Australian Government
Australian Transport Safety Bureau

Publication Date: October 2008 ISBN 978-1-921490-64-4

ATSB TRANSPORT SAFETY REPORT

Marine occurrence investigation No. 247

Final

Collision between *Namhae Gas* and *Rexandra*

30 November 2007

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ABSTRACT

At about 0036[1] on 30 November 2007, the liquefied petroleum gas (LPG) tanker *Namhae Gas* collided with the fishing vessel *Rexandra*. At the time, both vessels were about 30 miles[2] northeast of Mooloolaba, Queensland.

Neither *Namhae Gas*'s watch-keeper nor duty lookout was keeping a proper lookout in the time leading up to the collision. They also assumed that a collision between their ship and *Rexandra* had not occurred. Consequently, the second mate did not immediately report the incident to the ship's master and he made no attempt to contact the damaged fishing vessel.

While *Rexandra*'s skipper was aware that the ship was approaching the fishing vessel, he did not take early action when he became aware that a risk of collision existed.

The costs associated with repairing the damage *Rexandra* sustained in the collision outweighed the cost of the vessel. As a result, *Rexandra* was scrapped.

FACTUAL INFORMATION

Namhae Gas

Namhae Gas is a Korean registered LPG tanker (Figure 1). It has an overall length of 110 m, a beam of 17.6 m, a depth of 7.8 m and a deadweight of 3676 tonnes at its summer draught of 4.96 m. It has an LPG cargo capacity of 4521 m^3, which is carried in three refrigerated tanks located forward of the accommodation. The ship's bridge is equipped with navigational equipment consistent with SOLAS[3] requirements.

At the time of the incident, *Namhae Gas* had a complement of 14 Korean nationals. While at sea, the mates maintained a watch-keeping routine of four hours on, eight hours off. During the hours of darkness, a seaman was also posted on each watch as a dedicated lookout.

The second mate on the bridge at the time of the collision had about 19 months of seagoing experience. He graduated from maritime college early in 2007 and held a Korean class three certificate of competency. *Namhae Gas* was the second ship he had served on and he had joined it on 24 November 2007, six days prior to the collision.

The seaman on lookout duty at the time of the collision had been at sea for about 17 years and had joined *Namhae Gas* on 11 October 2007.

Figure 1: *Namhae Gas*

Rexandra

Rexandra (Figure 2) was a 15.24 m timber fishing vessel which operated out of Mooloolaba, Queensland. It had a beam of 5.56 m, a depth of 2.29 m and a gross tonnage of 48.1.

1 All times referred to in this report are local time, Coordinated Universal Time (UTC) +10 hours.

2 A nautical mile of 1852 m.

3 The International Convention for the Safety of Life at Sea, 1974, as amended.

At the time of the incident, *Rexandra* was owned by Aquapalm, Queensland and registered with Maritime Safety Queensland. It was built in 1979, and was constructed of hardwood planks over hardwood frames. The hull and wheelhouse were painted white with blue trim and the decks had been sheathed with glass reinforced plastic (GRP).

Rexandra's wheelhouse was located forward of a large working deck. The helm, engine controls and navigational equipment were located on the port side of the wheelhouse. A central companionway led from the wheelhouse to the sleeping quarters located beneath the forecastle deck, forward of the wheelhouse. The wheelhouse had two access doors, one leading from the port side and the other leading from the after working deck.

Figure 2: *Rexandra*

The vessel was equipped with an echo sounder, an autopilot, a global positioning system (GPS) unit, a very high frequency (VHF) radio and a chart plotter. *Rexandra* was not equipped with radar.

Propulsive power was provided by a 280 hp diesel engine.

At the time of the incident, *Rexandra* had two crew members. The skipper held a Queensland class three skipper's certificate and had been skipper of the vessel for about 19 years. The deckhand had about 15 years experience working on board fishing vessels, including two years on board *Rexandra*.

THE INCIDENT

On 28 and 29 November 2007, *Rexandra* was engaged in prawn trawling operations about 30 miles northeast of Mooloolaba, Queensland. At about 1600 on 29 November, *Rexandra*'s skipper and deckhand awoke after sleeping during the day while the boat was anchored. They shot their nets for the first time that evening at about 1900, after which the deckhand went below to sleep again. The skipper returned to the wheelhouse, where he remained at the helm, with the autopilot engaged. *Rexandra* was making good a speed of about 2.5 knots[4] on a course of about 010° (T).

Rexandra was trawling in the company of several other fishing vessels, working in approximately 95 m of water trailing three nets. *Rexandra*'s skipper reported the weather that evening as fine and clear, with slight seas, a low swell and light north-easterly winds. Visibility was also good, with the moon in its last quarter[5].

At 2330, the skipper woke the deckhand and at 2345, they started retrieving the nets. All the nets were on board by midnight and shortly afterwards, the nets were shot again.

Meanwhile, *Namhae Gas* had departed Gladstone, Queensland, on the morning of 29 November and was en route to Westernport, Victoria. The ship was on a course of 177° (T) and making good a speed of about 14 knots.

Namhae Gas's second mate arrived on the bridge at about 2345 on the 29th and received a handover from the third mate, who left the bridge at 2355. The seaman on lookout duty had also been relieved. Following the handover, the second mate looked at the radar and saw a large target about 12 miles from the ship. He then left the radar on the 12 mile range scale and returned to the chartroom, which was curtained off aft of the wheelhouse.

Between 0010 and 0020 on 30 November, *Rexandra*'s skipper was moving in and out of the wheelhouse while the deckhand was on the working deck sorting the catch. At about 0020, the skipper went into the wheelhouse and saw a ship approaching on the port bow. He estimated that the ship was between five and six miles away. He did not alter course or attempt to contact the ship via VHF radio but remained in the wheelhouse and monitored the approaching ship.

As the skipper observed the ship, he could see that it appeared to be closing on *Rexandra*. At about 0025, he took the engine out of gear. The nets, with approximately 350 m of trawl wire out,

4 One knot, or one nautical mile per hour equals 1.852 kilometres per hour.

5 50% or less of the moon's visible surface is illuminated.

remained down, and *Rexandra*'s heading remained about 010° (T).

When *Rexandra*'s skipper estimated the ship to be about one mile away, he realised that a collision was imminent and he yelled a warning to the deckhand. He then put the engine astern and the vessel's heading started to change to port.

At 0030, *Namhae Gas*'s second mate put a GPS position on the chart and came out of the chartroom. He briefly looked at the radar and then went back into the chartroom. A few minutes later the lookout rushed into the chartroom and told the second mate he had just seen an 'ordinary' light fine to starboard ahead. The second mate quickly came out of the chartroom and saw the light, which he thought was white, and estimated it to be about 200 m from the ship.

The second mate then ordered the lookout to take the wheel as he engaged hand steering mode. He then ordered hard to port on the rudder. He then went out onto the starboard bridge wing.

At 0036, in position 26°23.7'S 153°34.5'E, *Rexandra* struck *Namhae Gas* on the ship's starboard bow. *Rexandra*'s bow was pushed violently to port and the fishing vessel was pushed bodily backwards through the water. After the initial impact, it passed down the starboard side of the ship without further contact.

Immediately after the collision, *Rexandra*'s skipper made a mayday call on VHF Channel 16 and a local radio channel used by fishermen. Several small vessels in the area, a merchant ship about 17 miles away and 'Brisbane Harbour' heard the mayday call.

When *Namhae Gas*'s second mate saw that the light, which was on a fishing vessel, was about ten metres off the ship's starboard quarter, he ordered the rudder to be put hard to starboard, to clear the fishing vessel which was moving astern.

Rexandra's skipper checked if the deckhand was alright, and moved out of the wheelhouse to check the vessel for damage. He was not able to identify the ship, although he noted the ship's grey hull colour and thought he saw the word 'gas' or something similar on the ship's stern as it moved away.

The fishing vessel's bow and surrounding structure was damaged. It was taking on a small amount of water, but its bilge pumps were able to cope with the water ingress. The skipper and deckhand then set about retrieving the nets, which had been tangled during the vessel's change in heading and its backward movement during the collision.

On board *Namhae Gas*, the second mate and the lookout did not know if their ship had collided with the fishing vessel. At about 0040, the second mate ordered that the original course be resumed.

Also at 0040, one of the small vessels that had heard the mayday call on VHF Channel 16 issued a 'mayday relay' call on VHF Channel 16, which was acknowledged by 'Brisbane Harbour'.

At about 0045, 'Brisbane Harbour' contacted *Rexandra* via VHF Channel 16 and was informed by the skipper that no assistance was needed, but if it was, he would contact them.

At 0105, 'Brisbane Harbour' identified the ship most likely to have been involved in the collision by using its automatic identification system (AIS). At about 0115, the 'Brisbane Harbour' officer contacted *Namhae Gas* via VHF Channel 16 requesting the ship's destination and estimated time of arrival, which was provided by the second mate.

At 0130, *Namhae Gas*'s second mate telephoned the chief mate who then came to the bridge. The second mate explained what had occurred. The chief mate then telephoned the master who came to the bridge a short time later. At 0143, after being briefed by the second mate, the master turned the ship onto an almost reciprocal course.

The ship maintained a northerly heading during which time they neither heard nor saw anything that indicated that a collision had occurred. After 15 minutes, the master ordered a heading of 177° (T). By about 0205, the ship had resumed its original course.

Rexandra arrived back in Mooloolaba at 0900 on 30 November and *Namhae Gas* arrived in Westernport on the morning of 3 December.

ANALYSIS

Australian Federal Police officers and investigators from the Australian Transport Safety Bureau (ATSB) took paint samples from *Namhae Gas* after it had berthed in Westernport and from *Rexandra* while it was on a slipway in Mooloolaba.

The paint samples from *Namhae Gas* were taken from newly created contact marks on the ship's

starboard shoulder (Figure 3). The marks were consistent with the ship being hit by a metal and wooden object which then slid partway down the ship's starboard side.

The damage to *Rexandra*'s bow was consistent with the fishing vessel hitting something nearly head on, then moving to port.

Forensic analysis of the paint samples strongly supports the proposition that the two vessels came into contact with each other.

Figure 3: Markings on *Namhae Gas*'s bow

LOOKOUT

The crew members on board *Namhae Gas* and *Rexandra* were obliged to maintain a proper lookout in accordance with Rule 5 of the International Regulations for the Prevention of Collisions at Sea, 1972 as amended (COLREGS).

Namhae Gas

When the third mate handed over the watch to the second mate, he made no mention that he had seen any other traffic in the ship's vicinity. He was in a hurry to leave the bridge and had plotted a position by dead reckoning (i.e. estimation) for midnight.

The handover of the watch was conducted solely in the chartroom, which was separated from the wheelhouse by a curtain. Neither mate moved from the chartroom into the darkened wheelhouse to look out of the bridge windows or to look at the radars (only one of which was operating). The second mate did not check the estimated midnight position which the third mate had put on the chart.

Furthermore, after taking over the watch, the second mate quickly looked at the radar and returned in the chartroom. At that time, *Namhae Gas* and *Rexandra* were about nine miles from each other, and *Rexandra* was fine on the ship's starboard bow.

It was not until the lookout came into the chartroom, just after 0030, that the second mate became aware that there was a vessel ahead of the ship. By that stage, the range between the two vessels had reduced to be less than 0.9 miles, with *Rexandra* still fine on the ship's starboard bow.

When he took over the watch, the second mate, and the lookout, should have been maintaining a proper lookout and therefore should have been able to see the fishing vessel at about midnight. In addition to its navigation lights, R*exandra*'s working deck floodlights were on which, according to the skipper, illuminated an area about 60 m around the vessel. There were also several other similarly lit fishing vessels in the vicinity, all of which were proceeding in the same direction as *Rexandra*.

Not only did the lookout not see *Rexandra* until just after 0030, he also did not see any of the other fishing vessels.

The second mate was preoccupied with activities in the chartroom immediately after he took over the watch and did not have an appreciation of any traffic in the ship's vicinity because he had not looked out of the bridge windows. He also did not appropriately use the ship's radar, by changing to a lower range scale, to check for targets in the immediate area.

The evidence indicates that both the second mate and the lookout were not maintaining an effective lookout in accordance with the COLREGS.

Rexandra

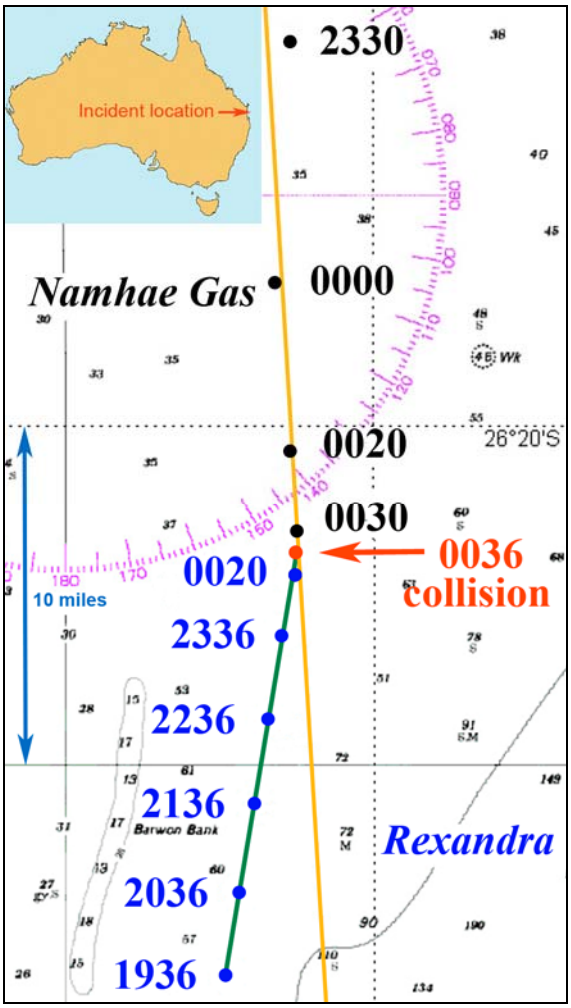
Because *Rexandra* was not equipped with radar or any other electronic collision avoidance/ warning aids, it was of paramount importance that the skipper maintained a proper visual lookout at all times.

A reconstruction of the relative positions of the two vessels[6] (Figure 4) shows that when he first saw the lights of the ship at 0020, they were only 3.6 miles apart, on an almost steady bearing.

6 *Rexandra*'s positions estimated based on a speed of 2.5 knots.

Given the skipper's height of eye above the sea, *Namhae Gas*'s relatively low profile above the water and the prevailing weather conditions, the evidence indicates that *Rexandra*'s skipper was keeping an appropriate lookout and saw *Namhae Gas* at the earliest opportunity.

Figure 4: Section of navigation chart Aus 365



RISK OF COLLISION

Rule 7 (d) of the COLREGS states:

> In determining if risk of collision exists the following considerations shall be among those taken into account:
>
> - such risk shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change.

The plotting of *Namhae Gas* and *Rexandra*'s tracks shows that the two vessels were on a relatively steady bearing for more than an hour before the collision occurred (Figure 4). Therefore, the risk of collision existed all of this time.

On the morning of 30 November, *Rexandra* was engaged in fishing, and exhibiting lights in accordance with the COLREGS. It was also a crossing vessel, passing very slightly from *Namhae Gas*'s starboard to port.

In both the cases, under the COLREGS *Namhae Gas* was required to give way to *Rexandra*. However, no one on *Namhae Gas*'s bridge detected *Rexandra* until the collision was imminent, when the second mate ordered the last minute alteration of course to port, away from the fishing vessel. He then ordered the rudder to starboard in, what he believed to be, an attempt to prevent the ship's stern contacting the fishing vessel.

The lookout being maintained on board *Namhae Gas* by the second mate and the lookout was manifestly inadequate. This resulted in the action taken by the second mate to avoid the collision being initiated far too late.

At about 0020, *Rexandra*'s skipper went into the wheelhouse and saw a ship approaching on *Rexandra*'s port bow. His opinion at that time was that it was 'closing on my course and did not appear to make any changes to his course'.

At that time, because it was night and not having radar to assist him, *Rexandra*'s skipper overestimated the distance between the two ships to be 'easily five or six miles'. This overestimation probably led him to believe that he had more time to assess the situation that was developing than he actually did.

It is also probable that he believed, because his vessel was exhibiting the correct lights under the COLREGS, and had its working lights on, that the crew on board the ship would carry out their obligations under the COLREGS and keep clear of his vessel. As a result, he maintained *Rexandra*'s course and speed and did not take any avoiding action for about five minutes.

By 0025, he was concerned that the ship was not altering course so he disengaged the engine, and then put it astern in an attempt to avoid a collision. However, this action was not enough to prevent the collision.

Rule 8 (a) of the COLREGS states that any action to avoid collision 'shall, if the circumstances of the case, be positive' and 'made in ample time'.

The action *Rexandra*'s skipper took to avoid the collision was too little, too late.

Because *Rexandra* was trailing nets, the vessel was restricted in its ability to alter course and/or speed in a timely manner. The skipper would have been aware of the time he would need to take avoiding action and therefore, he should have more carefully assessed the risk of collision when he saw *Namhae Gas*, regardless of whether *Rexandra* was the stand-on vessel or not.

From 0020, he could have confirmed his initial opinion by taking bearings of the ship. While this is difficult on small vessels, he could have easily positioned himself within the wheelhouse where he could observe the approaching ship relative to an object on board, e.g. a window frame. By doing this, he would have determined if the ship remained nearly in the same position relative to that object and if it did, then a risk of collision existed.

Rule 7 (a) of the COLREGS states:

> Every vessel shall use all available means appropriate to the prevailing circumstances and conditions to determine if risk of collision exists. If there is any doubt such risk shall be deemed to exist.

As Rule 7 (a) states, if he was in any doubt at all, the skipper should have assumed that a collision could occur and take action alone, and not endanger his crew or vessel by relying solely on the crew of the ship to 'do the right thing'.

Therefore, had the skipper taken some form of action at or just after 0020, some 16 minutes before the collision, including calling the ship on the VHF radio, the result may have been either the ship's officer on watch becoming alerted to the fishing vessel's presence or *Rexandra*'s skipper having more time in which to manoeuvre the fishing vessel and nets in a way to avoid the collision.

Time to take action

When vessels are approaching one another on a 'collision course', there are three phases which can be identified: an early period when the 'target' is detected but when action to avoid collision can be deferred; a critical period when action must be taken; and a terminal period when it is too late to prevent impact.[7]

Namhae Gas and *Rexandra* were approaching at a combined speed of about 15.5 knots. The responsible persons in charge of these two vessels only implemented actions to avoid a collision within the terminal period.

Because a proper lookout was not being kept on board *Namhae Gas*, the early and critical periods passed with no action being taken.

Rexandra's skipper did have the opportunity to take action within the critical period but he did not recognise the threat. When he realised that a collision was imminent, at a distance of about one mile, he only had about four minutes in which to take action to avoid the collision. This was not enough time, given his restricted ability to manoeuvre.

ACTIONS AFTER THE COLLISION

Article 98 of the United Nations Convention of the Laws of the Sea (UNCLOS) clearly outlines the responsibilities of a ship's master following a collision at sea. It states that:

> Every state shall require the master of a ship flying its flag, in so far as he can do so without serious danger to the ship, the crew or the passengers, after a collision, to render assistance to the other ship, its crew and its passengers and, where possible, to inform the other ship of the name of his own ship, its port of registry and the nearest port at which it will call.

As the master's delegate on the bridge, the second mate was responsible to ensure that the master's standing orders were followed. He was also responsible for ensuring that all the appropriate rules and regulations were complied with while he was in charge of the navigational watch.

Both *Namhae Gas*'s second mate and lookout stated that they did not see, feel or hear the collision. At the time, they surmised that the two vessels had merely passed very close to each other.

It is possible that following the collision, the second mate was in denial that a collision did occur. This might be the reason he did not report the incident to the ship's master, as per the ship's standing orders, waking the chief mate instead at 0130. It may also be the reason he made no attempt to contact the fishing vessel to determine

7 Supplement to the Nautical Institute, *Seaways*, January 1994 – Radar detectability and collision risk.

if it had been damaged or whether its crew needed assistance.

Furthermore, even when 'Brisbane Harbour' made contact with the ship via VHF Channel 16 at 0115, the second mate still did not call the ship's master, or initiate a turn to return the ship to the location of the collision, or in his opinion, the close quarters situation. It was not until the master arrived on the bridge, one hour after the collision, that the ship was turned around.

However, having turned the ship around shortly after 0143, there was no attempt to return to the 0036 position. The ship only remained on a northerly course for about 15 minutes before resuming a course of 177° (T). In addition, at no time did the ship's personnel make a VHF call to vessels in the vicinity to ascertain if a fishing vessel was having trouble.

Even though the VHF radio was tuned to Channel 16, *Namhae Gas*'s second mate and lookout stated in their interview that they did not hear any VHF Channel 16 radio transmissions regarding *Rexandra* after the collision.

It is possible that the second mate was on the bridge wing watching the passing fishing vessel at the time of the initial mayday call. However, given the number of other transmissions clearly able to be heard on VHF Channel 16 in the eleven minutes immediately following the collision, which were directly associated with *Rexandra,* it is more likely that the second mate did hear the subsequent VHF radio conversations. If so, he could have been in no doubt that a collision had occurred but he did nothing about it for about 55 minutes, until he telephoned the chief mate at 0130.

The ship's crew did not make any real effort to ascertain whether a collision had actually occurred and therefore did not follow the practices of good seamanship. They also disregarded their legal and moral obligations to ensure the safety of the fishing vessel's crew following the collision.

RADAR DETECTABILITY

In the prevailing sea conditions, *Rexandra* should have been visible to *Namhae Gas*'s radar at approximately six miles[8]. However, targets such as *Rexandra* (wooden/GRP construction, low profile vessels) are often lost or are seen intermittently when sea clutter (echoes from waves) interferes with their detection, especially at the centre of a radar screen when such targets are close to the ship.

With respect to a ship's radar, it is essential for fishing vessel skippers and bridge watch-keepers to understand that small vessels, with weak radar echoes, can only be detected at a limited range and are likely to be lost close in due to clutter.

Small vessels should, in an attempt to improve their vessel's radar detectability, be fitted with a radar reflector. A radar reflector can be a simple and inexpensive device that improves a vessel's radar reflection, or it can be an active reflector (a radar transponder) that transmits a pulse when it is activated by an incoming radar signal, and this pulse is, in turn, detected by a ship's radar.

Rexandra was not equipped with a radar reflector and hence its detectable range was significantly less than it could have been.

The ATSB has published several safety investigation reports on collisions between fishing vessels and ships where a radar reflector could have improved the detectability of the smaller craft. The ATSB has also published Safety Bulletin Five on the topic. These can be downloaded from the ATSB web site: www.atsb.gov.au.

AUTOMATIC IDENTIFICATION SYSTEM (AIS)

Vessel traffic services (VTS) and ships use AIS for identifying and locating nearby ships. The system helps to resolve the difficulty in positively identifying ships by providing them with a means for exchange of identification, position, course, speed and other ship data.

The system works by integrating a VHF transceiver with an electronic navigation system, such as a GPS, and other on board navigational sensors.

The system is a useful aid to collision avoidance in areas where small vessels may be operating. It provides an additional method of identifying a

8 Supplement to the Nautical Institute, *Seaways*, January 1994 – Radar detectability and collision risk.

potential collision risk that can be used independently of radar or visual means.

While it is not a requirement for fishing vessels to be fitted with an AIS, it is a SOLAS requirement that an AIS is fitted on board ships of 300 gross tons or more, and all passenger ships regardless of size.

If *Rexandra* had been fitted with an AIS unit, the vessel would probably have been positively identifiable on board *Namhae Gas*, had the second mate used AIS as a watchkeeping aid. It is likely that, if the second mate was armed with this information, he might have been in a position to take appropriate action early enough to avoid the collision.

In addition, had *Rexandra* had an AIS unit on board, the skipper could have identified the approaching ship by name and made a VHF radio call to the ship, using its name, as soon as he became concerned that it had not altered its course. This would have alerted the ship to the fact that there were other vessels in the area.

FINDINGS

Contributing Safety Factors

- Neither *Namhae Gas*'s second mate nor lookout were keeping a proper lookout in the time leading up to the collision.
- *Namhae Gas*'s second mate did not immediately report the collision to the ship's master and he made no attempt to contact the damaged fishing vessel.
- *Rexandra*'s skipper did not make a proper appraisal of the risk of collision.

Other safety factors

- *Rexandra*'s electronic detectability was reduced because of the vessel's timber construction and the lack of a radar reflector or an AIS unit. *[Safety issue]*

SAFETY ACTION

The safety issues identified during this investigation are listed in the findings and safety actions sections of this report. The Australian Transport Safety Bureau (ATSB) expects that all safety issues identified by the investigation should be addressed by the relevant organisation(s). In addressing those issues, the ATSB prefers to encourage relevant organisation(s) to proactively initiate safety action, rather than to issue formal safety recommendations or safety advisory notices.

All of the responsible organisations for the safety issues identified during this investigation were given a draft report and invited to provide submissions. As part of that process, each organisation was asked to communicate what safety actions, if any, they had carried out or were planning to carry out in relation to each safety issue relevant to their organisation.

ATSB safety advisory notices

MS20080027

Rexandra's electronic detectability was reduced because of the vessel's timber construction and the lack of a radar reflector or an AIS unit.

The Australian Transport Safety Bureau advises that ship and fishing vessel owners, operators' masters/skippers and State/Northern Territory marine regulators should consider the safety implications of this safety issue and to take action where it is considered appropriate.

SUBMISSIONS

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.

A draft of this report was provided to the master, the second mate and the owners of *Namhae Gas*, the owners and skipper of *Rexandra*, the Australian Maritime Safety Authority, Maritime Safety Queensland and the Australian Federal Police.

Submissions were received from the owners and second mate of *Namhae Gas*, the skipper of *Rexandra*, Maritime Safety Queensland and the Australian Federal Police. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly.

Publication No.: INFRA-08234