Departmental investigation into the collision between the Australian fishing vessel "GALAXY" and the Malaysian flag bulk carrier "ALAM TENGGIRI" off High Peak Island, Queensland, at about 0240 on 6 September 1996

MIIU

COMMONWEALTH DEPARTMENT OF TRANSPORT AND REGIONAL DEVELOPMENT

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Contents

Navigation Act 1912

Navigation (Marine Casualty) Regulations

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and the Malaysian flag bulk carrier

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Summary

Early in the morning of 6 September 1996, the Malaysian cargo ship Alam Tenggiri was about 65 miles east-by-south of the Queensland port of Mackay, en route from Bing Bong, in the Gulf of Carpentaria, to Newcastle, New South Wales. The weather was fine, the visibility clear and the sea calm.

At about 0120 Eastern Standard Time, the officer on watch saw the light of a vessel ahead on the port bow. Alam Tenggiri was making good a speed of about 12.8 knots, with High Peak Island about 20 miles on the starboard bow. After watching the other vessel he deduced that the vessel was on a parallel or nearly parallel course and that his ship was the overtaking ship and had a duty to keep clear. He started an ARPA plot and determined the closest point of approach of the other vessel.

The fishing vessel Galaxy was relocating from fishing grounds off Mackay to grounds further south, to the west of the Capricorn Group. The Skipper handed over the watch to the vessel's Cook, who maintained a lookout and a check that the vessel followed the course displayed on the vessel's plotter, which was connected to the GPS. The Cook saw no other vessels.

At about 0240, collision seemed imminent and Alam Tenggiri's rudder was put hard to starboard. As the starboard trawl boom of the fishing vessel came into contact with the port side railing of Alam Tenggiri the cargo ship's rudder was put hard to port. The smaller fishing vessel passed down the port side of the cargo ship.

The Alam Tenggiri started to slow its engine in readiness for turning about to render assistance. After about 20 minutes VHF radio contact

was established and information was exchanged. The fishing vessel reported that it had sustained damage to its boom, but did not require assistance.

The collision occured in approximate position 21°50.5' South 150°48' East.

Alam Tenggiri continued on its voyage to Newcastle. Galaxy abandoned the voyage to the new fishing ground and set a course to return to its home port of Caloundra.

Sources of information

The Master and Crew of Alam Tenggiri.

The Skipper and crew of the fishing vessel Galaxy.

Australian Maritime College.

Captain Waddah A F Abu-Elatta, Department of Marine Studies, The Hong Kong Polytechnic University.

Dr Ian Dand, BMT SecTech Ltd
Gosport Hampshire.

Acknowledgement

Portion of chart Aus 4602 reproduced by kind permission of the Hydrographic Office, RAN.

Narrative

Alam Tenggiri

Alam Tenggiri is a Malaysian flag general cargo vessel of 17,322 tonnes deadweight at a summer draught of 9.484 m and specially strengthened for heavy cargoes. It has a length overall of 145.52 m, a beam of 21.04 m and a moulded depth of 13.14 m. It has five holds and five cranes.

The vessel is powered by a single 12 cylinder Pielstick engine developing 3,972 kW, driving a single variable pitch propeller, which is normally controlled from the bridge and provides a service speed of 14.5 knots. The engine room operates as an unmanned machinery space with a duty engineer on call. When on passage under normal service conditions the ship operates with a shaft generator supplying electrical power. A second generator is on standby to operate automatically if required.

On 6 September 1996, the vessel had a crew of 21, recruited from four countries, Pakistan, Malaysia, Indonesia and Mayamar. The Master, Mate and Second Mate all held valid Master Class 1 certificates of competency. The navigation of the ship is based on the traditional three watch routine, 12-4, 4-8, 8-12.

Galaxy

The fishing vessel Galaxy, built in Brisbane in 1974, is of wooden, carvel construction with a raked stem and transom stern. It is 15.54 m in length, has a beam of 5.54 m and a moulded depth of 2.48 m. It has a single deckhouse containing a common wheelhouse, messroom

and galley, and a toilet/shower compartment in the aft port corner, accessed from the deck. Sleeping accommodation for the skipper and crew is in the forecastle, accessed through a companion way at the forward end of the wheelhouse.

The vessel is fitted with a Cummings 855 diesel engine, generating 186.5 kW, providing an estimated service speed of about 8 knots.

Navigation equipment includes an Anritsu radar, Furuno DGPS, Sony electronic plotter, magnetic compass and autopilot, with off-course alarm. There is also a watch alarm.

Galaxy, owned by a family business based in Caloundra, spends about half of each year trawling for prawns, bugs, or scallops in Great Barrier Reef waters off Bundaberg and Gladstone, away from its home base. The vessel is operated by a crew of four, consisting of a skipper, two deck hands and a cook.

The Skipper at the time of the incident had been a skipper since 1991 and was the holder of a Skipper Grade 3 Certificate and a Marine Engine Driver Grade 4 Certificate, both issued by the Queensland Department of Transport in 1989. The Cook was the Skipper's fiancee, the two having been sailing together for about 18 months. Two other deck hands made up the vessel's complement.

Alam Tenggiri's account

Alam Tenggiri loaded a part cargo of rock phosphate into three holds at Christmas Island, before going to Bing Bong anchorage in the Gulf of Carpentaria, where the vessel loaded zinc/lead concentrate from barges for discharge at Newcastle. Cargo was completed and the ship sailed on
1 September 1996, at a draught of about 9.48 m. The Master sent a message to the Maritime Rescue Coordination Centre detailing its

route, its estimated speed of 12.5 knots, a daily reporting time of 1400 local time and an ETA at Newcastle of 8 September. The ship had earlier embarked a Barrier Reef Pilot off Gove for the passage through the Prince of Wales Channel and the Great Barrier Reef.

The voyage through the inner route was uneventful and the Pilot was disembarked off Cairns at 1445 on
4 September.

At about 2355 on 5 September 1996, the Second Mate went to the bridge to relieve the Third Mate and take over the navigation watch. The vessel was off Vernon Rocks light, about 65 miles east by south of Mackay. The weather was good with a light breeze and good visibility. There were no other vessels in sight. Number two radar was in use and all equipment was operating properly. The ratings on lookout duty also changed at this time.

At 0019 on 6 September, course was altered to 130° with Vernon Light bearing 288° by 5.3 miles. The Second Mate plotted the ship's position at 0100 and at 0200 by radar and visual bearings. The speed made good over this period was 12.8 knots.

At about 0100, the Second Mate checked the magnetic compass error by the amplitude of the moon. Some time after this, between 0110 and 0130, he saw a light of another vessel on his port bow and—shortly after—the rating on lookout also reported the light.

After a while the light developed into a cluster of what appeared to be accommodation lights and the Second Mate assumed them to be those of a small trading vessel. The absence of any obvious masthead light or coloured side lights lead him to conclude that Alam Tenggiri was overtaking a vessel on a similar course.

The Second Mate acquired the other vessel as a target on the radar at 8 miles. Number 2 radar was linked to the ARPA and he was able to

obtain a CPA and course for the other vessel. He recalled that the radar gave a CPA of between 0.8 mile and 1.0 mile and the vessel was going in the same direction on about the same course of 130°.

After fixing the ship's 0200 position, the Second Mate adjusted course to 127°, to counter a westerly set. Over the next 20 minutes or so, he monitored the bearing of the other vessel from time to time—initially visually, but latterly by ARPA—and the bearing changed from 107° to 105°. After the vessel had closed to a distance of 2 miles and was bearing about 105°, he relied on a visual assessment of the situation rather than continuing an ARPA plot or using compass bearings to assess the risk of collision.

At 0230, he ordered the lookout to standby the wheel as Alam Tenggiri overtook the smaller vessel. At about 0234, the Second Mate assessed the vessel as being about 20 degrees on the bow. At about 0236, he had the impression that the other vessel seemed to shear towards his vessel and he then saw the green side light. He realised that he had to take immediate action and ordered full starboard helm. As the vessel started to swing the Second Mate saw that collision was inevitable and, as the boom attached to the vessel come into contact with Alam Tenggiri's port side railing at about hatch 4, he ordered full port rudder to lessen any impact. He saw the vessel scrape down Alam Tenggeri's port side and pass clear astern and realised that it was a fishing vessel, although it was not showing any fishing light signals.

Alam Tenggiri swung through 56° to starboard, to a heading of 183° in about one minute, before the vessel started to turn to port and resuming its original course. In all, from the time the vessel started to swing to starboard and it resumed its course, some 2½ minutes had elapsed.

He could not see anybody on board the fishing vessel and was concerned that somebody may have been knocked overboard by the impact. He immediately ordered the helmsman to resume a course of 127°. He used the VHF on channel 16 to call the fishing vessel but received no response. He then called the Master and briefly explained what had happened.

The Master went to the bridge immediately. He went to the bridge wing and studied the fishing vessel with binoculars studying the side lights and the bright working lights. He too could not see any person on board the fishing vessel.

He returned to the wheelhouse where the Second Mate had started to reduce speed very gradually. With the shaft generator in operation, the practice was to only manoeuvre in an emergency and as the fishing vessel appeared undamaged the Master was prepared to wait until a diesel generator was started. The Master called the Chief Engineer and told him what had happened and that he would need to turn the ship and manoeuvre to give assistance. He also called the Chief Mate to assess the damage.

While waiting for the diesel generator to be started several attempts were made to contact the fishing vessel by VHF channel 16. Eventually after fifteen to twenty minutes contact was established with a male member of the fishing vessel's crew, who confirmed, no assistance was required, nobody on board the fishing vessel was injured, the vessel had not been holed and damage was restricted to the starboard fishing boom. The Second Mate asked them what they were doing and if there was anybody on watch.

The position of the collision was fixed at 21°50.53' South 150°48.0' East.

Galaxy's account

Galaxy sailed from Mooloolaba in May 1996, proceeding first to fishing grounds off Bundaberg. After five weeks the Skipper moved north, fishing to the north of Hydrographer's Passage and landing the catch at Mackay on 25 July. He then remained in Mackay over the period of the full moon, sailing on 5 August to grounds in the area of Hydrographer's Passage. In search of a good catch, the Skipper progressively moved further north putting into Townsville, Cairns and then returning to Townsville. During time in Queensland ports the two deck hands were replaced by two others.

Galaxy sailed from Townsville at 1130 on Monday, 2 September, and spent that night and the night of 3 September fishing in the vicinity of Gate Reef. On the night of 4 September, the nets snagged on rocks and were badly damaged, so the Skipper telephoned the owner, who suggested he tie up in port, but left the decision to him. The Skipper considered going into Bowen or Mackay, but he and the Cook were due to be married at the end of the month and needed the money, so he decided to proceed south, to fish off Gladstone, with the possibility of fishing some of the reefs on the way.

Leaving Gate Reef at 1100 on 5 September, the Skipper headed for Chauvel Reef, he and the two deckhands working on repairing the damaged nets. The Cook went to bed at about midday, having been up for most of the night and the morning. After three nights spent fishing and that morning spent repairing the nets, they were all becoming tired, so at 1400, the Skipper also sent the two deckhands to bed.

The Skipper considered fishing off Chauvel Reef, but other vessels ahead had already moved away from that area, having had no success, so he continued south. After passing Prince Reef, the Skipper set

course for the anchorage on the north-west side of North West Island, marked the track line on the plotter and, at 2200, being extremely tired himself, he called the Cook to take over the watch. Before stepping down into the sleeping area in the forecastle, he switched the radar which was in "ship's head up/relative display", to the 6-mile range and off centre, providing greater range ahead.

The night was calm and clear, the sea smooth. Galaxy was showing the regulation steaming lights - masthead, stern and sidelights - and also the deck working lights - two 1300 Watt quartz halogen floodlights, one 1000 Watt mercury vapour floodlight and 16 daylight fluorescent tubes.

Galaxy was proceeding in autopilot with the Cook keeping a visual lookout, the watch alarm was switched on. The watch alarm gives a visual indication (flashing light) at four minute intervals and if this is not accepted, an audible alarm sounds after a further minute. If this alarm is not accepted, a loud alarm, audible throughout the vessel, sounds after the lapse of one more minute. When acknowledging the warning light or the initial alarm, the Cook would check the plotter, to see that the vessel was on the track line and would also check the radar, to see if any other vessels were in the vicinity.

After taking over the watch at 2200, the Cook prepared the meal in the galley area at the after end of the deckhouse, while also keeping a lookout and watch on the GPS plotter and radar.

By about 0230 on 6 September, the meal was cooked and, feeling hungry, the Cook put out a serving for herself, but before sitting down to eat, she went to the lavatory. When she returned to the wheelhouse, the first stage audible watch alarm was sounding. She acknowledged the alarm, checked that Galaxy was on track. She looked at the radar screen but did not see any target echoes. Looking

out of the forward windows, the only light visible was High Peak Island light, on the starboard side, which had been visible for some time.

The Cook then moved back to the table when there was a loud, metallic banging noise. Looking through the starboard side window, she saw, almost alongside, the white load line markings on the black side plating of a ship. She screamed, ran to the wheel and tried to turn it hard over to port.

The Skipper, awoken by the Cook's scream and the noise, stepped up into the wheelhouse and immediately put the engine out of gear. He saw the starboard side boom folding forward against the black hull of a vessel and the Cook struggling with the wheel. He reached up, switched off the autopilot and put the wheel hard over to port, Galaxy responding, swinging away from the ship's side.

When Galaxy was clear of the other vessel, the Skipper calmed and assured the Cook and two deckhands, then quickly assessed the damage, which appeared to be restricted to the starboard fishing boom equipment. Satisfied they were not in any danger, the Skipper called on VHF channel 16 at about 0245, calling "Southbound ship approximately eight miles north-east of High Peak Island, the trawler Galaxy, do you receive, over." The other vessel did not respond and appeared to be continuing on its voyage.

The Skipper repeated his call a number of times and eventually obtained a response at 0306, when he was asked why there had been no one on watch. The Skipper replied that they had had a full watch and had not altered course. Only after three requests did the other vessel give its name, which the Skipper received as "Holantinguri", and advise that it was slowing down and ask if Galaxy required any assistance. The skipper advised the other vessel that they were not at risk and, at about 0315, the other vessel was cleared to proceed on its voyage.

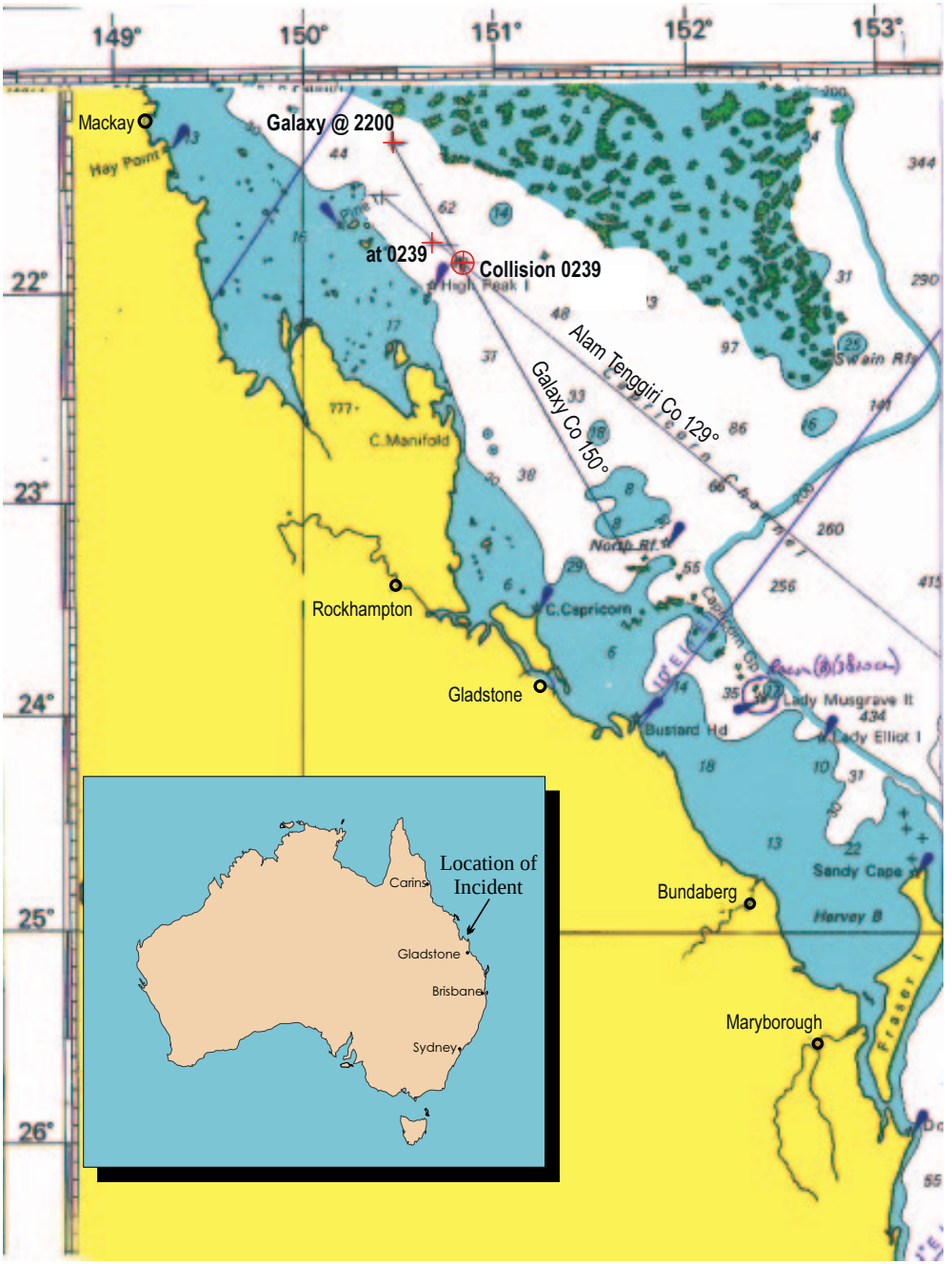
The position of the collision was fixed by the skipper as 21°50.07' South 150°38.47' East, 8.9 miles north-east of High Peak Island.

Galaxy was then contacted by the yacht Moecca (call sign MQWK8) northbound for Hamilton Island, which offered assistance, should it be needed.

The Skipper and crew set-to, securing the damaged starboard boom, retrieving the boom's forward, solid stay, which had broken and was hanging overboard and resecuring the starboard otter boards, which had been knocked from their housing.

Once the gear was secured, the Skipper resumed passage, continuing south using the auto-pilot and making contact with the owner, who instructed him to return to Mooloolaba. He also made contact with Townsville Radio, to report the collision, and was told that the collision had already been reported.

Galaxy arrived at Mooloolaba shortly after 1830 on Saturday 7 September.



Portion of chart Aus 4602 showing location of incident

Comment and Analysis

The Collision Regulations

Rule 5 makes it mandatory on all vessels at all times to keep a proper lookout by all available means appropriate in the prevailing circumstances. The reference to a lookout involves not only seeing or detecting a vessel but also " . . . involves the intelligent interpretation of the data received by way of [these] various scientific instruments."[1]

Alam Tenggiri was an overtaking ship and had a duty to keep clear of Galaxy. The International Regulations for Preventing Collisions at Sea, 1972 define an overtaking ship as any vessel coming up with another vessel from a direction more than 22.5° abaft her beam. Rule 13 requires:

(a) Notwithstanding anything contained in the Rules of this section any vessel overtaking any other shall keep out of the way of the vessel being overtaken.

Galaxy was a vessel being overtaken and was the "stand-on" vessel and was required to maintain her course and speed. Rule 17 makes provision for the action of the stand-on vessel:

(*a*) *(i)Where one of two vessels is to keep out of the way the other shall keep her course and speed.*

(b) when, from any cause, the vessel required to keep her course and speed finds herself so close that collision cannot be avoided by the action of the give-way vessel alone, she shall take such action as will best aid to avoid collision.

Watchkeeping

Galaxy

The person maintaining the watch on board Galaxy, the Cook, was not qualified and was in effect a lookout and cannot be considered as keeping a navigational watch. Although the weather was fine, the visibility good and the radar was operating, the Cook did not see Alam Tenggiri approaching from astern and did not detect the ship on the radar. She stated she was unaware of the presence of Alam Tenggiri until the moment of collision, despite routinely looking at the radar. The radar was on the six mile range with the "centre spot" offset to give a range of detection of 9.7 miles ahead, reducing the stern range to 2.3 miles. Given the relative speeds and courses of the two vessels, Alam Tenggiri should have been detected on Galaxy's radar for 20 to 25 minutes before the collision, 23° abaft the starboard beam.

The wheelhouse was effectively the fore end of the communal saloon and galley. The Cook's visual checks were made in an arc forward of the beam. The arrangement of bridge equipment restricts, to a degree, visibility ahead of the vessel. The arrangement of the booms and gantry restrict any lookout astern from within the wheelhouse/ saloon. A view astern could only be gained from the port and starboard deck, outside the wheelhouse doors and even then the view across the stern was restricted by the vessel's fishing gear. This difficulty is not a reason for not maintaining a lookout all around the horizon.

To these factors must be added the fact that the Cook had been preparing and cooking and was anticipating eating a meal. These tasks represented her normal role on board and were probably a significant distraction.

Under the provisions of the Australian Transport Advisory Council's Uniform Shipping Law Code, vessels of Galaxy's size are only

required to carry one person with navigation skills and awareness. Galaxy had been away from its base port since May and, although it had called regularly at ports in North Queensland, the vessel spent prolonged periods underway at sea. It is not possible for the one qualified navigator to be on watch at all times.

The evidence, based on the vessel's normal operating practice, is that only the Skipper altered course and the Cook would not have altered or adjusted course without first consulting him. It was stated by those on Galaxy that the Skipper was asleep at the time of the incident.

It seems probable that the fishing vessel Galaxy maintained a constant course and speed from its original position at 2200 to the collision point. However, no proper lookout was maintained, therefore Galaxy was not in a position to act under Rule 17 (b).

Alam Tenggiri

The working language on board is English. Both the Master and Second Mate were fluent English speakers. The Indonesian rating on lookout also spoke good English. Internal communications were not a factor in this incident.

The Second Mate was an experienced watchkeeper with a Master Class 1 Certificate. The evidence of passage planning and the condition of the charts and associated equipment indicated that the Second Mate was a competent, efficient and well motivated individual. He did not drink alcohol or coffee. He followed a regular rest routine which had not been interrupted for some time. There is no evidence that sleep deprivation or other factors related to fatigue affected his level of performance.

The Second Mate first saw the lights of Galaxy after he had checked the magnetic compass error shortly after 0100. Given the known course and speed of Alam Tenggiri and the probable course and speed

of the fishing vessel, this first contact was about 80 minutes before the time of collision, at about 0120. This sighting is consistent with the height of eye of a person standing on Alam Tenggiri's bridge of 13 m giving a distance to the sea horizon of 7.6 miles.

The Second Mate was using number 2 radar, located just to the port side of the centre line. This radar is linked to the main ARPA set and has all the attributes of an ARPA except automatic plotting and a 12 inch (304 mm screen) rather than a screen of at least 340 mm diameter. He recalled that the radar distance of the target at that time was 8 miles and that the "letter" Z" was shown on the radar display, indicating that the other vessel was on a similar course, and it was making good a speed of between 8 knots and 10 knots, with a closest approach of between 0.8 miles and 1 mile.

At 0200, when the vessels were about 3.7 miles apart, the Second Mate adjusted course to port to 127°. The ARPA recomputed the CPA at 0.7 to 0.9 miles.

After the adjustment of course at 0200, the Second Mate stated that he took a series of visual bearings. The initial bearing was 107° and the ARPA showed a nearest approach of 0.8 miles with the vessel on a course approximately the same as Alam Tenggiri. Thereafter he monitored the vessel by ARPA and he recalled that at about 0220 the vessel being overtaken was bearing 105 degrees (22° on the port bow). Based on the speed of the two vessels, they would have been a little more than 2 miles apart at this time.

From such a position relative to Alam Tenggiri, a course of about 150° at a speed of 8.6 knots would have brought Galaxy to the collision point.

At about 0230, the Second Mate placed the lookout by the wheel to be ready in case avoiding action was necessary. Had the vessels been

passing with a CPA of 0.8 miles this precaution would seem over cautious, however it would have been a sensible precaution if the vessel was, in fact, closer than he had initially anticipated. The vessel being overtaken was about 22° on the port bow and would have been between 0.44 miles and 0.5 miles off. This is inconsistent with the observed CPA of 0.8 miles and at this time, had Galaxy been on a parallel course, the CPA would have been about 0.4 miles.

Both the Second Mate and the rating on the bridge saw Galaxy at about 8 miles and had the fishing vessel in sight (and as a radar target) for at least 80 minutes. It does appear that he placed too much reliance on the ARPA information, without appreciating its limitations, particularly where the relative speed between the two vessels was in the region of 5-6 knots. It is doubtful whether there were any specific distractions and the inspector is satisfied that he did not consciously ignor the collision regulations. The overtaking of another vessel, particularly a smaller vessel, was routine and for a prolonged period there was no immediate risk of collision. This risk only occurred in the last minutes of a period that extended over one hour. In the open waters with few other hazards to concern the Second Mate his sensitivity to the developing risk seems to have been reduced to a dangerous degree.

Reconstruction

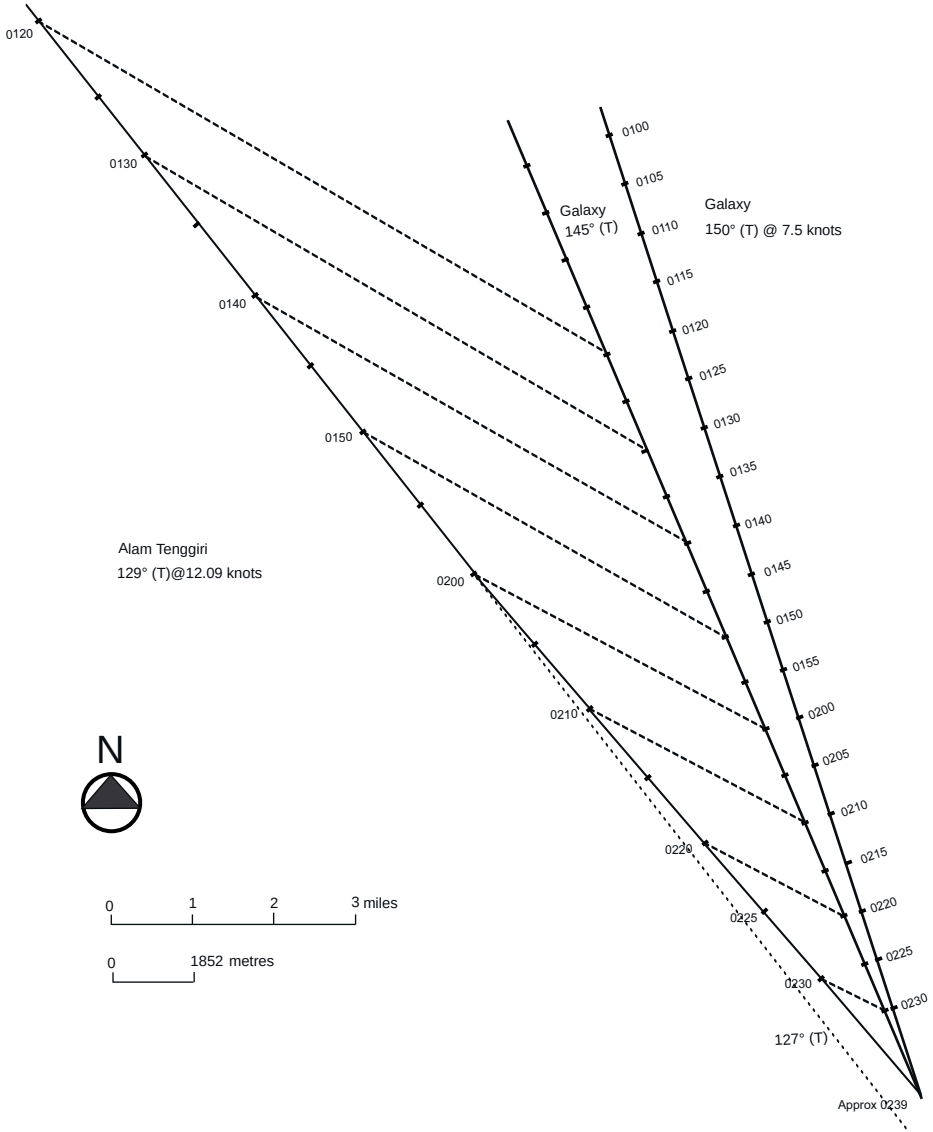
Both Alam Tenggiri and Galaxy were using a GPS navigation system which gave each vessel the same time. However, although the officers on Alam Tenggiri maintained a log book and charted positions, noting times of alterations and the ship's position, Galaxy maintained no contemporaneous records of its position, course or speed on passage, relying solely on the GPS Plotter. Soon after the collision the Skipper recorded the collision point and the vessel's 2200 approximate position in his diary but, as was normal practice when transferring between

fishing grounds, the initial departure position and the positions along the track were not retained in the plotter's memory, so as not to overload it.

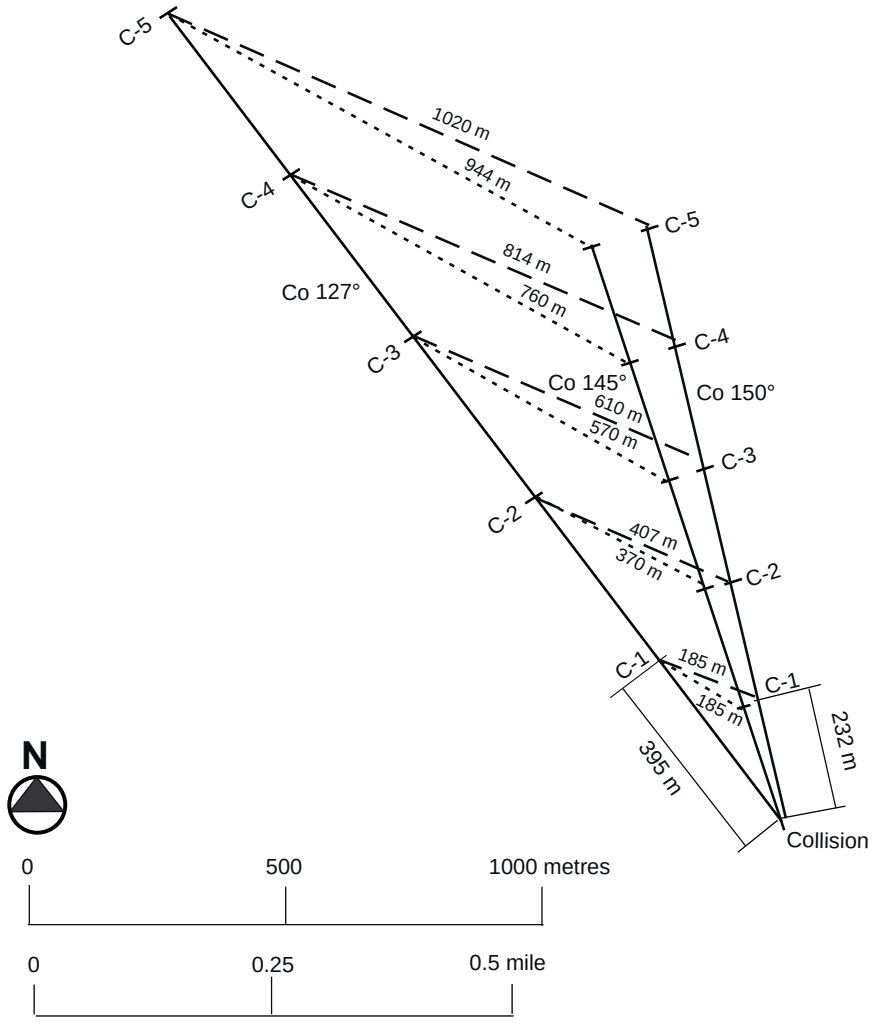
Alam Tenggiri's course recorder was set at Bing Bong and synchronised with the GPS time. Comparing the course recorder times to logged times, it seems that the course recorder was about 1½ minutes slow of bridge time. Between 0019 and 0200, Alam Tenggiri covered 21.8 miles, giving a speed of 12.9 knots. Alam Tenggiri's course recorder provides the only absolutely objective evidence. This shows that at a minute or two before 0200, course was adjusted from 129° to 127°. This course was maintained until 0237:30, when the ship's head started to swing to starboard reaching a heading of 183° at 0238:30, when the vessel started to swing to port returning to a course of 127° at 0241.

There is no objective evidence available from Galaxy. The initial track line departure point, at 2200 on 5 September, was recorded as 21° 15.3'S 150° 27.4 E, about 15 miles south-east-by-east of Alarm Reef. This is considered to be accurate within 0.5 miles and 15 minutes or so in time. The assessment of Galaxy's course and speed are at best estimates. Galaxy, from its estimated position at 2200 to the point of collision covered 39.9 miles in 4 hours 38 minutes at a speed of 8.6 knots, making good a course of 151°. The Skipper stated that he intended fishing close to North West Island, to the west of the Capricorn Group, and the vessel's course was consistent with such a destination.

Alam Tenggiri's log recorded a course of 130°, however, the course recorder showed the course as 129°. From 0119 to 0200, the two vessels would have been converging at a rate of about 5.8 knots. Thereafter, with the cargo ship steering 127°, the rate of convergence would have increased marginally to 6.06 knots.



Relative positions Alam Tenggiri and Galaxy from 0120



Relative positions
from about 0235 to Collision

C-1–C-1minute

Relative position at one minute intervals from about 0234-collision

Projecting Alam Tenggiri's course and estimated speed back from the collision point and similarly projecting Galaxy's probable course and speed, the two vessels would have been about 8 miles apart at 0115, at about the time the Second Mate recalled first sighting the fishing vessel. Based on a speed of 8.6 knots, the fishing vessel would have been bearing about 095° from Alam Tenggiri. The Second Mate recalled that the bearings of the other vessel taken after 0200 opened by 2° from 107° to 105°, 22° on the port bow. It is possible that the Second Mate read the compass card the wrong way and the bearings were in fact 93° and 95°. However, it is more probable that the Second Mate's bearings were accurate and Galaxy was making good a speed in the region of 7.5 knots.

A precise reconstruction is not possible in the absence of accurate times and bearings. A reconstruction of the collision, based on the known course and speed of Alam Tenggiri and the estimated course and speed of Galaxy is at figure 1.

Whatever the true bearing, an alteration of two degrees in bearing in about 20 minutes cannot be considered a substantial alteration in bearing. It is probable that the relative bearing between the two vessels did not alter significantly after 0020. This is supported by the Second Mate's estimation that the vessel being overtaken was about 2 points (22½°) on the port bow at 0130.

The Second Mate described how, about 3 minutes before the collision the vessel being overtaken seemed to sheer in towards Alam Tenggiri as though trying to cross the cargo ship's bow and just before he ordered full starboard rudder he saw the side light of Galaxy. This description was supported in general by the lookout.

However, the probability is the two vessels were converging at an angle of about 20°. Theoretically, the fishing vessel's side lights would have become visible to the overtaking vessel at between 60 seconds

and 45 seconds before the collision, however small vessels would tend to yaw even in slight sea conditions and the side lights may have been visible a short time earlier. It does seem improbable that the fishing vessel altered course and subsequent examination of its automatic steering system showed that it was working properly and a system malfunction seems unlikely. The Cook was not alerted by the off course alarm (set for 20° off course) and the Skipper stated that he was not aware of the alarm sounding as he switched off the automatic helm.

Also, Galaxy's apparent sheer towards Alam Tenggiri was possibly an optical illusion as the aspect of the Galaxy's lights altered as the larger vessel drew alongside. It is probable that the smaller, slower fishing vessel was affected by the flow of water around Alam Tenggiri's hull, causing the fishing vessel's bow to move towards the larger vessel.

Whatever the situation, the passing distance between the two vessels must have been very small. The vessels were not in restricted waters and Alam Tenggiri had the sea room to give the overtaken vessel a wide berth. Had the Second Mate realised that risk of collision existed sometime before the collision, he could have slowed Alam Tenggiri or put the propeller pitch to full astern. However, by the time he realised a collision was about to occur it was too late to slow or reverse the propeller pitch.

ARPA

Work by Captain Waddah A F Abu-Elatta, of the Department of Marine Studies, The Hong Kong Polytechnic University, has addressed inaccuracies in ARPA predictions. He has shown that inaccuracies in the relative motion and the CPA increase as range increases, depending upon the relative speeds of the two vessels. Also inaccuracies in the relative course and CPA increase as the relative speeds between the two vessels decreases.

In reviewing the outline of this collision he identified three areas that posed a problem to the Second Mate - a region of uncertainty, risk assessment and ARPA error.

Captain Abu-Elatta identified a “region of uncertainty” where ships are steaming with similar speeds on a narrowly converging course. If it is assumed that the two vessels were on a collision course when 8 miles apart, an error of 2° in course could change the CPA by 0.5 miles.

Alam Tenggiri was overtaking Galaxy at a steady rate but the aspect of the fishing vessel was nearly constant. Initially there was a very low level of risk and the risk perception remained at a very low level until the final minutes at which time the risk assessment increased rapidly. The long period of low risk leads to a misjudgement of the real risk and the lack of effective early action to avoid a close quarter situation.

In addressing ARPA error Captain Abu Elatta calculated that at the initial range of 8 miles, the expected errors of 95 per cent probabilty in CPA would amount to 0.7 miles after 3 minutes after initial tracking but as much as 3.6 miles after only one minute. Based on a 3 minute track, the error would fall to about 0.25 miles 20 minutes before CPA, but could have been as much as 1.2 miles in error if a CPA was taken after only one minute tracking time. The evidence is that the Second Mate did allow 3 minutes tracking before taking a reading, however, Captain Abu-Elatta recommends that, under such circumstances a proper allowance in the CPA should be made to offset such predictable errors.

The Second Mate stated that when overtaking, the ARPA radar information was not as consistent as when vessels were crossing or on a reciprocal course. This is consistent with the above findings due to the small amount of relative movement. The accuracy of the information will also depend on whether the ARPA stores the relative track or the true track of targets.

Although the Second Mate did not use the ARPA once the two vessels had approached to about 2 miles, he seems to have made an early assumption based on scanty ARPA information, which was potentially inaccurate through the limitations of the ARPA system.

Lights and signals

Alam Tenggiri was showing the correct lights for a vessel of her length.

Galaxy was not engaged in fishing and, correctly, was not exhibiting the lights for a vessel engaged in trawling. It was showing the steaming lights for a vessel of its length. However, in addition it also had the working lights over the after deck switched on. This would have made the vessel more noticeable, but they did mask the stern light.

Post collision

Reports from the Skipper of the fishing vessel suggested that Alam Tenggiri may not have been prepared to turn and offer assistance and that there was a delay in establishing communication between the two vessels.

On passage on 6 September, Alam Tenggiri operated with a shaft generator, which is dependent upon the constant speed of the propeller shaft. The vessel has a variable pitch propeller and a constant speed propeller shaft. The vessel should be able to manoeuvre and the Master's standing orders state that the officer of the watch always has the engine at his disposal and, in the case of an emergency can operate the variable pitch propeller without prior advice to the master or engineer on duty. In fact, although the engine is of a dual power range type, there is nothing to prevent the propeller

being put from full ahead to full astern with the shaft generator in operation.

Up to the time of the collision Alam Tenggiri had been making good a speed over the ground of 12.8 knots. Between 0300 and 0400 the vessel made good 9.5 knots, thereafter its speed increased to in excess of 12.5 knots. The evidence is that Alam Tenggiri did slow and prepare to turn about to offer assistance. However, the response was not immediate, and the Master did not circle Galaxy until such time he could reduce speed or was released to proceed.

Communications

The incident was reported to Townsville Maritime Communications Centre by the Australian bulk carrier River Boyne, which was 19 miles north-west of High Peak Island at 0300 on 6 September. At this time the officer on watch picked up a broken transmission broadcast from Galaxy on channel 16 VHF, stating the vessel had been in collision 8 miles north-east of High Peak Island. No other details, such as the name of the other vessel were received, and VHF radio contact was soon lost. The transmission was apparently the fishing vessel trying to contact the other vessel involved in the collision.

At 0309, the information was passed by River Boyne to the duty officer at Townsville Maritime Communications Centre, who immediately telexed to the Australian Maritime Safety Authority's Maritime Rescue Coordination Centre.

After some initial checks, the MRCC identified Alam Tenggiri as being the closest known ship to the reported position. At 0322, the MRCC sent a message to the Master of Alam Tenggiri, through Townsville MCC, inquiring whether his vessel was in the area and if he knew anything of the collision. At 0328, a message was sent to Galaxy seeking a standard report of the incident.

No immediate reply was received from Alam Tenggiri and at 0417 MRCC asked Townsville MCC to repeat the earlier message. At 0600, Alam Tenggiri responded to the MRCC's query, the Master reporting that his vessel had been in contact with an extended trawl boom of the fishing vessel Galaxy. He confirmed that VHF contact had been made with Galaxy and although both vessels had sustained slight damage, the fishing vessel required no assistance and both vessels were continuing on passage. MRCC received this message at 0604.

Alam Tenggeri's Master repeated the message at 0653, concerned that his initial response had not been received. MRCC confirmed receiving the message at 0706.

Conclusions

These conclusions identify the different factors contributing to the collision between Alam Tenggiri and Galaxy and should not be read as apportioning liability or blame to any particular ship or individual.

It is considered that the fishing vessel Galaxy was on a steady course of about 150° and the following factors contributed to the collision:

- The Second Mate on Alam Tenggiri, having seen the light of the vessel being overtaken, did not keep a proper lookout in that he did not make a full and effective appraisal of the situation and of the risk of collision.
- The Second Mate placed too great a reliance on ARPA without a full appreciation of its possible inaccuracies.
- A prolonged period of overtaking involving no immediate risk of collision reduced awareness of the potential danger of eventual collision.
- Given the extent of open water available, Alam Tenggiri did not give sufficient sea room to the vessel being overtaken.
- The person on lookout on board Galaxy did not keep a proper lookout and did not detect the overtaking vessel by sight or radar.
- Although the manning of Galaxy met the requirements of the Australian Transport Advisory Council's Uniform Shipping Law Code, the person on lookout on board Galaxy was not qualified, had no training in the use of radar and did not have the knowledge to maintain a watch.

Submissions

The provisions of sub-regulation 16 (3) of the Navigation (Marine Casualty) Regulations require 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 relevant part of the report. Sub-regulation 16(4) provides that such a person may submit written comments or information relating to the report.

The final draft of the report, or parts of thereof, was sent to:

- the Master and Second Mate of Alam Tenggiri
- the Skipper and Cook of Galaxy.

The Second Mate stated in submission that:

1. He continuously monitored both the course of his own vessel and that of the fishing vessel with due diligence, having due regard to the keeping of a proper lookout, the risk of collision and appraisal of the situation. He used all available means to monitor the fishing vessel, including ARPA and radar to the best of his ability.

2. Contact between the two vessels was strictly due to the negligence of the other vessel as no lookout was being maintained and Galaxy sheered towards his vessel. The fishing vessel did not maintain its course as required by Rule 17 (a)(i) of the International Regulations for preventing Collisions at Sea.

3. He maintained that he had done his best to avoid contact with the fishing vessel, but it altered towards Alam Tenggiri. He had attempted to lift Alam Tenggiri's stern clear but without success.

4. Following the collision neither he or the Master saw anybody in the wheelhouse or on deck and he queried why any person on the fishing vessel would see the load line mark rather than the larger, distinctive company markings on the ship's hull.

5. The evidence relating to the fishing vessel's speed at page 12 is not objective, whereas Alam Tenggiri provided objective evidence relating to position speed and course.

6. The ARPA on board Alam Tenggiri is accurate giving correct CPA. He knew the characteristics, efficiency and limitations of the radar equipment.

7. He did not ignore the Rules of the Road but maintained a proper lookout.

8. As Alam Tenggiri did not cause the collision, the evidence presented by the fishing vessel cannot be relied upon.

The Skipper of the fishing vessel submitted:

1. He acknowledged that the person on watch on Galaxy was not officially qualified, but had been in his employ for 17 months, during which time she had had extensive on board training in all aspects of seamanship, boat handling and watchkeeping.

2. The bright lights of the fishing vessel may lull their watchkeepers into a false sense of security as they feel that the vessel must be highly visible and hence safe from being run down.

3. The time taken to respond to VHF calls and the failure to come about to standby the vessel could have meant the difference between life and death to the crew of Galaxy.

Details of vessel

Galaxy

Official number	385339
Flag	Australian
Vessel Type	Fishing
Built	Brisbane
Year Built	1974
Construction	Wood
Gross tonnage	48.39
Net Tonnage	23.96
Length	15.54 m
Breadth	5.54 m
Depth	2.48 m
Engine	Diesel - General Motors
Power	186.5 kW
Speed	10 knots
Crew	3

Details of vessel cont.

Alam Tenggiri

Previous names	Aramis (85-87) - Ikan Tenggiri (87-92)
IMO Number	8306929
Flag	Malaysia
Classification Society	Det Norske Veritas
Ship Type	General cargo
Builder	Ishikawajima-Harima Heavy Industries, Tokyo, Japan
Year Built	1985
Owner	Alam Tenggiri Sendirian Berhad
Ship Managers	Pacific Ship Management, Port Kelang
Gross Tonnage	10,511
Net Tonnage	6280
Summer deadweight	17322 tonnes
Summer draught	9.484 m
Length overall	145.52 m
Breadth	21.04 m
Moulded depth	13.14 m
Engine	Pielstick, 10 cylinder
Power	3972 kW
Crew	21