilsum* was more that one nautical mile clear of the nearest anchored vessel.

5 One shackle equals 27.5 metres.

6 Ratio of cable length to water depth (scope = length of anchor cable ÷ depth of water).

Figure 4: Ships anchored near *Pilsum* on the morning of 24 June 2005



The deck and engineering officers maintained sea watches while the ship was at anchor. In the succeeding days the bridge watch keepers used GPS, ECS and radar ranges and bearings from Nobbys Head Lighthouse to monitor the ship's position.

The weather at the anchorage in the days leading up to 24 June was variable and up to force eight (34 to 40 knots), mostly off the land, from the west-northwest. No significant swells were recorded during this time.

On 19 June, the master gave permission for the main engine to be disabled to allow for the overhaul of number seven piston. On completion of this maintenance, the engine was tested. During the test the engine failed to start when operated from the engine control room. On examination, the problem was traced to the failure of the main engine's governor actuator. The fault could not be rectified immediately, as there was no spare actuator on board. Consequently the main engine was operated from the engine side emergency control stand and the engine test was completed successfully. The main engine remained ready for use in this emergency mode.

The master requested the ship's managers supply a replacement actuator. On 24 June, the ship's managers informed the master that the new part would be supplied on 27 June, after the ship had berthed in Newcastle.

3.4.2 *China Steel Growth*'s arrival

China Steel Growth arrived off Newcastle, at 1724 on 22 June 2005 after a voyage from Kimitsu in Japan. The ship had de-ballasted prior to arrival at the anchorage and was due to load a cargo of coal for export.

The ship anchored in approximately 40 metres of water using the port anchor and eight shackles of cable, a scope of 5.50. Its final anchored position was with Nobbys Head Lighthouse bearing 345°(T) at a range of 3.8 nautical miles. *Pilsum* and another China Steel Express vessel, *China Steel Trader*, were the closest ships to *China Steel Growth* in the anchorage. These three ships were nine cables[7] clear of each other (Figure 4).

The deck officers maintained sea watches while the ship was at anchor, using GPS, ECDIS, radar and range and bearings from Nobbys Head lighthouse to monitor the ship's position. The engineers maintained their normal duty roster.

The chief engineer had previous experience at the Newcastle anchorage and consequently, any engine room maintenance was limited to minor repairs and cleaning duties during the ship's time at anchor.

3.4.3 The morning of 24 June 2005

During the night of 23 June 2005, the weather off Newcastle was mainly from the west northwest. A wind speed of 10 to 20 knots was recorded at Nobbys Head, and confirmed in both ships' log books. It was cloudy with occasional passing rain showers and visibility was seven to eight miles.

By 0330 on 24 June, a predicted weather front was approaching. The wind direction had started to shift to the south, and the wind speed was increasing. By 0500, the wind was from the south at 25 to 35 knots and the sea was increasing. This change in the weather was now causing the ships to yaw around their anchored positions, describing an arc of some 360 metres.

At 0800 on the morning of 24 June, the third mates on board both *Pilsum* and *China Steel Growth* took over the anchor watches on their respective ships. At this time, the wind speed was recorded at Nobbys Head as 30 to 40 knots. Both *Pilsum* and *China Steel Growth* recorded the weather at 0800 as southerly, force eight (34 to 40 knots) with five to six metre seas. Both ships were maintaining their position relative to each other and Nobbys Head.

At about 0800, VTIC issued the following weather warning via VHF radio.

> 'Winds south southeast 30-40 knots easing to 20-30 knots later in the day. Seas three - four metres abating to two - three metres. Swell south southeast three metres.'

Pilsum

At 0821 *Pilsum*'s anchor broke out and began to drag. The anchor dragged for five minutes before it took hold. At the time the third mate did not notice that the ship had drifted one and a half cables. The ship yawed around this position for the next 29 minutes and at 0855 the anchor broke out again and the ship started to drag.

At about 0900 *Pilsum* lurched suddenly and started rolling. The chief mate thought the rolling was more pronounced than that which they had been experiencing, and he made his way to the bridge to investigate. At the same time, the third mate noticed a change in the ship's position on the GPS. He telephoned the master and informed him that he believed the ship was dragging its anchor (Figure 5).

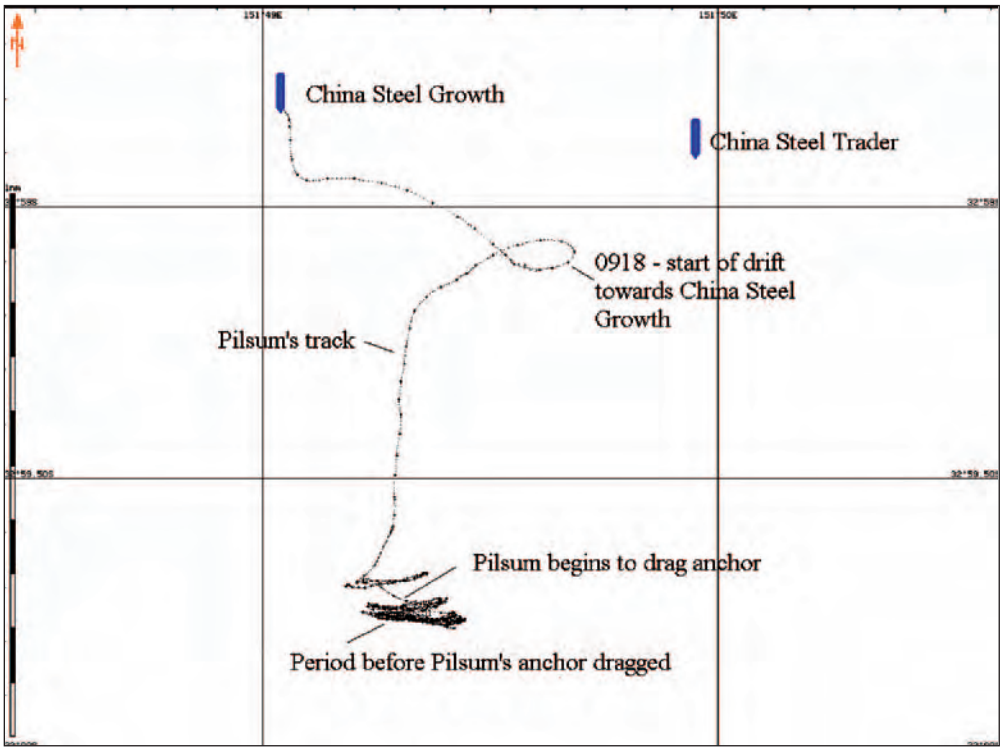
7 One cable = 185 metres.

The master immediately came to the bridge. He checked the ship's position and confirmed that the ship had dragged its anchor. With the ship dragging its anchor and the weather deteriorating the master decided to weigh anchor and depart the anchorage.

At 0900 the chief engineer was informed that the main engine was needed for manoeuvring as soon as possible. The engine room was already on ten minutes notice for engine readiness. The main engine was ready for manoeuvring at 0905, and at 0906 the main engine was started and run at dead slow ahead.

At 0907 VTIC notified *Pilsum* that it appeared the ship was dragging its anchor. The third mate replied, informing VTIC that the ship was weighing anchor and departing the anchorage. The master's intention was to take the ship to sea where he planned to drift until the weather moderated.

Figure 5: ECS printout of *Pilsum*'s track between 0800 and 0941 on 24 June



The boatswain and two seamen were sent to the forecastle, and at 0913 the master gave the order to weigh anchor. The ship was beam on to the wind, lying in an easterly direction. As a result of this, the port anchor cable was leading to starboard across the ship's bulbous bow, and there was too much weight on the cable for the windlass to recover it. To assist in the recovery of the anchor cable, the master rang full ahead on the main engine and put the helm hard to starboard. This manoeuvre brought the ship's head into the wind. It also had the effect of causing the ship to drift to the northeast, towards *China Steel Trader*, which was now only three cables off the port quarter.

Recovery of the anchor cable continued, and at 0918 with *Pilsum* now heading into the wind and the north-easterly drift arrested, the master reduced the main engine speed to half ahead.

At this point, *Pilsum* still had five shackles of anchor cable in the water. As the crew continued to recover the cable, the ship started moving in a north-westerly direction. The ship was now moving away from *China Steel Trader* and towards *China Steel Growth*.

Between 0920 and 0927, the master made a number of main engine and rudder movements to assist with retrieving the anchor cable and to move *Pilsum* away from *China Steel Growth*. Despite these movements *Pilsum* continued to close on *China Steel Growth*.

At 0927, *Pilsum* had recovered all but two shackles of cable. The master estimated that *Pilsum* was approximately 40 metres ahead of *China Steel Growth*, which was now on its starboard quarter. The master rang full ahead on the main engine in an attempt to increase the distance between the two ships. The main engine was now starting to arrest the ship's astern movement.

At 0935, *Pilsum* pitched heavily, causing its propeller to partially clear the water. The sudden decrease in propeller load caused the main engine revolutions to rapidly increase until the engine was shutdown by the overspeed trip.

Pilsum's chief engineer went about resetting the main engine overspeed trip, a process that would take approximately two minutes. Resetting involved bringing the engine side control to the stop position, aligning the bridge and engine control room telegraphs at stop and then pushing the reset button, located on the engine control room console. When this was completed, the bridge was telephoned and informed that the engine was now ready to be restarted. The engine was restarted at 0937. While the main engine was being reset, the ship drifted closer and closer to *China Steel Growth*.

Although *Pilsum*'s engine was now running at full ahead the ship continued to move astern, towards *China Steel Growth*.

China Steel Growth

The weather and sea conditions at 0800 prompted the chief mate on board *China Steel Growth* to remain on the bridge with the third mate. The master joined them at 0830, and at 0850 the chief mate left and went to his cabin. The master remained on the bridge with the third mate.

At about 0920, the master noticed that *Pilsum* was having difficulties and was moving closer to his ship. He made an emergency announcement on the ship's public address system, alerting his crew to the situation. He contacted the engine room and notified the chief engineer that the main engine was needed for manoeuvring. The engine room was already on a half hour's notice for engine readiness. It was the master's intention to let out more anchor cable and run the main engine astern to increase the distance between his ship and *Pilsum*.

The chief mate, carpenter, boatswain and one seaman went to the forecastle. They tried disengaging the windlass motor in an attempt to pay out more anchor cable but were unable to. The load on the cable made this impossible. Under instruction from the master, they began walking the anchor cable out under power.

The main engine was ready at 0930. The engine was started at 0931 and run at dead slow astern. The master also used the ship's whistle to enquire as to *Pilsum*'s intentions, by sounding five short blasts.

At 0938, with the two ships only 20 metres apart, the master made VHF radio contact with *Pilsum* and requested that they use their main engine to keep clear of his ship. He received only a garbled reply.

As *Pilsum* approached, the crew on the forecastle stopped walking out the anchor cable. They put the windlass on the brake and cleared the forecastle. At this time *China Steel Growth* had 11 shackles of anchor cable in the water.

The collision

At 0939, the two ships collided. *Pilsum*'s starboard midship section at deck level, just aft of number five hatch, made contact with the port side of *China Steel Growth*, just aft of the forecastle (Figures 6 & 7).

Figure 6: First contact on *China Steel Growth* (damage to shell plating)



Figure 7: First contact on *Pilsum* (bent railing)



As the two ships separated, *Pilsum*'s engine finally started to arrest the astern movement of the ship. However, at 0941 the ships touched again. *Pilsum*'s accommodation superstructure contacted *China Steel Growth* abreast of number four hatch (Figure 8).

At 0942 *Pilsum*'s anchor was clear of the water. The anchor was brought home and made secure. The ship now started to make head way, and began to move clear of *China Steel Growth* (Figure 9).

As *Pilsum* cleared *China Steel Growth*, both masters reported the incident to VTIC. Each reported only minor damage and no breeches of the hull plating. *Pilsum* also reported that it would be making its way to sea.

Pilsum and *China Steel Growth* berthed in Newcastle on 25 June and 27 June respectively. The damage to both ships was assessed, and while it was not seen as serious, conditions of class were imposed on the ships by their respective classification societies.

Both ships completed loading as scheduled and sailed on time.

Figure 8: Second contact between the two ships



Figure 9: *Pilsum* clearing *China Steel Growth*



4 COMMENT AND ANALYSIS

4.1 Evidence

On 25 June 2005, marine investigators from the Australian Transport Safety Bureau (ATSB) attended *Pilsum* in Newcastle. The master and officers were interviewed and provided accounts of the incident. Copies of relevant documents were obtained including: log book entries, pilot card, various procedures and statutory certificates.

Data from the vessel's ECS for the relevant day was downloaded and used in the analysis of the incident.

On 26 and 28 June, the investigators attended the Newcastle vessel traffic information centre. All relevant VTS information was recorded and used in the analysis of the incident.

On 27 June, ATSB attended *China Steel Growth*. The master and officers were interviewed and provided accounts of the incident. Copies of relevant documents were obtained including: log book entries, pilot card, various procedures and statutory certificates.

4.1.1 Times

The times that were recorded on both *Pilsum* and *China Steel Growth*, and those from the vessel traffic information centre VTS information were inconsistent. None of these times were found to be accurate when compared to local time (UTC +10).

For example *Pilsum* recorded that the initial collision occurred at 0940, *China Steel Growth* recorded this same event as occurring at 0935. From analysis of the available evidence, it is concluded that the initial collision between the ships occurred at 0939 on 24 June 2005.

The times referred to in this report are local time. Times received from all sources have been corrected to this datum.

4.2 The anchorage

The Newcastle anchorage is exposed to pronounced swells, particularly from the south, and no anchorage off the port is recommended as being suitable for all weather use. It would therefore appear inappropriate for masters to choose to anchor large bulk carriers at minimum drafts in such close proximity.

Instances of vessels dragging their anchors in heavy weather are not unusual in the anchorage off Newcastle. Similar events have been investigated previously by the ATSB. While investigating this incident it was discovered that between 0800 and 0930 on 24 June, at least 11 ships were advised by VTIC that it appeared that they were dragging their anchors. A number of these ships weighed anchor and departed the anchorage, and indeed one of the departing ships nearly collided with an anchored ship.

The notes in the 'Australian Pilot' with regard to the anchorage off Newcastle (below) would not necessarily raise any alarms with a master with little experience of the Newcastle anchorage.

> Whilst no anchorage off the port can be recommended as suitable for all weather use, good fair weather anchorage can be found ….

Had the notes been more appropriate, such as those in the 'Guide to Port Entry' (below), *Pilsum*'s master may well have made quite different decisions during the ship's time at anchor.

> A good anchor watch should be maintained and main engines should not be dismantled whilst at anchor. Weather conditions may deteriorate in a very short period. During southerly weather, sea and swell conditions may become confused. Vessels at anchor should weigh and proceed to sea until the weather moderates.

All ships trading in Australia are required to carry the 'Australian Pilot' publication. It is therefore most important that the information contained in this publication is clear, and that it provide adequate warnings of all well known dangers.

The ships in the vicinity of *Pilsum* on 24 June, were anchored with clearing distances of between six and 14 cables. The average clearing distance between these ships was nine and a half cables. *Pilsum* and *China Steel Growth* were anchored with a clearing distance of nine cables (1760 metres).

It is important to note that *Pilsum* had initially anchored with a clearing distance in excess of one nautical mile from the nearest anchored ship. It was *China Steel Growth* and *China Steel Trader* who anchored in close proximity to *Pilsum*.

The Newcastle VTIC does not determine where individual ships anchor when they are outside the port limits. However, a modification to the instructions given to ships that intend anchoring off the port, reinforcing written warnings regarding local weather conditions and their effects on the anchorage, could well influence masters to anchor their ships with greater clearing distances.

Some ports in Australia have designated anchoring positions marked on the navigation chart for the port. In these cases the anchorage is usually within the port limits. This may not be feasible off Newcastle, where there are generally a large number of ships anchored over a wide area. However, the Newcastle VTIC should investigate the various possibilities, and formulate procedures that have the effect of increasing the clearing distances between ships in the anchorage.

4.3 Anchoring

Anchors provide maximum holding power when the cable is pulling horizontally at the anchor shank. The efficiency of the anchor is reduced significantly as the angle between the cable and the shank of the anchor increases. A rule of thumb is that a pull of 5° above the axis of the anchor shank reduces the holding power by 25 per cent and a pull of 15° reduces the holding power by 50 per cent[8]. It is therefore important that sufficient anchor cable is deployed to allow the cable to lie along the seabed before the anchor shackle (connecting the cable to the anchor shank).

In relation to the scope of cable required, the admiralty recommends the following lengths, which should be regarded as the minimum for calm weather and a five knot stream[9].

8 Danton's, The theory and Practice of Seamanship, eleventh edition.

9 Danton's, The theory and Practice of Seamanship, eleventh edition.

Length of forged steel cable = 28 x √Depth of water

In *Pilsum*'s case the following calculations would therefore apply.

Minimum admiralty recommendation = 28 x √45 metres
= 188 metres
= 6.8 shackles

The following variables should be considered when deciding on the scope of cable required at an anchorage.

- The nature of the holding ground.
- The swing room available for the ship as the wind or stream change direction.
- The degree of exposure to bad weather.
- The strength of the stream and / or wind.
- The duration of the stay at anchor.

As ships at anchor off Newcastle are often there for a week or more, and the anchorage is exposed to both wind and seas, it is fair to say that these criteria need to be given sufficient weight when deciding on the amount of cable to lay out. *Pilsum*'s master laid out eight shackles of anchor cable. While this is more than the minimum recommended it may have been prudent to lay out more anchor cable given the length of stay and the variety of weather conditions encountered at the anchorage.

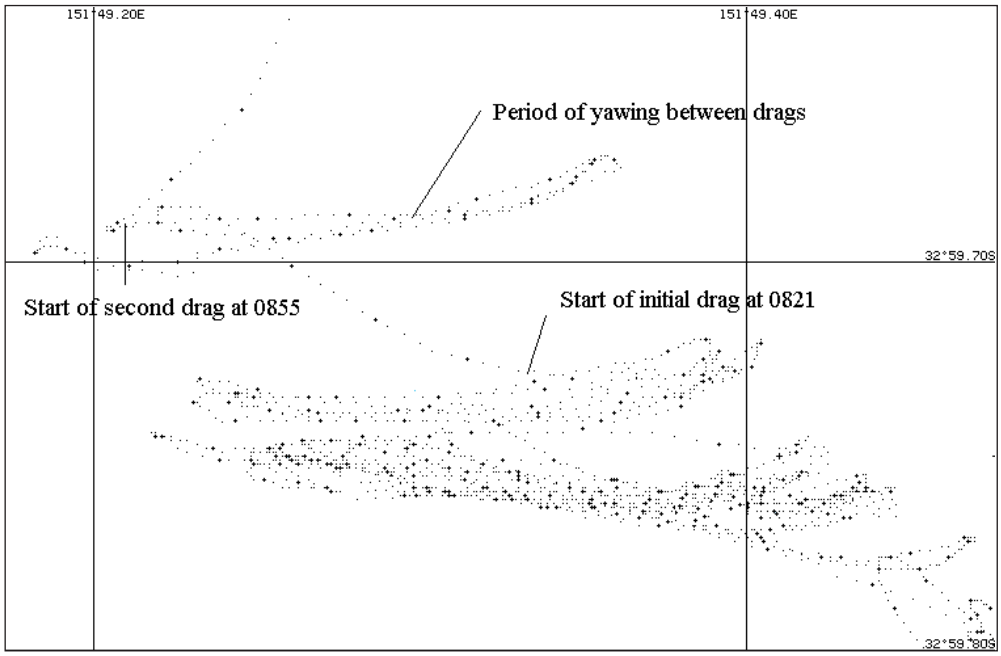
During *Pilsum*'s time at anchor there were considerable variations in weather, wind and sea conditions. The master had regular weather reports via both the on board weather fax system and VTIC. He had a number of opportunities both on and before 24 June, to increase the scope of cable. It would have been prudent in these circumstances to increase the amount of cable laid out.

4.4 *Pilsum*'s anchor watch

Analysis of *Pilsum*'s ECS backup gives some insight into the events that occurred prior to 0900 on 24 June, events which were not detected by the third mate. Had the third mate detected the early changes in the ships position it would have given the crew an extra 40 minutes with which to weigh the anchor and avoid the collision with *China Steel Growth*.

It is evident from the ECS printout (Figure 10) that the ship first dragged its anchor at 0821. This initial drag lasted for 5 minutes and, during this time, *Pilsum* had moved approximately 150 metres to the northwest. For the next 29 minutes the ship yawed over an area of about 50 metres. At 0855, the anchor broke out again and the ship started to drag.

Figure 10: *Pilsum*'s ECS print out



Good watch keeping practices require all available navigational equipment to be fully utilised. The evidence indicates that the third mate was not fully utilising or cross checking the ECS. If the third mate had been monitoring the ECS more closely, the early changes in the ships position would probably have been detected.

If the third mate had detected the early changes in *Pilsum*'s position, and informed the master of the changes, the master would have had more time to take appropriate actions. Given more time and distance it is likely that the two ships would not have collided.

4.5 The master's decision making

It had been 28 years since *Pilsum*'s master had been to Newcastle and consequently many of his decisions were made based on the information provided in the 'Australian Pilot' publication and by the Newcastle VTIC.

On 19 June he agreed to the chief engineer's request to disable the main engine for the day to allow for the overhaul of number seven piston. The weather report was favourable, however, the evidence indicates that no one on board *Pilsum* considered the nature of the Newcastle anchorage and the possible need to use the main engine manoeuvring during this maintenance period. There is always a risk of something going wrong during main engine maintenance, and if this had been the case, the ship may have been without propulsion for a considerable period of time.

Even with the changing weather reports the mater made no decision to increase the scope of anchor cable laid out.

It would appear that the master had formed a 'safe' mindset, and that this mindset continued throughout the days at anchor prior to 24 June.

There is evidence that he made some risk assessments. He had considered the changing weather conditions and reduced the notice for main engine readiness

from 30 to 10 minutes in the evening of 23 June. He also assessed the situation after the ship dragged its anchor on the morning of 24 June.

By the time the master had determined that *Pilsum* was dragging its anchor, he had a number of courses of action to consider. These included:

- pay out more anchor cable,
- let go the other anchor,
- slip the anchor cable,
- weigh anchor and depart the anchorage, and,
- monitor the situation and drag through the anchorage.

At no time did the master consider paying out more anchor cable in an attempt to arrest the drag. He did not perceive that this course of action was an alternative, and it was not raised as a possibility by any of the bridge team. Letting out more anchor cable may have enabled the anchor to bite and arrest the drift. If this had been effective the master would have bought himself time in which to address the situation. It should also be noted that the resistance offered by cable is only about three quarters of its weight, and there is thus no point in laying out more cable than is necessary.

The master did not consider letting go the second anchor. While letting the anchor go may have slowed the drift of the ship, the two anchors may have tangled causing even more problems. It is worth noting that about 20 minutes before the collision the ship did make a clockwise swing.

The master deduced that it would not be possible to drag through the anchorage. He looked at *Pilsum*'s likely track and assessed that the ship would have cleared *China Steel Growth* and *China Steel Trader*. However another ship, *Nobel Forum*, was further to the north. The master considered that this ship posed a risk of collision (Figure 4).

After deciding to weigh anchor, problems were encountered that the master did not foresee. He did not consider slipping the anchor. Slipping the anchor would be considered an extreme action in these circumstances, and one that would have taken a considerable amount of time. It is unlikely that *Pilsum* could have slipped its anchor in time to avoid making contact with *China Steel Growth*.

Since the master only considered two options, and one of those he had deemed as not feasible he was left with no choice but to weigh anchor and depart the anchorage.

4.6 *Pilsum*'s main engine overspeed

Under normal operating conditions the main engine is operated from the engine control room, with instruction from the bridge via a telegraph. The governor controls main engine revolutions.

On 24 June, the main engine could not be controlled in the normal manner, due to the failure of the governor actuator. Consequently the engine was operated from the engine side emergency control stand.

The master and chief engineer discussed the failure of the governor prior to 24 June. The master was aware that the main engine would be operated from the engine side emergency control stand until such time that a replacement actuator was supplied and fitted. There was however, no evidence to suggest that the master and chief engineer had discussed the limitations associated with operating the main engine from the engine side emergency control stand. They made no attempt to factor in a safety margin by limiting the maximum main engine revolutions available during manoeuvring.

When a main engine such as *Pilsum*'s is operated from the engine side emergency control stand, the engine revolutions are controlled by the fuel lever setting. The fuel lever is controlled manually by the operator. In conditions where the ship is pitching heavily and the top of the propeller blades are approaching the water surface or even clearing it, the main engine revolutions fluctuate due to the changing load transmitted to the engine by the propeller. The operator controls the fluctuations in engine speed by continually adjusting the fuel lever setting. Sometimes, however, the propeller will lift sufficiently clear of the water and cause the engine revolutions to increase at a rate that cannot be controlled by the operator. When this occurs the engine will overspeed and be shutdown by the overspeed trip.

On 24 June, *Pilsum*'s main engine shut down under these circumstances. The failure of the governor was a direct contributing factor in the engine shutdown. The master and chief engineer did not have a plan in place that included limiting maximum main engine revolutions during manoeuvring to a speed lower than full ahead. Had such a plan been in place the likelihood of a main engine overspeed may have been reduced.

It is possible that the two ships may not have collided if *Pilsum*'s main engine had not shut down at the critical time when the two ships were only 40 metres apart.

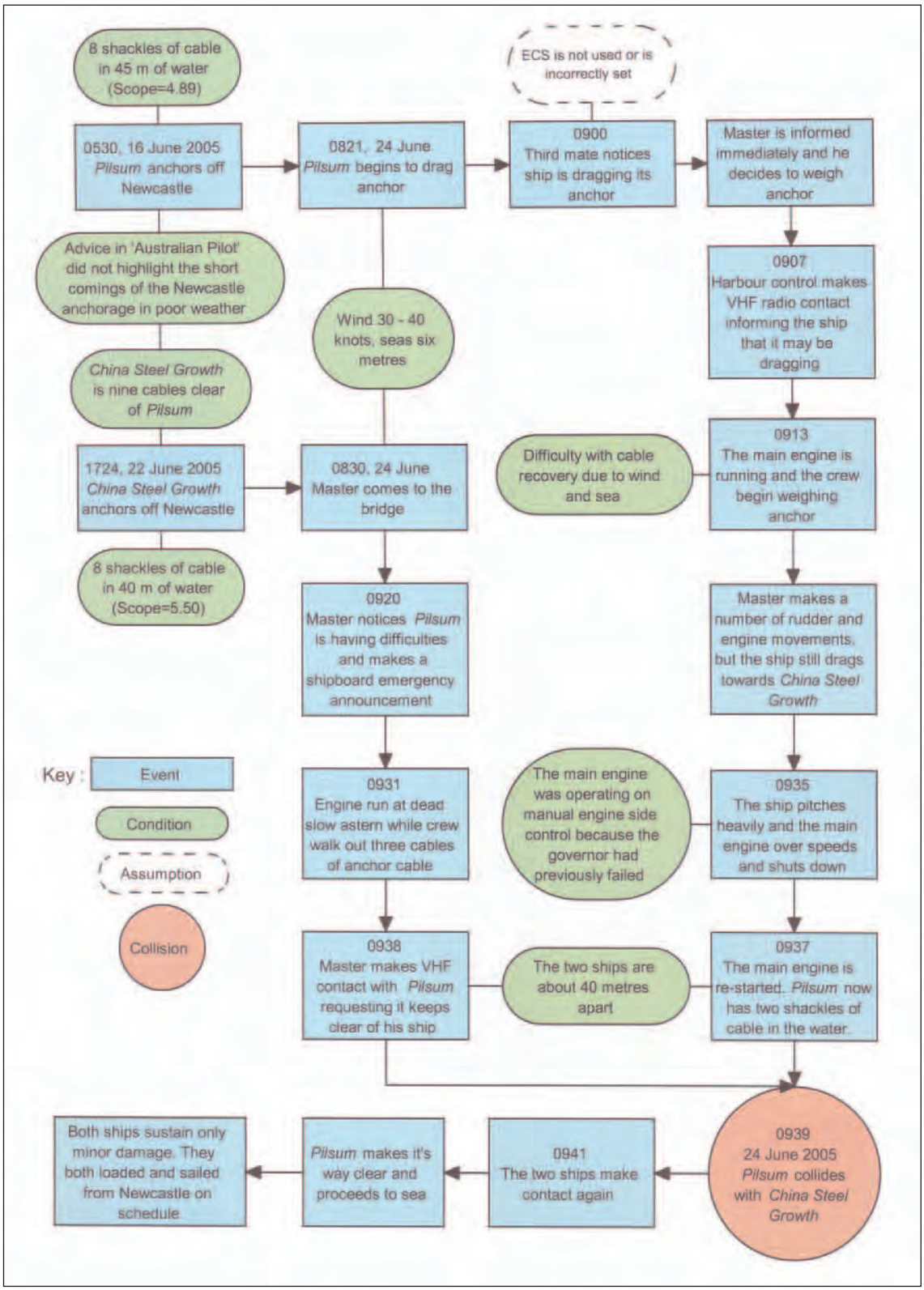
4.7 *China Steel Growth*

There is no evidence to suggest that the master or deck officers on board *China Steel Growth* detected *Pilsum*'s drag prior to the VTIC VHF radio communication at 0907. From that time onward, the master and third mate did monitor the situation. The master made some attempts to avoid the collision, including paying out more anchor cable and running the main engine astern. While he was not successful in avoiding the collision it is likely that his actions did play some part in limiting the damage.

China Steel Growth's windlass was left in gear at the time of anchoring, and consequently could not be disengaged when the master wanted to quickly pay out more cable on 24 June. It is always a good practice to put the windlass on the brake, fit the chain stopper and disengage the windlass motor clutch at the completion of anchoring.

The master made no attempt to contact *Pilsum* via VHF radio until 0938. At this stage it was too late. If contact had have been made earlier, the master would have been better informed of the difficulties *Pilsum* was experiencing. He may have been able to take more substantial action earlier to avoid the collision.

Figure 11: Events and causal factors chart



5 CONCLUSIONS

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

Based on the available evidence, the following factors are considered to have contributed to the collision between *Pilsum* and *China Steel Growth* off Newcastle on 24 June 2005.

1. The ships in the anchorage to the south of Nobbys Head on 24 June 2005 were anchored too close to each other.
2. *Pilsum*'s third mate did not fully utilise all available equipment while keeping the anchor watch on the morning of 24 June. This resulted in him not identifying the change in the ships position until 0900; some 40 minutes after the ship began to drag its anchor.
3. *Pilsum*'s master did not increase the scope of cable laid out, either prior to or on 24 June despite the changing weather reports and conditions at the anchorage.
4. The advice to masters in the Australian Pilot publication does not sufficiently highlight the short comings of the Newcastle anchorage in adverse weather conditions.
5. *Pilsum*'s drift towards *China Steel Growth* was arrested at 0927, when the two ships were 40 metres apart. It was not until the main engine oversped, that the drift resumed.
6. *Pilsum*'s master and chief engineer did not adequately address the main engine's operational limitations due to the failed governor and the need to operate the main engine from the engine side emergency control stand.

6 RECOMMENDATIONS

MR20050027

The Newcastle Port Corporation should consider a modification to the instructions given by the vessel traffic information centre to ships that intend anchoring off the port, with a view to increasing the clearing distances between ships in the anchorage.

MR20050028

The Newcastle Port Corporation should consider modifying the advice contained in the Australian Pilot. This advice should highlight the risks associated with the Newcastle anchorage in adverse weather conditions.

MR20050029

Ships' masters and crews formulate and implement plans that take into account equipment failures and other identified risks.

7 SUBMISSIONS

Under Part 4, Division 2 (Investigation Reports), Section 26 of the Transport Safety Investigation Act 2003, the Executive Director may provide a draft report, on a confidential basis, to any person whom the Executive Director considers appropriate Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the Executive Director about the draft report.

Copies of the final draft report were sent to the master and ship manager of *Pilsum*, master an ship manager of *China Steel Growth*, Newcastle Port Corporation and Australian Maritime Safety Authority.

Submissions were included and/or the text of the report was amended where appropriate.

8 *PILSUM*

IMO Number	9161687
Call sign	A8DO8
Flag	Liberia
Port of Registry	Monrovia
Classification society	Det Norske Veritas
Ship Type	Bulk carrier
Builder	Sumitomo Heavy Industries
Year built	1997
Owners	*Pilsum*
Ship managers	Laeisz Reederei
Gross tonnage	38 364
Net tonnage	24 713
Deadweight (summer)	73 762 tonnes
Summer draft	13.871 m
Length overall	225 m
Length between perpendiculars	216 m
Moulded breadth	32.25 m
Moulded depth	19 m
Engine	Sulzer 7RTA48T
Total power	12 070 kW
Crew	22

9 CHINA STEEL GROWTH

IMO Number	9220213
Call sign	BMEQ
Flag	Republic of China (Taiwan)
Port of Registry	Kaohsiung
Classification society	Lloyds Register of Shipping
Ship Type	Bulk carrier
Builder	China Shipbuilding Corporation
Year built	2002
Owners and managers	China Steel Express
Gross tonnage	91 051
Net tonnage	58 440
Deadweight (summer)	175 775 tonnes
Summer draft	17.8095 m
Length overall	289 m
Length between perpendiculars	281.5 m
Moulded breadth	45 m
Moulded depth	24.1 m
Engine	MAN B&W 6S70MC
Total power	21 800 kW
Crew	16

investigation into the collision between the Liberian flag bulk carrier *Pilsum* and the Taiwanese flag bulk carrier *China Steel Growth* off the port of Newcastle, New South Wales 24 June 2005

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