Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT
Marine Occurrence Investigation No. 268
MO-2009-008
Final

Independent investigation into the collision between the Australian registered yacht

Ella's Pink Lady

and the Hong Kong registered bulk carrier

Silver Yang

off Point Lookout, Queensland

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Released in accordance with section 25 of the *Transport Safety Investigation Act 2003*

Published by: Australian Transport Safety Bureau
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ISBN and formal report title: see „Document retrieval information' on page v

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DOCUMENT RETRIEVAL INFORMATION

Report No.	Publication date	No. of pages	ISBN	ISSN
268	June 2010	52	978-1-74251-041-5	1447-087X

Publication title

Independent investigation into the collision between the Australian registered yacht *Ella*'s *Pink Lady* and the Hong Kong registered bulk carrier *Silver Yang* off Point Lookout, Queensland, on 9 September 2009.

Prepared By

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Reference Number

Mar10/ATSB68

Abstract

At 0150½ on 9 September 2009, in a position about 15 miles to the east of Point Lookout, North Stradbroke Island, Queensland, the Australian registered single-handed yacht *Ella's Pink Lady* collided with the Hong Kong registered bulk carrier *Silver Yang*.

At the time of the collision, *Silver Yang* was en-route to China and travelling at a speed of about 9 knots on a northerly heading. *Ella's Pink Lady* was under sail on a voyage from Mooloolaba, Queensland, to Sydney, New South Wales. The yacht was making good a south-easterly course at a speed of about 7 knots.

Ella's Pink Lady was dismasted as a result of the collision, but the skipper was able to cut the headsail free, retrieve the mast, the mainsail and the rigging on board and motor the damaged yacht to Southport, Queensland.

The Australian Transport Safety Bureau (ATSB) investigation found that *Ella's Pink Lady* was not fitted with a passive radar reflector and that, at the time of the collision, neither the yacht's skipper nor the ship's watch keepers were keeping a proper lookout or appropriately using the available electronic aids to navigation to make a full appraisal of the situation and the risk of collision. The investigation also found that, following the collision, the ship's watch keeper did not initiate contact or offer any form of assistance to the yacht's crew and that, when contacted by the yacht's skipper via VHF radio, he could not be clearly understood.

The ATSB acknowledges the safety actions taken to address these safety issues and, in addition, has issued two safety advisory notices. As a consequence, the visibility of *Ella's Pink Lady* was enhanced, attention has been drawn to limits in the detectability of Class B AIS transmissions and the international requirement to render assistance following a collision has been highlighted.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated. The terms the ATSB uses to refer to key safety and risk concepts are set out in the next section: Terminology Used in this Report.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

TERMINOLOGY USED IN THIS REPORT

Occurrence: accident or incident.

Safety factor: an event or condition that increases safety risk. In other words, it is something that, if it occurred in the future, would increase the likelihood of an occurrence, and/or the severity of the adverse consequences associated with an occurrence. Safety factors include the occurrence events (e.g. engine failure, signal passed at danger, grounding), individual actions (e.g. errors and violations), local conditions, current risk controls and organisational influences.

Contributing safety factor: a safety factor that, had it not occurred or existed at the time of an occurrence, then either: (a) the occurrence would probably not have occurred; or (b) the adverse consequences associated with the occurrence would probably not have occurred or have been as serious, or (c) another contributing safety factor would probably not have occurred or existed.

Other safety factor: a safety factor identified during an occurrence investigation which did not meet the definition of contributing safety factor but was still considered to be important to communicate in an investigation report in the interests of improved transport safety.

Other key finding: any finding, other than that associated with safety factors, considered important to include in an investigation report. Such findings may resolve ambiguity or controversy, describe possible scenarios or safety factors when firm safety factor findings were not able to be made, or note events or conditions which „saved the day' or played an important role in reducing the risk associated with an occurrence.

Safety issue: a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operational environment at a specific point in time.

Risk level: The ATSB's assessment of the risk level associated with a safety issue is noted in the Findings section of the investigation report. It reflects the risk level as it existed at the time of the occurrence. That risk level may subsequently have been reduced as a result of safety actions taken by individuals or organisations during the course of an investigation.

Safety issues are broadly classified in terms of their level of risk as follows:

- **Critical** safety issue: associated with an intolerable level of risk and generally leading to the immediate issue of a safety recommendation unless corrective safety action has already been taken.
- **Significant** safety issue: associated with a risk level regarded as acceptable only if it is kept as low as reasonably practicable. The ATSB may issue a safety recommendation or a safety advisory notice if it assesses that further safety action may be practicable.
- **Minor** safety issue: associated with a broadly acceptable level of risk, although the ATSB may sometimes issue a safety advisory notice.

Safety action: the steps taken or proposed to be taken by a person, organisation or agency in response to a safety issue.

EXECUTIVE SUMMARY

At 0150½ on 9 September 2009, in a position about 15 miles[1] to the east of Point Lookout, North Stradbroke Island, Queensland, the Australian registered single-handed yacht *Ella's Pink Lady* collided with the Hong Kong registered bulk carrier *Silver Yang*.

At the time of the collision, the conditions were excellent, the sky was well lit by a half moon, visibility was good and the seas were slight.

Ella's Pink Lady was on a voyage from Mooloolaba, Queensland, to Sydney, New South Wales, via Lord Howe Island. The yacht was under sail and making good a south-easterly course at a speed of about 7 knots[2].

Silver Yang was fully loaded and en-route to China, travelling at a speed of about 9 knots on a northerly heading.

About 5 minutes before the collision, *Ella's Pink Lady*'s skipper checked for ships in the area, both visually and on the radar, before going to bed for a short sleep. However, she did not detect *Silver Yang*.

Silver Yang's second mate and a seaman were on duty on the ship's bridge, but they did not see *Ella's Pink Lady* until 2½ minutes before the collision. At first, they thought the light was a fishing vessel. However, it did not appear to be moving so they concluded that it was a buoy. The second mate then altered the ship's heading by a few degrees to starboard in an attempt to give it some passing room.

The second mate then realised that the light was not a buoy and that there was a risk of collision. He instructed the seaman to put the helm over to starboard 20°; then hard-to-starboard. However, this action did not prevent the two vessels from colliding.

Ella's Pink Lady was dismasted as a result of the collision. The skipper checked that her vessel was seaworthy and then called her parents who, in turn, notified the Australian Rescue Coordination Centre (RCC). The RCC called the yacht and confirmed that the skipper did not require assistance. The RCC then reported the incident to the Queensland Police. Together, the RCC and the Queensland Police continued to monitor the situation.

About 20 minutes after the collision, *Ella's Pink Lady*'s skipper called *Silver Yang* on very high frequency (VHF) radio channel 16. The second mate eventually replied, and was able to ascertain that the yacht's skipper was safe, but he did not offer her any form of assistance.

Ella's Pink Lady's skipper was able to cut the headsail free, retrieve the mast, the mainsail and the rigging on board and motor the damaged yacht to Southport, Queensland, where it berthed at 1255.

The Australian Transport Safety Bureau (ATSB) investigation found that *Ella's Pink Lady* was not fitted with a passive radar reflector and that, at the time of the collision, neither the yacht's skipper nor the ship's watch keepers were keeping a proper lookout

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[1] A nautical mile of 1852 m.

[2] One knot, or one nautical mile per hour equals 1.852 kilometres per hour.

or appropriately using the available electronic aids to navigation to make a full appraisal of the situation and the risk of collision.

The investigation also found that, following the collision, the *Silver Yang*'s watch keeper did not initiate contact or offer any form of assistance to *Ella Pink Lady*'s skipper and that when contacted by the yacht's skipper via VHF radio he could not be clearly understood.

The ATSB acknowledges the safety actions taken to address these safety issues and, in addition, has issued two safety advisory notices. As a consequence, the visibility of *Ella's Pink Lady* was enhanced, attention has been drawn to limits in the detectability of Class B AIS transmissions and the international requirement to render assistance following a collision has been highlighted.

1 FACTUAL INFORMATION

1.1 *Silver Yang*

Silver Yang is a conventional „Panamax'[3] bulk carrier with seven cargo holds located forward of the ship's accommodation superstructure (Figure 1). The ship was built in 1982 in Copenhagen, Denmark. It has an overall length of 225.03 m, a moulded breadth of 32.31 m, a moulded depth of 18.01 m and a deadweight of 63,800 t at its summer draught of 13.08 m.

The ship's propulsive power is provided by a B&W 5L80GFCA single acting, direct reversing, two-stroke diesel engine. The engine develops 9,268 kW and drives a fixed pitch propeller, giving the ship a service speed of about 12 knots.

Figure 1: ***Silver Yang***

At the time of the incident, the ship was owned by Li Chuan Shipping, Panama, managed by China Shipping Development, China, registered in Hong Kong and classed with the China Classification Society (CCS).

Silver Yang's bridge was equipped with navigational equipment in accordance with SOLAS[4] requirements. This included two automatic radar plotting aid (ARPA) equipped X-band radars, a JRC JMA-900 and a Kelvin Hughes Nucleus 6000A, an Anschutz Kiel autopilot, a SAAB R4 Class A automatic identification system (AIS) unit, two global position system (GPS) units, two Sailor very high frequency (VHF) radios and a Kelvin Hughes MDP-A5 simplified voyage data recorder (S-VDR).

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[3] A ship that is limited in size to the dimensions of the Panama Canal.

[4] The International Convention for the Safety of Life at Sea, 1974, as amended.

The ship's crew consisted of 27 Chinese nationals. While at sea, the three mates maintained a traditional 4 hours on/8 hours off watch keeping routine. In addition, during the hours of darkness, an able bodied seaman was assigned to each watch to act as a lookout.

The master had 41 years of seagoing experience and had been employed by China Shipping Development for all that time. He had served as master since 1987. He held a Chinese master's certificate of competency and had been issued with an equivalent Hong Kong licence. He joined *Silver Yang* on 3 July 2009.

The second mate, the watch keeper assigned to the twelve to four watch, began his seagoing career in 2005. In 2008, he obtained his Chinese second mate's certificate of competency and was subsequently issued with an equivalent Hong Kong licence. At the time of the collision, he had a total of 6 months experience as second mate and had been on board *Silver Yang* for about 1 month.

1.2 *Ella's Pink Lady*

Ella's Pink Lady is a Sparkman and Stephens 34 foot sloop rigged yacht (S&S 34). It was built in 1984 and is constructed of glass-reinforced plastic (GRP). The yacht has a displacement of about 6.2 t, an overall length of 10.12 m, a beam of 3.07 m and a draught of 1.78 m. It has a combined maximum sail area of about 60 m^2 and carries a mainsail and a furling headsail on an aluminium mast that measures 12 m above the cabin top.

At the time of the incident, the yacht was privately owned and registered under the name *McIntyre Adventure*. It had been loaned to its current skipper to enable her to attempt an unassisted, solo, round-the-world voyage. During the previous year, the yacht had undergone an extensive refit and re-named *Ella's Pink Lady* (Figure 2).

The yacht has an open cockpit area aft with inward facing bench seats on the port and starboard sides. Above the forward end of the cockpit is a solid canopy mounted on the cabin top. Access from the cockpit to the cabin is through an aft facing companionway. The cabin contains a bunk and galley to starboard, a toilet forward and a large storage bin and chart table to port.

Auxiliary propulsive power is supplied by a 22 kW Yanmar 3YN inboard diesel engine, which drives a single folding propeller.

There were no internationally recognised construction standards that *Ella's Pink Lady* had to satisfy for the vessel to depart on its round-the-world voyage. Similarly, there were no standards that outlined the equipment that had to be fitted on board the vessel for such a voyage. However, *Ella's Pink Lady* was fitted out to the requirements of the International Sailing Federation „Category 0 Rules'[5].

[5] A set of rules that apply to yachts competing in trans-oceanic races, including races which pass through areas in which air or sea temperatures are likely to be less than 5° Celsius other than temporarily, where yachts must be completely self-sufficient for very extended periods of time, capable of withstanding heavy storms and prepared to meet serious emergencies without the expectation of outside assistance.

The yacht was normally steered by a tiller. However, in preparation for its round-the-world voyage, it had been fitted with three auto-pilots; a tiller mounted auto-pilot, a Fleming wind vane and a linear hydraulic ram fitted directly onto the steering quadrant.

Figure 2: ***Ella's Pink Lady***

Port and starboard navigation sidelights (separate units) were mounted on the yacht's bow (pulpit) railing, about 1.5 m above the waterline. A stern light was mounted at about the same height on the stern. A tri-colour navigation light[6] was also fitted to the masthead. The navigation lights met the statutory requirement for a vessel of this size, hence the sidelights should be visible at a range of at least 1 mile.

The navigation equipment on board the yacht included fixed and hand-held magnetic bearing compasses, a Navico NAIS-300 Class B AIS unit, a Simrad radar, four GPS units, an Echomax X-band radar enhancer, a Simrad NX40 Navstation

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[6] A single unit that includes a stern light and port and starboard side lights.

(integrated chart-plotter/radar display with GPS and AIS inputs). The yacht was also equipped with four laptop computers, one of which had been loaded with C-Map electronic charting software.

The yacht's communication equipment included two VHF radios, a high frequency (HF) radio, an Inmarsat-M satellite email/telephone unit and an Iridium satellite telephone.

At the time of the incident, the skipper was the only person on board *Ella's Pink Lady*. She was 16 years of age and had about 8 years of recreational sailing experience. For the past few years, she had been preparing for a solo, unassisted, round-the-world voyage. During that time, she had taken part in a number of ocean voyages on board conventionally crewed yachts[7], including two voyages from Vanuatu to Australia, a voyage from Queensland to Tasmania, a trans-Tasman voyage and a number of coastal yacht races. She held a Queensland „recreational marine driver licence' and had completed a number of training courses including; survival at sea, radar observer, radio operator and an Australian Yachting Federation yacht master's course[8]. She had also read a number of books relating to disaster management and solo yachting tactics.

1.3 The incident

At 0320 on 6 September 2009, *Silver Yang* berthed in Newcastle, New South Wales, to load coal for export to Jingtang, China.

Cargo operations finished on the morning of 7 September and at 1300, the ship departed its berth with a harbour pilot on board. At about 1340, after the pilot had disembarked, the master set the course and commenced the voyage to Jingtang.

Over the following 36 hours, *Silver Yang*'s voyage, northwards along Australia's east coast, progressed as planned.

At about 1000 on 8 September, *Ella's Pink Lady* departed from Mooloolaba, Queensland, bound for Sydney, New South Wales, via Lord Howe Island. The voyage was a 10 day test run before the skipper departed Sydney on a solo, unassisted, round-the-world voyage. On this leg of the voyage, she intended to clear the coastline as soon as possible and then set a course for Lord Howe Island. However, the wind was only light and the current pushed the vessel southwards, so she was unable to clear the coast as early as she had planned.

In the prevailing conditions, the skipper was „feeling a little queasy'. She had experienced this feeling before and expected that it would pass in the next 24 hours.

During the afternoon, „the wind glassed right out' so the skipper started the engine and motored *Ella's Pink Lady* for several hours. By sunset, the yacht was off Cape Moreton, to the east of Brisbane, Queensland. The wind had freshened from the west and the yacht was again under sail, with both the mainsail and the headsail set.

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[7] Yachts crewed by more than one person.

[8] While the skipper had completed this course she could not be awarded a Yacht Masters Certificate because she was under 18 years of age.

Ella's Pink Lady was now travelling at a speed of about 4 knots[9] in conditions that the skipper described as „nice and flat with perfect sailing conditions'. Visibility was good and a half moon was due to rise at 2056 and set at 0725 the following morning.

After sunset, *Ella's Pink Lady*'s skipper had a catnap (short period of sleep) every couple of hours. Before each catnap, she checked the radar, which she had set on the 8 mile range, for any vessels in the area. She then set the radar inner and outer guard-rings at 2 miles and 4 miles respectively. Once she considered that it was safe to have a catnap, she set three alarm clocks to wake her about 5 minutes later and then went to bed.

At midnight, *Silver Yang*'s third mate noted the visibility and recorded it in the bridge logbook as being up to 11 miles.

By 0030 on 9 September, *Ella's Pink Lady* was about 15 miles northeast of Point Lookout (Figure 3) and making good a course of about 140°(T) at a speed of 4 knots. The yacht was near the 100 fathom[10] line and in the south-setting East Australia Current. *Silver Yang* was about 17 miles east-southeast of Point Lookout, on a northerly heading and travelling at a speed of 8.7 knots.

At about 0146, *Ella's Pink Lady*'s skipper prepared for another catnap. The yacht was now making good a course of 144°(T) at a speed of 6.8 knots. The skipper checked the radar and noted that there was a vessel about 6 miles off the starboard quarter[11] (Figure 4). She could not see it visually, but she monitored its progress on the radar for about 1 minute. Once she had determined that it did not present a collision risk, she again set the radar guard-rings and alarm clocks before going to bed. By this time, *Silver Yang* was about 1 mile to the south-southeast of *Ella's Pink Lady*'s position (Figure 5). However, the yacht's skipper had not detected the ship's presence.

At 0148, *Silver Yang*'s second mate observed a single green light about 45° on the port bow. He estimated that it was at a range of about 3 to 5 miles. At first, he thought that the light may have been a small fishing vessel, but it didn't appear to be moving. At 0148½, he altered the ship's heading by a few degrees to starboard, to give more passing room to what he and the lookout now thought might be a buoy.

Silver Yang's second mate and lookout continued to observe the light, which remained at a constant bearing. The two men concluded that the light was stationary, but when the ship got closer to it, they thought that it started moving quickly towards their ship.

At 0149½, the lookout took the helm and the second mate ordered starboard 20° in an attempt to avoid a collision. About 10 seconds later, he ordered hard-to-starboard. However, at 0150½, *Ella's Pink Lady*'s bow collided with *Silver Yang*'s port side mid-section. The ship had come around to a heading of 024°(T), so the collision was almost square on (Figure 6).

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[9] All speeds referred to in this report are „made good/over the ground'.

[10] One fathom equals 6 feet or 1.83 m.

[11] The part of the vessel between the beam and the stern (aft corner).

Figure 3: **AIS image derived from the Point Lookout AIS base station showing the vessels in the vicinity at 0030**

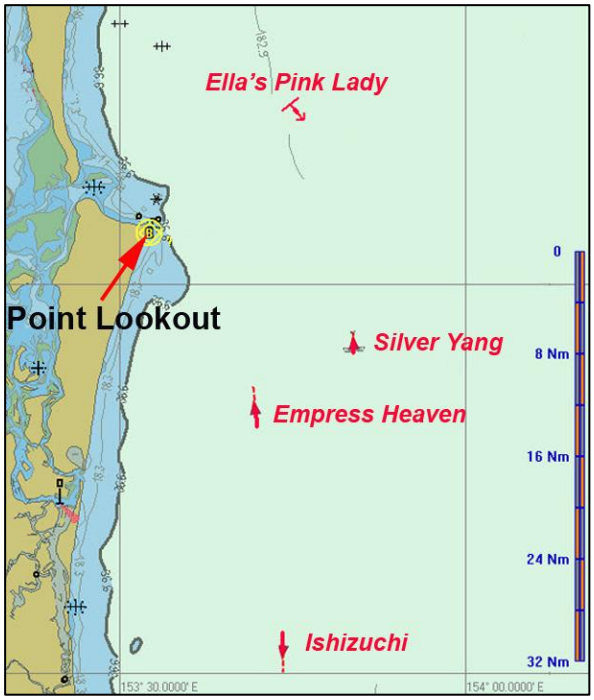


Figure 4: **AIS image derived from the Point Lookout AIS base station showing the vessels in the vicinity at 0146**

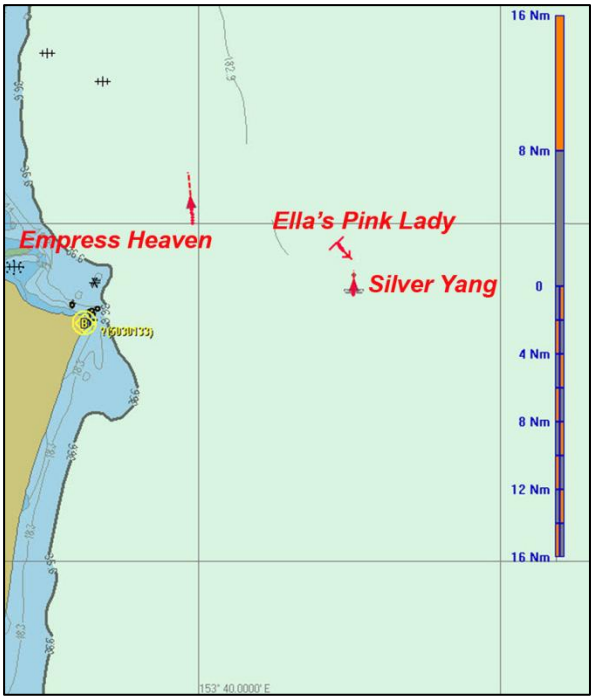


Figure 5: **AIS image derived from the Point Lookout AIS base station showing the relative positions of the *Ella's Pink Lady* and *Silver Yang* at 0146**

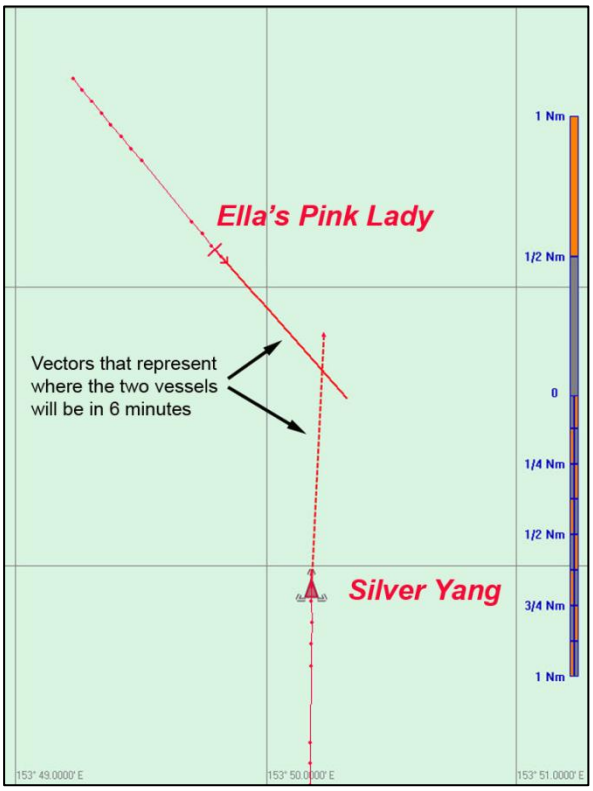
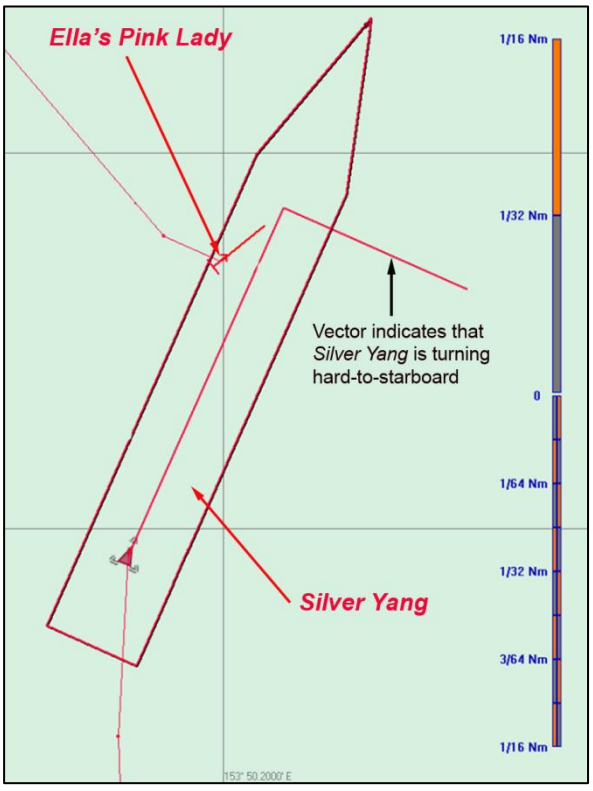


Figure 6: **AIS image derived from the Point Lookout AIS base station at 0150½ showing the collision between the two vessels (*Silver Yang* to scale)**



Immediately following the collision, *Silver Yang*'s second mate ordered port helm and the lookout eased the helm to midships. The second mate could now see that the vessel his ship had just collided with was a yacht and that it was damaged.

The impact of the collision pushed *Ella's Pink Lady*'s bow to port and the yacht's starboard side scraped along the port side of the ship. The collision woke the skipper and she climbed out of the cabin, grabbed the tiller and tried to steer the yacht. She looked upwards and thought that the yacht's rigging would probably become entangled with the ship and dismast her vessel, so she returned to the cabin. A few seconds later, the mast came crashing down.

Once *Ella's Pink Lady* had cleared the ship's stern, the skipper assessed the damage to her yacht (Figure 7). She found no ingress of water and, although the yacht's hull was damaged and it had been dismasted, the vessel appeared to be seaworthy. She then used the yacht's satellite telephone to call her parents. She spoke to her father and told him what had happened. While she was talking to her father, her mother telephoned the Australian Rescue Coordination Centre (RCC) in Canberra and reported the collision.

The RCC then telephoned *Ella's Pink Lady* directly to confirm what assistance the skipper required. She confirmed that she was safe, the yacht was seaworthy, and that when she had the mast, sails and rigging on board and properly tied down, she would motor towards Southport, Queensland.

The RCC reported the incident to the Queensland water police and both the RCC and the police continued to monitor *Ella's Pink Lady*'s progress.

By 0155, *Silver Yang*'s second mate had returned the ship to its original northerly heading. He and the lookout continued to discuss what had just happened, but they could not understand why the yacht had moved towards them.

Figure 7: *Ella's Pink Lady*'s damaged starboard side

At 0205¾, *Ella's Pink Lady*'s skipper made a VHF radio call, „Ship on the horizon, ship on the horizon, ship on the horizon, this is sailing vessel *Pink Lady*, *Pink Lady*, *Pink Lady*, on one six, over'. She received no reply. At 0209½, she made a second similar broadcast, but again received no reply. She then checked the yacht's AIS unit to see if she could determine the name of the ship that her yacht had collided with.

At 0210½, *Ella's Pink Lady*'s skipper made another VHF radio call, „*Silver Yang*, *Silver Yang*, *Silver Yang*, this is sailing vessel *Pink Lady*, *Pink Lady*, *Pink Lady*, on one six, over'. She received no reply, so 30 seconds later, she repeated the broadcast. On this occasion, *Silver Yang*'s second mate replied.

Figure 8: Dismasted *Ella's Pink Lady* motoring towards Southport

It was difficult for *Ella's Pink Lady*'s skipper to understand *Silver Yang*'s Chinese second mate's poor spoken English. However, over a series of short conversations, spread out over a 5 minute period, the ship's second mate was able to ascertain that the yacht was damaged, it had been dismasted and that its crew was safe. During the discussions, *Ella's Pink Lady*'s skipper asked *Silver Yang*'s second mate to provide his ship's identification number but it was not provided.

At 0216½, *Silver Yang*'s second mate telephoned the ship's master and informed him that there had been a collision. About 1 minute later, the master arrived on the bridge. He queried the second mate and the lookout as to what had happened and what they had done to avoid the collision. He also asked them, on a number of occasions, the condition of the yacht's crew. On each occasion, the second mate confirmed that the yacht's crew was safe. The master questioned why the second mate had not taken appropriate action to avoid the yacht; why he did not stop the ship after colliding with the yacht; and why he waited so long before telephoning the master. The second mate offered no answers to the master's questions.

Silver Yang continued on its voyage. Meanwhile, *Ella's Pink Lady*'s skipper cut the headsail free and secured the mainsail, mast and rigging on board the yacht. She then set a course for Southport.

At 0740, the water police vessel *D.A. Shean* departed Southport. At 0820, *D.A. Shean* rendezvoused with *Ella's Pink Lady* and began escorting the yacht towards Southport (Figure 8).

At 1255, the two vessels berthed at the water police facilities in Southport. Later that afternoon, *Ella's Pink Lady* was moved to a private jetty in Runaway Bay, Queensland.

2 ANALYSIS

2.1 Evidence

On 9 and 10 September 2009, investigators from the Australian Transport Safety Bureau (ATSB) attended *Ella's Pink Lady* while it was berthed in Runaway Bay, Queensland. The skipper was interviewed and she provided her account of the incident. Photographs of the vessel were taken and copies of relevant documents, including log books, charts and manuals were obtained.

Since *Silver Yang* was en-route to China, the ATSB investigators were unable to attend the vessel. However, the Hong Kong Marine Department agreed to assist in the investigation by ensuring that the ship's managers provided data from the ship's voyage data recorder (VDR), statements from the master and involved crew members, photographs and copies of relevant documents including log books, charts, procedures and manuals.

Additional information was provided by the Queensland Water Police, Maritime Safety Queensland (MSQ) and the Australian Maritime Safety Authority (AMSA).

On 9 October 2009, the ATSB investigators met with *Ella's Pink Lady*'s skipper to discuss the ongoing investigation, with a view to testing tentative conclusions and providing a briefing on safety issues relevant to *Ella's Pink Lady*. The meeting was held in Sydney, prior to the skipper's departure on a round-the-world voyage.

2.2 Lookout

The International Regulations for the Prevention of Collisions at Sea, 1972 as amended (COLREGS) „…apply to all vessels upon the high seas and in all waters connected therewith navigable by seagoing vessels.' According to the COLREGS, the word „vessel' includes every description of water craft.

The COLREGS contain specific requirements for keeping a lookout and actions to be taken to avoid collision. Rule 5 „Lookout' states:

> Every vessel shall at all times maintain a proper lookout by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and the risk of collision.

Since the COLREGS applied to both *Ella's Pink Lady* and *Silver Yang*, the crew members on board both vessels were responsible for maintaining a proper lookout in order to determine if a risk of collision existed, so that they could take the required action to avoid it. However, neither the yacht's skipper nor the ship's watch keepers complied with this navigational requirement.

2.3 *Silver Yang*'s lookout

At the time of the collision, and during the period of time leading up to it, *Silver Yang*'s bridge was manned by the ship's second mate and a lookout (an able-bodied seaman). Together, the two men were charged with the responsibility of keeping a proper lookout.

The audio component of *Silver Yang*'s voyage data recorder (VDR) data indicates that the second mate and lookout remained in the one location in the wheelhouse during the 30 minutes leading up to the collision. During that period of time, they were engaged in a conversation unrelated to their duties that continued without interruption. It is likely that the two men were engrossed in their conversation and that they were not as attentive to their lookout duties as they should have been. They did not see the yacht until it was 0.6 miles away, only 2½ minutes before the collision.

Ella's Pink Lady's sidelights were visible at a range of at least 1 mile, consistent with statutory requirements. However, in practice, these types of lights are often detectable at greater ranges. At the time of the collision, the sky was well lit by a half moon, visibility was good and the seas were slight. In these excellent conditions, the yacht was probably visible to the watch keepers on board *Silver Yang* at a range of at least 3 miles. This may explain why, when the second mate first saw the yacht, he assumed that it was 3 to 5 miles away. However, it was only 0.6 miles away.

The second mate did not use binoculars to check for any other lights, to confirm the type of vessel that he had detected or its aspect. Furthermore, he did not check the radar or the automatic information system (AIS) unit to ascertain its range. He simply assumed that it was at a range of about 3 to 5 miles.

2.3.1 Electronic aids

Silver Yang was equipped with navigation equipment as required by SOLAS. This included two automatic radar plotting aid (ARPA) equipped X-band radars and an automatic identification system (AIS) unit. At the time of the collision, the AIS unit and one radar were operating[12].

These devices enable navigators to detect vessels which they may not be able to detect visually, to determine their range and bearing; and whether those vessels might pose a collision risk. However, *Silver Yang*'s second mate did not detect *Ella's Pink Lady* with any of the ship's electronic navigation aids.

Radar

For a ship's radar to detect a small fibreglass vessel, like *Ella's Pink Lady*, it is essential for the radar to be correctly tuned and for its gain and clutter controls[13] to be adjusted for optimum performance.

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[12] It is normal practice for only one radar to be operating when a ship is at sea.

[13] Controls to adjust signal strength (gain) and to reduce interference due to waves and rain (clutter).

In theory, with *Silver Yang*'s radar properly adjusted, *Ella's Pink Lady* should have been visible on the ship's radar display at a range of up to about 6 miles[14]. However, the echo displayed on the ship's radar display was still dependent upon the size, shape, aspect and composition of the small vessel and the weather conditions at the time[15]. Furthermore, these types of echoes are often lost or seen intermittently when sea clutter interferes with their detection, especially towards the centre of the radar screen.

While it is likely that the second mate's conversation with the lookout had distracted him from his responsibility to observe the ship's radar to appraise himself of the traffic in the area and the risk of collision, it is possible that he did observe the radar display from time to time and that he did not detect *Ella's Pink Lady* because the radar was either not correctly tuned or the echo provided by the yacht was either faint or intermittent.

AIS

AIS is a very high frequency (VHF) radio broadcasting system that transfers packets of data over a VHF data link. The system enables AIS equipped vessels, and shore-based AIS stations, to send and receive identification information that can be displayed on an electronic chart, computer display or compatible radar.

While it is possible that the echo displayed on *Silver Yang*'s radar display was difficult for the second mate to detect, the VDR data shows that the yacht was detected by the ship's AIS unit at least 38 minutes before the collision.

The VDR data indicates that the ship's AIS unit did not display the yacht's name, or ship type, only its Maritime Mobile Service Identity (MMSI) number and specific navigational data. While the AIS unit would not have alerted the second mate to the presence of *‚Ella's Pink Lady'* or a ‚yacht', it would have indicated that there was a vessel in close proximity to the ship and provided relevant navigational information including its speed and heading. This information should have been enough to alert the second mate to the fact that there was a vessel in the vicinity and that he should continue to monitor its progress by all appropriate means.

However, the second mate did not detect the yacht until he saw it visually 2½ minutes before the collision. This indicates that during the period of time leading up to the collision (at least 38 minutes), he either did not check the AIS unit display or did not comprehend the information it was displaying.

Had the second mate appropriately used the ship's AIS unit, he would have been alerted to the presence of a vessel (*Ella's Pink Lady*) well in advance of the collision. He could have then monitored the developing situation visually, on the radar and using the AIS unit, making it possible to take the necessary avoiding action to prevent the collision.

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

[15] ATSB Safety Bulletin 5 – Fisherman and Safety Awareness at Sea.

2.4 *Ella's Pink Lady*'s lookout

As a result of her training and previous sailing experience, *Ella Pink Lady*'s skipper was aware of the requirement under the COLREGS for her to keep a lookout by sight and hearing at all times. However, since she was alone, she had to balance this legal requirement against her physical need for sleep if she was to successfully complete the voyage to Sydney or her planned global circumnavigation.

Before departing on the voyage, the skipper had decided to achieve this balancing act by taking a number of catnaps (short periods of sleep) throughout the night. It was her intention to keep a visual lookout during the periods when she was awake. She would then determine when it was safe for her to take a catnap. It was her belief that when she was asleep, the navigational aids fitted to her yacht would either alert her to the presence of an oncoming vessel, or alert an oncoming vessel to her yacht's presence, thus enabling the other vessel's crew to take avoiding action if necessary.

The yacht's skipper, like many solo sailors, considered that because hers was a sailing vessel, and hence had right of way over power driven vessels[16], that it was acceptable, and safe, for her to sleep at sea from time to time.

This incident clearly demonstrates the conundrum that exists between long distance solo-sailing and the legal requirements of the COLREGS. Since it was not possible for the yacht's skipper to keep a watch by sight and hearing at all times, it was not possible for her to comply with the COLREGS.

The skipper was aware of this inconsistency. As a result, she had assessed the risks associated with not keeping a visual lookout at all times and had implemented a system that she believed would reduce the risks. This system required the fitment and effective use of navigational aids and an appropriate assessment of when it was safe to take a catnap.

However, she was not meeting her obligation to keep a proper lookout at all times and was, at times, placing her safety in the hands of others and relying on them to maintain a proper lookout and give way to her vessel when necessary.

The skipper stated that before retiring for a catnap just before the collision, she checked the radar and saw a ship that did not pose a collision risk. She then visually checked the horizon and saw nothing. However, had she scanned the horizon thoroughly in all directions, she should have seen *Silver Yang*, which was only about 1 mile to the southeast.

However, human information processing is not infallible and, due to a wide range of factors, errors can occur. Research by Green and Senders (2004) [17] has shown that in road accidents, critical or important information may have been detectable but the motorist did not attend to, or notice, that information. These are often termed „looked but did not see' events and cover phenomena such as „change blindness' and 'inattentional blindness'.

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[16] COLREGS – Responsibilities between vessels – Rule 18 - The provisions described in this paragraph have effect except where the narrow channel rule, traffic separation schemes or overtaking rule otherwise require. A power driven vessel underway must keep out of the way of a vessel not under command, a vessel restricted in her ability to manoeuvre, a vessel engaged in fishing and a sailing vessel.

[17] Green, M., Senders, J. (2004). *Human error in road accidents*.

Change blindness occurs when a person does not notice something that is different about the visual environment compared to before the change. Research has shown that, in some cases, quite dramatic changes are not detected (Simons and Levin, 1998)[18], particularly if those changes occur when the observer is not looking at the relevant part of the visual environment at the time.

Inattentional blindness occurs when a person does not notice an object which is fully-visible, but unexpected, because their attention is engaged on another task. It is a failure to perceive what would appear to others as an obvious visual stimulus.

Hence, it is possible that *Ella's Pink Lady*'s skipper did not notice the ship when it appeared on the horizon or that she was distracted by other activities she was carrying out. It is also possible that she was experiencing the detrimental effects of fatigue when she failed to see *Silver Yang*.

In the context of human performance, fatigue is a physical and psychological condition that is primarily caused by prolonged wakefulness and/or insufficient or disturbed sleep. Fatigue can result from a number of different sources, including time on task, time awake, acute and chronic sleep debt and circadian disruption (i.e. factors which affect the normal 24-hour cycle of body functioning).

The Australian House of Representatives (2000) inquiry into managing fatigue in the transportation industry[19] stated that an individual who is fatigued is unable to function at a normal level of alertness and efficiency, possibly leading to slowed reaction times, reduced vigilance, memory lapses, inattention to tasks, complacency, lack of awareness, lack of communication, mood changes, lack of judgement, decline in motivation and falling asleep.

While many of the symptoms associated with fatigue generally only appear after substantial levels of sleep deprivation, even the loss of sleep for one night may have negative influences on several aspects of human performance.

The skipper was using regular 5 minute catnaps as a fatigue counter measure. However, while using naps can be effective, most guidance suggests that a minimum 15 minute nap every 2 to 3 hours is required and that napping is not effective long term.

The skipper reported that she did not feel fatigued. However, studies have found that there is a discrepancy between self-report of fatigue and actual fatigue levels and that people generally underestimate their level of fatigue.

The skipper would have been awake for approximately 17 hours without a proper sleep and, therefore, it is likely that she may have been experiencing an associated decrease in her level of performance.

The skipper also reported that she had been dealing with a minor bout of motion sickness (sea sickness) and was feeling „a little bit queasy'. The symptoms of motion sickness are wide and varied but may include excessive production of saliva, headache, nausea, dizziness, heavy sweating, weakness and drowsiness.

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[18] Simons, D.J. and Levin, D.T. (1998). Failure to detect changes to people during a real-world interaction. *Psychonomic Bulletin and Review*, 5 (4), 644-649.

[19] House of Representatives Standing Committee on Communication, Transport and The Arts (2000). *Beyond the Midnight Oil: An inquiry into managing fatigue in transport*. Commonwealth of Australia, Canberra

Hence, it is likely that during the period of time leading up to the collision, the skipper's level of performance had deteriorated due to fatigue and a minor bout of seasickness and that she may have not appropriately processed the visual information at hand. As a result, she may have „looked but did not see' *Silver Yang*.

2.4.1 Electronic aids

Ella's Pink Lady was fitted with radar and an AIS unit, both of which were operating at the time of the collision and in the hours leading up to it.

It was the skipper's habit to use the yacht's Simrad NX40 Navstation in split screen mode (Figure 9). In this mode, half the screen displayed radar information and the other half displayed an electronic chart with an overlay of icons indicating vessels identified via an AIS interface.

While it is possible that *Ella's Pink Lady*'s skipper looked at the radar and AIS displays but did not see *Silver Yang* (for the reasons previously discussed), there are further reasons as to why these devices did not alert her to the ship's presence.

Figure 9: *Ella's Pink Lady*'s Simrad Navstation display in split screen mode

Radar

The skipper had set the yacht's radar display on the 8 mile range and, since *Silver Yang* was large and constructed of steel, the ship should have appeared as a strong echo on the yacht's radar display from the time it came within its set 8 mile range. The ship entered the 8 mile range about 30 minutes before the collision but the yacht's skipper did not detect the ship during this time.

The radar display was equipped with a number of alarms, including two „guard ring' alarms, which are set at a selected radii on the radar display by the operator. When in operation, these alarms activate an audible siren when a radar target crosses any part of the circumference of the „guard ring'.

At the time of the collision, the skipper had the radius of the inner and outer guard rings set at 2 miles and 4 miles respectively, but the alarms did not activate before the collision. It was the skipper's routine to set the guard ring alarms to operate only when she was sleeping. She stated that this was probably because the alarms sometimes activated when a ghost echo[20] crossed the guard ring, causing her unnecessary distraction. As a result, the guard rings were not set for activation in the period leading up to the collision. When the skipper set them prior to taking the catnap, *Silver Yang* was only about 1 mile away; a position that was already inside both guard rings. As a result, the alarms never activated and the skipper was not alerted to the ship's presence.

AIS

The yacht's AIS installation could also have alerted the skipper to *Silver Yang*'s presence. The Simrad Navstation AIS display would have been displaying an icon indicating *Silver Yang*'s position well before the collision, but the skipper did not detect its presence on the AIS display.

The Simrad Navstation was equipped with an alarm function that activated an audible siren when the closest point of approach (CPA) of an identified AIS target came within an operator set range. However, at the time of the collision, the skipper had not set this alarm function to operate.

When the skipper was interviewed by the ATSB, she demonstrated an understanding of the basic workings of the yacht's AIS unit. However, she had not been formally trained in its use. As a result, it is possible that she may have known how to operate the unit but was not aware of all of its features and how best to utilise them.

Display orientation

It was usual for *Ella's Pink Lady*'s skipper to set the Simrad NX40 Navstation display with the radar section displaying head-up information and for the chart to be displayed north-up. In this situation, with the vessel heading southward, the two side by side displays were essentially upside down with respect to each other.

It is possible that having these two displays side by side with different orientations could have led to a level of confusion for the skipper. On the displays, the electronic chart would have shown *Silver Yang* below *Ella's Pink Lady*'s position, but on the radar, the ship would have been displayed above the yacht's position. Hence, it is possible that the skipper was confused by the different ways in which the information displayed by the two screens. As a result, she may have detected *Silver Yang* and wrongly concluded that the vessel did not pose a collision risk.

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[20] An echo that is the result of clutter.

2.5 Collision avoidance

With respect to collision avoidance, COLREGS Rule 7 „Risk of collision' part (d) states:

> In determining if risk of collision exists, the following considerations shall be among those taken into account.
>
> (i) such risk shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change;
>
> (ii) such risk may sometimes exist even when appreciable bearing change is evident, particularly when approaching a very large vessel or a tow or when approaching a vessel at close range.

Furthermore, Rule 8 „Action to avoid collision' part (b) states:

> Any alteration of course and/or speed to avoid collision shall, if the circumstances of the case admit, be large enough to be readily apparent to another vessel observing visually or by radar; a succession of small alterations of course and/or speed should be avoided.

When *Silver Yang*'s second mate first saw the green light, at what he assumed was a range of 3 to 5 miles, he thought that it was a small fishing vessel. Then, after watching it for about 30 seconds, he concluded that, because its bearing remained constant, it was stationary and hence it was probably a buoy. As a result, at 0148½, he altered the ship's heading by a few degrees to starboard to give the buoy „some passing room'.

The second mate demonstrated an inadequate understanding of the physical relationship between two approaching vessels, when he assumed that because the light (*Ella's Pink Lady*) remained at a constant bearing it was stationary and hence did not pose a collision risk. As Rule 7 of the COLREGS clearly states, the risk of collision „shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change'.

As the two vessels closed on each other, the second mate and the lookout were surprised when the light appeared to start racing towards the port side of their ship. It was then, at 0149½, that the second mate ordered starboard 20°, followed by hard-to-starboard, in an attempt to avoid the collision.

Observing a vessel for about 30 seconds could not have provided the second mate with enough information to make the assumptions and decisions that followed. During such a short period of time, it is unlikely that, at its range and relative bearing, the bearing of the vessel he was observing would change significantly enough to be visually apparent. Hence, he should have gathered more information, information that he could use to develop a complete picture of the situation that was unfolding.

Silver Yang's second mate may have considered that he would only encounter power driven vessels 15 miles off the coast and that avoiding action was not necessary because a vessel approaching his ship from the port side was the give

way vessel[21]. However, in this instance, the vessel was a yacht (sailing vessel) and he was obliged to give way[22].

Sighting a single green light should have indicated to the second mate and the lookout that they had probably detected a sailing vessel[23]. It was a clear night and they should have used binoculars to check for any other lights and to confirm the aspect of the vessel. This would have given them a better indication of the type of vessel they had detected and what collision risk it posed. The radar should have been used to confirm the range. Checking the AIS unit would have also confirmed the range and, possibly, identified the vessel.

The second mate did not use any of the navigational equipment that was available to him and did not appropriately interpret all of the visual information to properly assess the situation and determine whether a risk of collision existed. Had he concluded that he had detected a sailing vessel at a range of 0.6 miles, that it was not changing course and that it was likely that the two vessels were going to collide, he would have been better placed to take appropriate action to avoid the collision.

2.6 Detectability of the yacht

Since the echo displayed on the ship's radar screen is dependent upon the size, shape and composition of the target vessel, it is essential that small vessel owners and operators attempt to improve their vessel's radar detectability by fitting a radar reflector.

A radar reflector can be a simple and inexpensive passive reflector that improves a vessel's radar reflection; or an active reflector (radar transponder) that transmits a pulse, when activated by an incoming radar signal, which is detected by radar.

At the time of the collision, *Ella's Pink lady* was not fitted with a passive radar reflector, but the yacht was equipped with an „Echo-max' X-band radar transponder. However, when the two vessels collided, and during the hours leading up to the collision, the Echo-max unit was turned off.

When interviewed, the skipper was not able to offer an explanation as to why the Echo-max unit was not turned on. It is possible that she may have forgotten to turn it on, that she was trying to preserve the yacht's batteries, or that she was not sufficiently aware of the limitations watch keepers on board large ships face in detecting small vessels like *Ella's Pink Lady*. Regardless of the reason, this important device was not operating at the time.

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[21] COLREGS – Crossing situation – Rule 15 – When two power driven vessels are crossing so as to involve risk of collision, the vessel which has the other on her own starboard side shall keep out of the way and shall, if the circumstances of the case admit, avoid crossing ahead of the other vessel.

[22] COLREGS – Responsibilities between vessels – Rule 18 – The provisions described in this paragraph have effect except where the narrow channel rule, traffic separation schemes or overtaking rule otherwise require. A power driven vessel underway must keep out of the way of a vessel not under command, a vessel restricted in her ability to manoeuvre, a vessel engaged in fishing and a sailing vessel.

[23] COLREGS – Light and Shapes - Rule 25(a) - A sailing vessel underway shall exhibit side lights and a stern light.

This collision demonstrates why it is important for small vessel operators to fit passive radar reflectors to their vessels, even if the vessel is fitted with an active reflector. A passive reflector does not require a power supply to operate and it cannot be turned off. As a result, it enhances the small vessel's radar detectability at all times.

Ella's Pink Lady was also fitted with a Class B AIS unit, which was operating at the time of the collision. While the operation of the unit had been checked before the yacht departed Mooloolaba, at the time of the collision it was not transmitting the correct „vessel type' information. Hence, it is likely that the vessel type information had not been correctly entered into the AIS unit prior to the yacht's departure.

As a result, *Ella's Pink Lady* was visible to AIS shore base stations and AIS units fitted on board other ships, including *Silver Yang*'s. However, it was indicating the vessel type as „un-assigned'.

Had the ship type information been entered correctly, that information would have been transmitted and other ships would have been informed that *Ella's Pink Lady* was a yacht. This information could have then been used by seafarers when trying to visually detect the yacht and when considering any possible collision avoidance strategies.

2.7 Actions taken 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.

2.7.1 Actions taken by *Silver Yang*'s second mate

As the master's delegate on *Silver Yang*'s bridge, the second mate was responsible for ensuring that the master's standing orders were implemented and that all appropriate rules and regulations were followed.

However, *Silver Yang*'s second mate did not immediately report the collision to the ship's master and he made no attempt to contact *Ella's Pink Lady* to determine whether the yacht's crew required any form of assistance or if the yacht had been seriously damaged. This inaction may have placed the safety of *Ella's Pink Lady*'s skipper at risk, had she indeed been injured or her yacht been seriously damaged.

Silver Yang's VDR data clearly shows that the second mate was aware that the two vessels had collided and that he chose not to offer any form of assistance to *Ella's Pink Lady*'s crew. None of the information available to the investigation casts light on why he took this course of action.

Silver Yang's master was eventually called to the bridge after *Ella's Pink Lady*'s skipper had contacted the ship by VHF radio, some 26 minutes after the collision. The master quizzed the second mate and the lookout as to what had happened and why he was not called. He also asked a number of times if the yacht's crew was safe. On each occasion the second mate confirmed that they were. The ship was now about 3½ miles north of the position where the collision occurred and the master stated that it was now too late to turn back. He also stated that the second mate should have stopped the ship and offered assistance after the collision.

Language

When *Silver Yang*'s second mate finally responded to *Ella's Pink Lady*'s VHF radio calls about 19 minutes after the collision, he spoke in English. However, *Ella's Pink Lady*'s skipper found him very difficult to understand. As a result, communications were disjointed and necessary information, like the ship's identification number, was not passed to the yacht's skipper.

The VDR audio data indicates that the ship's second mate appeared to comprehend what was being said to him. However, the data also clearly shows that others, including *Ella's Pink Lady*'s skipper and Brisbane Harbour Control, were unable to clearly comprehend what he was saying.

It is a requirement of the International Maritime Organization (IMO) Seafarers' Training, Certification and Watchkeeping (STCW) Code that all watch keepers have knowledge, understanding and proficiency in the English language[24] and for standard phraseology to be used as much as possible in order to reduce the risk of important safety messages being misunderstood[25]. It is also a SOLAS requirement for all bridge-to-bridge and bridge-to-shore communications to be carried out in English[26].

On 9 September 2009, it appears that the second mate was able to understand messages received in English over the VHF radio. However, he demonstrated that he could not effectively use the IMO's Standard Marine Communication Phrases (SMCP) to make his own messages clearly understandable. Hence, it is likely that his training and certification in this area did not meet the requirements set out in the STCW Code.

Previous collisions

Since 1990, there have been 38 collisions or near misses involving ships and small vessels that have been investigated by the ATSB or its predecessor, the Marine Incident Investigation Unit.

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[24] IMO STCW Code, Table A-II/1

[25] With reference to the appropriate use of language in communications at sea, the IMO publication Standard Marine Communication Phrases (SMCP) states; Use of the IMO SMCP should be made as often as possible in preference to other wording of similar meaning; as a minimum requirement, users should adhere as closely as possible to them in relevant situations. In this way they are intended to become an acceptable safety language, using English for the verbal interchange of intelligence among individuals of all maritime nations on the many and varied occasions when precise meanings and translations are in doubt, as is increasingly evident under modern conditions at sea.

[26] SOLAS, Regulation V/14.4

During this time, a number of safety investigation reports covering ship/small vessel collisions have been published. In an effort to further highlight the ongoing dangers and similar contributing factors in these incidents, the ATSB has also published a number of safety bulletins[27].

An analysis of these collisions shows that on 20 occasions (53 per cent of the time) the ship involved in the collision did not offer assistance to the crew on board the smaller vessel. On 22 occasions, the crew of the smaller vessel attempted to make contact with the ship, generally via VHF Channel 16, and on 15 occasions, the ship's crew did not respond to the calls.

The number of past reported instances indicates that the second mate's actions in failing to stop and render assistance in accordance with the requirements of UNCLOS were not unusual. The evidence is indicative of a systemic issue amongst seafarers from a variety of backgrounds and it is concerning that this trend continues to potentially put lives at risk needlessly.

While most flag States, like Hong Kong (*Silver Yang*'s flag State), have laws in place that implement the UNCLOS provisions on their ships, the recent history in Australia indicates that these laws are not being effectively implemented on board all ships.

2.7.2 Actions taken by *Ella's Pink Lady*'s skipper

Following the collision, *Ella's Pink Lady*'s skipper inspected her vessel to ensure it was seaworthy. She then notified her parents of the collision, who in turn, notified the Australian Rescue Coordination Centre (RCC).

Informing her parents first was in line with the procedure that she had agreed to prior to starting the voyage. She had planned only to call the RCC if she was injured or needed assistance. Since she was not injured and believed that she did not need assistance, she called her parents, primarily to establish the details she needed to get from the ship as it appeared to her that it was not stopping.

However, she would have been better served by notifying the RCC directly, thereby reducing any delay in notifying the search and rescue authorities and removing any chance of information dilution. The RCC would have been able to question her directly and determine what assistance, if any, was required as early as possible.

2.8 AIS investigation

During the course of the investigation, the ATSB investigators considered whether the VHF signal transmitted by *Ella's Pink Lady*'s Class B AIS unit was being received by *Silver Yang*'s Class A AIS unit.

This question was answered when the *Silver Yang*'s VDR data confirmed that the AIS signal was being received on board the ship. However, a few anomalies were discovered which are noteworthy.

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[27] These reports and safety bulletins are available to download at - www.atsb.gov.au

Class A AIS was developed for use by international commercial shipping[28]. It is a SOLAS requirement for a Class A unit to be fitted on board vessels of 300 gross tonnes and upwards engaged on international voyages, cargo ships of 500 gross tonnes and upwards not engaged on international voyages and passenger ships (more than 12 passengers), irrespective of size. Operators began fitting AIS units to ships in 2002.

More recently, the Class B AIS system has been developed for non-SOLAS commercial and recreational vessels[29]. Class B units are less expensive than Class A units, provide limited functionality and are designed with a ‚politeness factor', meaning that they will not interfere with, or cause degradation of, the effectiveness of Class A units.

In 2008, the Australian Defence Science and Technology Organisation (DSTO) carried out an assessment of the performance of Class B AIS. The report[30] details the results of a 3-month study investigating the issue. The outcome, based on a survey of vessels entering Newcastle Port, was that the different types of Class A AIS units were capable of detecting Class B signals. However, 17% of vessels fitted with Class A AIS units did not report Class B AIS detections.

The report noted that the lack of detection was more likely to occur if the ship's Class A AIS unit only displayed the Class B vessel's MMSI number because the Class A unit was not capable of decoding and displaying the name of the vessel. The report also noted that the lack of detection issue was, to some extent, caused by vessel masters not recognising the detection on their AIS unit display.

On 15 October, the ATSB investigators contacted Sydney Harbour Control while *Ella's Pink Lady* was berthed in the port. Harbour Control was asked to confirm whether *Ella's Pink Lady*'s Class B AIS signal was being detected by their shore based Class A AIS station and to confirm whether the yacht was being detected by other vessels working in the port. Harbour Control confirmed that the yacht was detected by their AIS installation, but that it was not being detected by any of the four vessels (a pilot boat and three ferries, all fitted with Class A AIS units) that Harbour Control contacted.

The investigators considered that the yacht may not have been detected by the four vessels because their skippers were looking for its name and not its MMSI number. Consequently, the test was repeated on 16 October and Harbour Control was provided with *Ella's Pink Lady*'s MMSI number. Again, Harbour Control detected the yacht but it was not detected by any of the five vessels contacted (a passenger ship berthed at Darling Harbour, three ferries and a cargo ship due to berth that day, all of which were fitted with Class A AIS units). However, the ship that was due to berth that day, did detect the yacht's MMSI number for a short period of time later that afternoon.

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[28] More information can be found at - http://www.amsa.gov.au/publications/fact_sheets/aisa_fact.pdf

[29] More information can be found at - http://www.amsa.gov.au/publications/fact_sheets/aisb_fact.pdf

[30] Automatic Identification System: AIS-A Reception of AIS-B, 2008 Study

While no substantive conclusions can be drawn from such uncontrolled tests, it is possible that not all transmissions from Class B AIS units are detected by the operators of all vessels fitted with Class A AIS units. Since Class A units are certified as being compatible with the Class B system, it is likely that the issue lies somewhere other than in the units themselves, possibly in the installation of the units and their associated equipment, their interface with displays such as electronic charting systems and radars or, perhaps, operator error.

Regardless of where the issue may lie, operators of vessels fitted with Class B AIS units should be aware that while their AIS units may effectively assist in the detection of other vessels, they must not rely on the AIS unit alone to warn ships of their presence. There is no substitute for keeping a proper lookout at all times by sight and hearing, and all other appropriate means.

3 FINDINGS

3.1 Context

At 0150½ on 9 September 2009, in a position about 15 miles to the east of Point Lookout, North Stradbroke Island, Queensland, the Australian registered single handed yacht *Ella's Pink Lady* collided with the Hong Kong registered bulk carrier *Silver Yang*.

At the time of the collision, *Silver Yang* was fully loaded and en-route to China, travelling at a speed of about 9 knots on a northerly heading. *Ella's Pink Lady* was under sail on a voyage from Mooloolaba, Queensland, to Sydney, New South Wales. The yacht was making good a south-easterly course at a speed of about 7 knots.

Ella's Pink Lady was dismasted as a result of the collision but the skipper was able to cut the headsail free and retrieve the mainsail, the mast and the rigging on board and motor the damaged yacht to Southport, Queensland.

From the evidence available, the following findings are made with respect to the collision and should not be read as apportioning blame or liability to any particular organisation or individual.

3.2 Contributing safety factors

- *Silver Yang*'s watch keepers were involved in a non-work related conversation during the period of time leading up to the collision. As a result, they were distracted from their duties and did not maintain a proper lookout.
- *Silver Yang*'s watch keepers did not detect *Ella's Pink Lady* until 2 ½ minutes before the collision and they did not identify that it was a yacht. As a result, the second mate did not alter course sufficiently to avoid the collision.
- About 5 minutes before the collision, *Ella's Pink Lady*'s skipper checked for ships in the area, both visually and on the radar, but she did not detect *Silver Yang*. She then went to bed for a short sleep and remained there until she was awakened by the collision.
- Neither *Ella's Pink Lady's* skipper nor *Silver Yang*'s watch keepers were using all available means appropriate in the prevailing circumstances and conditions (in particular radar and AIS) to make a full appraisal of the traffic situation in the area and the risk of collision.
- *Ella's Pink Lady* was not fitted with a passive radar reflector and, at the time of the collision, the yacht's active radar reflector was turned off. *[Significant safety issue]*

3.3 Other safety factors

- It is likely that prior to the collision, the level of performance of *Ella's Pink Lady*'s skipper had deteriorated due to fatigue and a minor bout of seasickness. As a result, she may not have effectively processed the visual information at hand; it is possible that she „looked but did not see' *Silver Yang*.
- While it appears that the second mate was able to understand messages received in English over the VHF radio, he demonstrated that he could not effectively use the IMO's Standard Marine Communication Phrases (SMCP) to make his own messages clearly understandable. *[Minor safety issue]*
- *Silver Yang*'s second mate did not report the collision to the ship's master and he made no attempt, immediately following the collision, to determine whether *Ella's Pink Lady* was damaged, or if its crew required any form of assistance.
- While most flag States have laws in place that implement the UNCLOS requirement for a ship's master to render assistance to the crew of another vessel following a collision, these laws are not being effectively implemented on board all ships. *[Significant safety issue]*
- The evidence suggests that Class B AIS transmissions may not be reliably detected by watch keepers on board all ships. Therefore, operators of small vessels fitted with Class B AIS units should be aware that they cannot rely on the AIS unit alone to warn ships of their presence. *[Minor safety issue]*

4 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 organisations. In addressing those issues, the ATSB prefers to encourage relevant organisations 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.

4.1 *Ella's Pink Lady*'s skipper

4.1.1 Detectability of the yacht

Significant safety issue

Ella's Pink Lady was not fitted with a passive radar reflector and, at the time of the collision, the yacht's active radar reflector was turned off.

Action taken by Ella's Pink Lady's skipper MO-2009-008-NSA-011

Following the collision, *Ella's Pink Lady* was fitted with a passive radar reflector.

ATSB assessment of action

The ATSB is satisfied that the action taken by *Ella's Pink Lady*'s skipper adequately addresses this safety issue.

4.2 Flag States

4.2.1 Shipboard implementation of the UNCLOS provisions

Significant safety issue

While most flag States have laws in place that implement the UNCLOS requirement for a ship's master to render assistance to the crew of another vessel following a collision, these laws are not being effectively implemented on board all ships.

ATSB safety advisory notice MO-2009-008-SAN-012

The Australian Transport Safety Bureau advises that all flag States should consider the safety implications of this safety issue and take action where considered appropriate.

4.3 Owners, operators and skippers of small vessels

4.3.1 Appropriate watch keeping

Minor safety issue

The evidence suggests that Class B AIS transmissions may not be reliably detected by watch keepers on board all ships. Therefore, operators of small vessels fitted with Class B AIS units should be aware that they cannot rely on the AIS unit alone to warn ships of their presence.

ATSB safety advisory notice MO-2009-008-SAN-014

The Australian Transport Safety Bureau advises that all owners, operators and skippers of small vessels should consider the safety implications of this safety issue and take action where considered appropriate.

4.4 China Shipping Development

4.4.1 Shipboard implementation of the UNCLOS provisions

Significant safety issue

While most flag States have laws in place that implement the UNCLOS requirement for a ship's master to render assistance to the crew of another vessel following a collision, these laws are not being effectively implemented on board all ships.

Action taken by China Shipping Development MO-2009-008-NSA-015

China Shipping Development has advised personnel on board all their managed ships that when a collision has, or may have, occurred, the bridge watch keeper should stop the ship on the spot to further check. When necessary, they should take proactive rescue measures and record the time and ship's position. In any case, they must call the master at once and report to the company to seek support.

ATSB assessment of action

The ATSB is satisfied that the action taken by China Shipping and Development adequately addresses this safety issue.

4.4.2 Language skills

Significant safety issue

While it appears that the second mate was able to understand messages received in English over the VHF radio, he demonstrated that he could not effectively use the IMO's Standard Marine Communication Phrases (SMCP) to make his own messages clearly understandable.

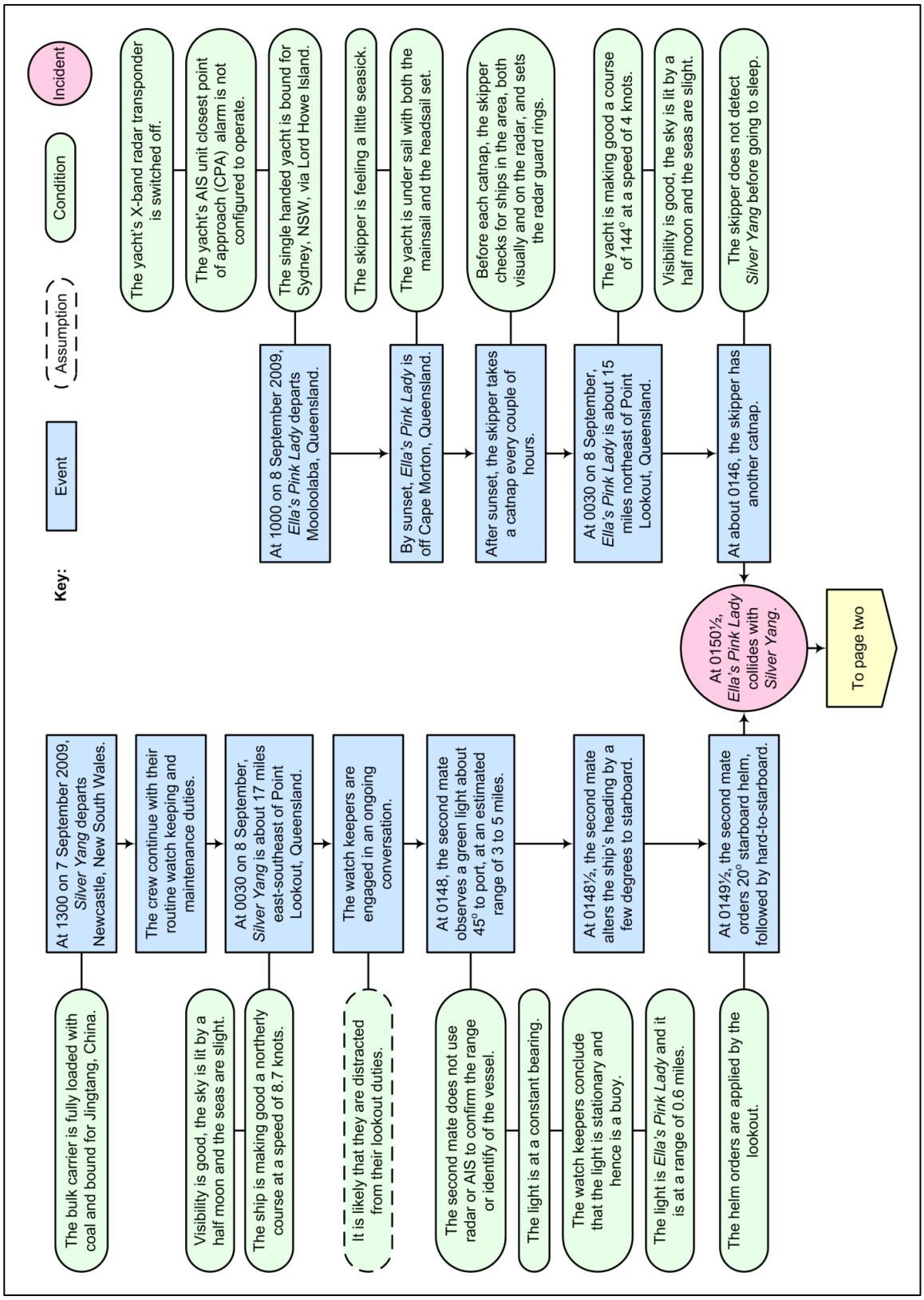
Action taken by China Shipping Development MO-2009-008-NSA-016

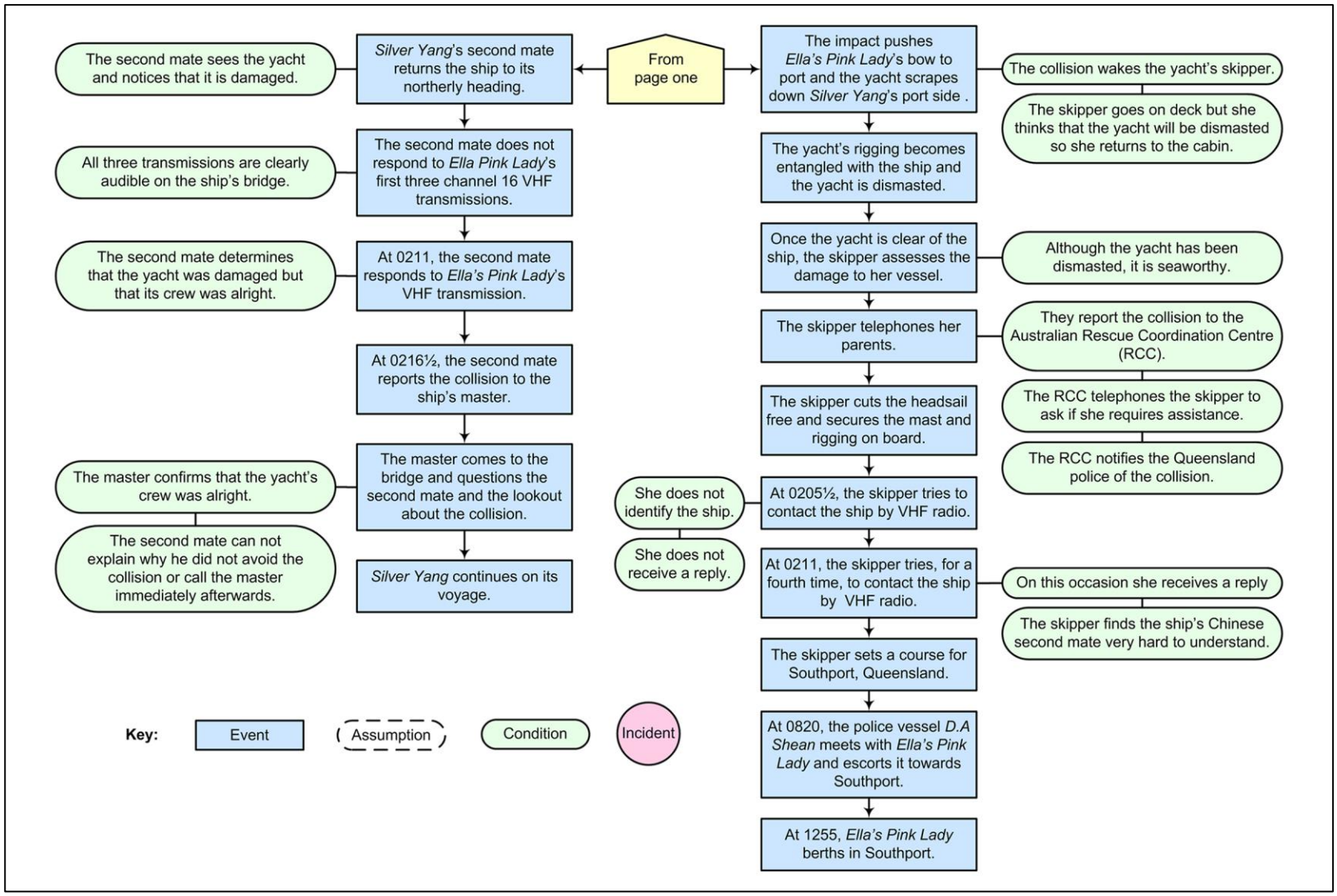
China Shipping Development intends to undertake further training of deck officers, especially in the area of language (English) and collision avoidance techniques.

ATSB assessment of action

The ATSB is satisfied that the action proposed by China Shipping and Development adequately addresses this safety issue.

APPENDIX A: EVENTS AND CONDITIONS




From page one
Silver Yang's second mate returns the ship to its northerly heading.
The second mate sees the yacht and notices that it is damaged.
The second mate does not respond to *Ella Pink Lady*'s first three channel 16 VHF transmissions.
All three transmissions are clearly audible on the ship's bridge.
At 0211, the second mate responds to *Ella's Pink Lady*'s VHF transmission.
The second mate determines that the yacht was damaged but that its crew was alright.
At 0216½, the second mate reports the collision to the ship's master.
The master comes to the bridge and questions the second mate and the lookout about the collision.
The master confirms that the yacht's crew was alright.
The second mate can not explain why he did not avoid the collision or call the master immediately afterwards.
Silver Yang continues on its voyage.
The impact pushes *Ella's Pink Lady*'s bow to port and the yacht scrapes down *Silver Yang*'s port side .
The collision wakes the yacht's skipper.
The skipper goes on deck but she thinks that the yacht will be dismasted so she returns to the cabin.
The yacht's rigging becomes entangled with the ship and the yacht is dismasted.
Once the yacht is clear of the ship, the skipper assesses the damage to her vessel.
Although the yacht has been dismasted, it is seaworthy.
The skipper telephones her parents.
They report the collision to the Australian Rescue Coordination Centre (RCC).
The RCC telephones the skipper to ask if she requires assistance.
The RCC notifies the Queensland police of the collision.
The skipper cuts the headsail free and secures the mast and rigging on board.
At 0205½, the skipper tries to contact the ship by VHF radio.
She does not identify the ship.
She does not receive a reply.
At 0211, the skipper tries, for a fourth time, to contact the ship by VHF radio.
On this occasion she receives a reply
The skipper finds the ship's Chinese second mate very hard to understand.
The skipper sets a course for Southport, Queensland.
At 0820, the police vessel *D.A Shean* meets with *Ella's Pink Lady* and escorts it towards Southport.
At 1255, *Ella's Pink Lady* berths in Southport.
Key:
Event
Assumption
Condition
Incident

APPENDIX B: SHIP INFORMATION

Silver Yang

IMO Number	8108585
Call sign	VRBN7
Flag	Hong Kong
Port of Registry	Hong Kong
Classification society	China Classification Society (CCS)
Ship Type	Bulk Carrier
Builder	B&W Skibsvaerft, Denmark
Year built	1982
Owners	Li Chuan Shipping, China
Ship managers	China Shipping Development, China
Gross tonnage	35,455
Net tonnage	21,711
Deadweight (summer)	63,800 t
Summer draught	13.092 m
Length overall	225.00 m
Length between perpendiculars	213.70 m
Moulded breadth	32.24 m
Moulded depth	18.01 m
Engine	B&W 5L80GFCA
Total power	9,268 kW
Speed	12.5 knots
Crew	27

Ella's Pink Lady

Registered Name	*McIntyre Adventure*
Flag	Australia
Port of Registry	Hobart
Vessel Type	Yacht
Design	Sparkman & Stevens S&S 34
Year built	1984
Displacement	6.2 t
Draught	1.78 m
Length overall	10.12 m
Beam	3.07 m
Engine	Yanmar 3YN
Total power	22 kW
Crew	1

APPENDIX C: SOURCES AND SUBMISSIONS

Sources of Information

Silver Yang's master and crew

China Shipping Development

Ella's Pink Lady's skipper and support crew

The Australian Maritime Safety Authority (AMSA)

Maritime Safety Queensland (MSQ)

Queensland Police Service

Hong Kong Marine Department

Sydney Harbour Control

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House of Representatives Standing Committee on Communication, Transport and The Arts (2000). *Beyond the Midnight Oil: An inquiry into managing fatigue in transport*. Commonwealth of Australia, Canberra

ATSB Safety Bulletin 5. *Fisherman and Safety Awareness at Sea*

Simons, D.J. and Levin, D.T. (1998). *Failure to detect changes to people during a real-world interaction. Psychonomic Bulletin and Review*, 5 (4), 644-649

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

The International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended

The International Regulations for the Prevention of Collisions at Sea (COLREGS), 1972 as amended

The International Sailing Federation Category 0 Rules

Submissions

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

A draft of this report was provided to *Ella's Pink Lady*'s skipper and support crew, *Silver Yang*'s master, second mate and lookout, China Shipping Development, the Australian Maritime Safety Authority, the Maritime Safety Administration of China, the Hong Kong Marine Department, Maritime Safety Queensland and the Queensland Water Police.

Submissions were received from *Ella's Pink Lady*'s skipper and support crew, China Shipping Development, the Australian Maritime Safety Authority, the Maritime Safety Administration of China, the Hong Kong Marine Department and Maritime Safety Queensland. The submissions were reviewed and, where considered appropriate, the text of the report was amended accordingly.

APPENDIX D: MEDIA RELEASE

Ella's Pink Lady **collision reveals lessons for all seafarers**

The Australian Transport Safety Bureau (ATSB) today released its final investigation report into the 9 September 2009 collision between the Australian registered yacht *Ella's Pink Lady* and the Hong Kong registered bulk carrier *Silver Yang* off Point Lookout, Queensland.

The ATSB investigation found that when the two vessels collided, neither the yacht's skipper nor the ship's watch keepers were keeping a proper lookout, nor were they appropriately using navigational aids to manage the risk of collision.

The investigation also found that following the collision, the ship's watch keeper did not offer to assist the yacht's skipper. This is a problem that has also been highlighted by previous ATSB investigations.

ATSB Chief Commissioner Mr Martin Dolan said there are significant lessons to be learnt from this incident.

"This is a timely reminder that, under United Nations' conventions, ship operators have an obligation to offer assistance immediately to other vessels following a collision," Mr Dolan said.

As a result of the ATSB investigation, the following key safety actions were taken:

- *Ella's Pink Lady*'s radar visibility was enhanced before its departure from Sydney.
- The international requirement to render assistance following a collision has been highlighted.
- Attention was drawn to the possible limits in the detectability of Class B AIS transmissions.
- *Silver Yang*'s operators intend to undertake further training of deck officers.

For a copy of the report visit the ATSB's website at www.atsb.gov.au or call 1800 020 616.

For all media enquiries, call 1800 020 616.

Independent investigation into the collision between the Australian registered yacht *Ella's Pink Lady* and the Hong Kong registered bulk carrier *Silver Yang* off Point Lookout, Queensland on 9 September 2009.