Australian Government
Australian Transport Safety Bureau

Unintentional release of the freefall lifeboat from the bulk carrier *Aquarosa*

Indian Ocean, 1 March 2014

ATSB Transport Safety Report
Marine Occurrence Investigation
307-MO-2014-002
Preliminary – 31 March 2014

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

Publishing information

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Addendum

Page	Change	Date

Safety summary

The information contained in this preliminary report is derived from the initial investigation of the occurrence. Readers are cautioned that it is possible that new evidence may become available which alters the circumstances as depicted in the report.

What happened

On 1 March 2014, the 190 m Maltese registered bulk carrier *Aquarosa* was on a voyage from Singapore to Kwinana, Western Australia, when its freefall lifeboat was inadvertently released during a routine inspection.

A ship's engineer, who was in the lifeboat at the time of its release, sustained serious injuries. The lifeboat was retrieved on board the ship about 5 hours after its release and the voyage to Kwinana was resumed.

What the ATSB found

The ATSB's initial analysis of the incident indicates that the lifeboat release mechanism was not fully and correctly reset after it was last exercised and that the hook was released when the engineer topped up the release system hydraulic oil reservoir and manually operated the pump to pressurise the system.

Initial analysis also indicates that the two simulation wires, which were designed to hold the lifeboat when the hook was released during a simulated release, failed at a load significantly below their rated safe working load.

What's been done as a result

On 17 March 2014, the ATSB contacted *Aquarosa*'s managers, the lifeboat manufacturer, Bureau Veritas, the International Association of Classification Societies, the Malta Merchant Shipping Directorate and the Australian Maritime Safety Authority. These organisations were advised of the incident and the initial findings of the ATSB safety investigation. They were also urged to identify ships fitted with similar freefall lifeboats and to advise operators of those ships to take appropriate safety action to prevent similar accidents from occurring.

Investigation direction

The investigation is ongoing and will focus on determining how the lifeboat release mechanism could be reset incorrectly without an obvious visual indication and why the simulation wires failed.

Contents

The occurrence

The information contained in this preliminary report is derived from the initial investigation of the occurrence. Readers are cautioned that it is possible that new evidence may become available which alters the circumstances as depicted in the report.

On 25 February 2014, the 190 m geared bulk carrier *Aquarosa* (Figure 1) departed Singapore in ballast on a voyage to Western Australia.

By 1 March, the ship was in the Indian Ocean about 450 miles[1] north-northwest of Dampier, Western Australia. The deck crew were washing the ship's cargo holds in preparation for a pre-loading grain survey and the second engineer, third engineer, electrical engineer, trainee engineer and supernumerary chief engineer were completing routine weekly checks of the safety equipment.

Figure 1: *Aquarosa*

Source: ATSB

At about 1100,[2] the third engineer and the supernumerary chief engineer went to the freefall lifeboat (Figure 2). They verified that the simulation wires securing the boat to the ship were fitted and then removed the hook release lock pin which was attached by a lanyard to the entry door and entered the lifeboat. Once inside, they carried out a general inspection of the lifeboat's machinery and equipment. When the checks were completed, they left the boat.

As the third engineer exited the boat, the second engineer entered it. He wished to confirm to himself that all was in order prior to the next port and any port state control inspections. The electrical engineer had also arrived and was standing adjacent to the funnel, forward of the lifeboat embarkation platform completing routine checks of the lifeboat battery charging system. The supernumerary chief engineer and the third engineer cleared the boat and stood on the embarkation platform just forward of the lifeboat.

The second engineer remained inside. He had noted in Singapore that the lifeboat release system hydraulics appeared to be losing oil, so he checked the area around the main hydraulic pump and noticed that there was a sheen of oil. He then topped-up the pump with oil.

The second engineer then checked the hydraulic system for leaks. As he was standing between the passenger seats, he leaned across the coxswain's seat and manually operated the pump. He intended to pressurise the system a little to see if he could identify any obvious oil leaks.

At about 1118, after moving the pump handle three or four times, the second engineer felt the boat shudder and move. He looked toward the entry door and saw that the boat had begun to

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1 A nautical mile of 1,852 m.

2 All times referred to in this report are local time, Coordinated Universal Time (UTC) + 8 hours.

move down the launching rails. Knowing that the boat had been released and that he was unable to make the exit, he took a seat and attempted to fit the seatbelt. As the lifeboat moved down the launching rails, the simulation wires parted and the boat launched from the stern of the ship.[3]

Figure 2: *Aquarosa*'s freefall lifeboat

Source: ATSB

On seeing the lifeboat inadvertently launched, the third and electrical engineers went to the bridge to raise the alarm while the supernumerary chief engineer maintained visual contact with the lifeboat.

On the bridge, the officer of the watch was alerted by the engineers. He immediately activated the ship's general alarm and made an emergency announcement over the public address system. He also made preparations for slowing and turning the ship and contacted the engine room to ensure that an engineer was standing by for manoeuvring.

Meanwhile, the master and chief mate were walking along the starboard side of the main deck and approaching the accommodation when they heard the general alarm and the announcement. They looked astern and could see the lifeboat. The master went directly to the bridge and the chief mate went aft to muster the crew to respond to the emergency.

Aquarosa was slowed and turned to return to the lifeboat. After about 10 minutes, the posted lookouts noticed that the lifeboat was underway and heading toward the ship.

At 1132, an Inmarsat-C distress signal was broadcast. The master also called the Australian Rescue Coordination Centre (RCC) and reported the incident.

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[3] At that time, the ship was in position 13°26.8'S 114°36.2'E.

The ship was then manoeuvred until the lifeboat could approach its stern. Sea conditions were moderate with winds at force[4] 4 (11 to 16 knots)[5] and a swell of about 1.5 m, making manoeuvring and securing the lifeboat difficult. Lines were thrown to the lifeboat in an attempt to secure it but the second engineer was unable to gather them in. During this process, the lifeboat's propeller became fouled in one of the lines and the boat lost propulsion.

Aquarosa's fast rescue boat was then launched to provide assistance to the second engineer. After some time, the lifeboat was made fast to the starboard side of the ship adjacent to the midship gangway.

A pilot ladder was deployed, but the second engineer could not climb it because he was injured.

At 1425, the gangway was lowered and the second engineer was assisted onto its bottom platform. The gangway was then raised and the second engineer was helped on board the ship and taken to the ship's hospital for assessment and treatment. Medical advice was requested from the RCC and advice was subsequently provided by the Australian Tele-medical Advice Centre.

The lifeboat was manoeuvred to the stern of the ship and, after some time, it was attached to the lifeboat retrieval system and brought on board. By 1630, the lifeboat was secured in its cradle. The master then contacted the RCC to cancel the distress and the voyage to Kwinana was resumed.

On 6 March, *Aquarosa* anchored off Fremantle, Western Australia, to complete the grain survey. On 8 March, the second engineer was transferred ashore for medical assessment and treatment where he was found to have a fractured kneecap. He remained ashore until he was well enough to travel, at which time he was repatriated.

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[4] The Beaufort scale of wind force, developed in 1805 by Admiral Sir Francis Beaufort, enables sailors to estimate wind speeds through visual observations of sea states.

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

Context

Aquarosa

At the time of the incident, *Aquarosa* was registered in Malta and classed with Bureau Veritas. The ship was owned by Aquarosa Shipping, Copenhagen, and managed by V.Ships, USA.

Aquarosa had a crew of 21 Indian and Sri Lankan nationals, all of whom were appropriately qualified for the positions they held on board the ship. The ship was also carrying a Filipino supernumerary chief engineer who was on board on behalf of new owners who were taking possession of the ship at the end of the current voyage.

The master held an Indian foreign-going master's certificate. He had 22 years of seagoing experience and had been sailing as master for 18 months. He had worked for V.Ships for 3 years and had been on board *Aquarosa* for 5 months.

The second engineer had 12 years of seagoing experience and held a United Kingdom class II engineer certificate of competency. He had worked with V.Ships for 4 years and had joined *Aquarosa* about 1 month before the incident. This was his first ship as second engineer.

Freefall lifeboat

Aquarosa was fitted with a Jiangsu Jiaoyan Marine Equipment Company (JY-FN-5.8 type) 27 person fibre reinforced plastic freefall lifeboat that was manufactured in November 2009. The lifeboat was 5.80 m long with a beam of 2.55 m and weighed 5,460 kg.

The lifeboat was housed in a Jiangsu Jiaoyan Marine Equipment Company JYF55 type launching appliance (Figure 3) which included provision for controlled lifting and lowering of the lifeboat into and out of the launching frame. This system included a davit and winch with a maximum hoist load of 42 kN[6] and maximum working load of 55 kN.

Under normal (ready for use) conditions, the freefall lifeboat was positioned in the launching arrangement with its side rails sitting on rollers fitted in the ramp section of the launching frame. The lifeboat was attached to the ship solely through ring links connected to a fixed hook on the ship and the release hook on the lifeboat (Figure 4).

A security pin was fitted into the lifeboat release hook to prevent the hook from opening and the unintentional release of the boat. This pin was attached by a lanyard to the entrance door of the lifeboat and arranged such that the pin had to be removed from the hook before the door could be opened and the lifeboat entered.

In this state, the lifeboat was ready for release. Once passengers were boarded, seated and strapped in, the coxswain would use the hand-operated hydraulic pump to actuate the lifeboat's release hook thereby releasing the lifeboat from the ship. The boat would then move down the ramp and freefall to the water below, clear of the stern of the ship.

Hook and release system

The lifeboat was fitted with a Jiangsu Jiaoyan Marine Equipment Company model JX-4 hook device and release mechanism (Figures 4 and 5). The system comprised the release hook mechanism located at the stern of the lifeboat, the hook hydraulic actuating cylinder and two hand operated pumps, one adjacent to the coxswain's position and an emergency pump to be used in case the coxswain's pump failed. A short section of ring links connected the release hook to a fixed strong point on the ship's structure.

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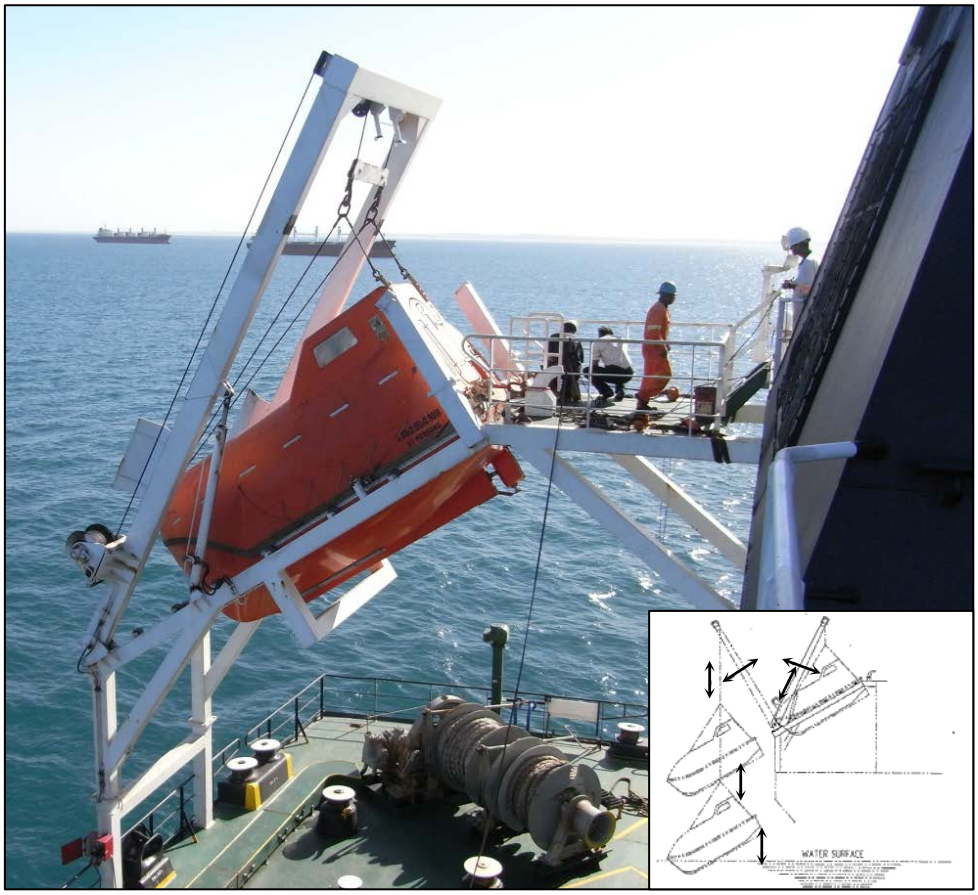
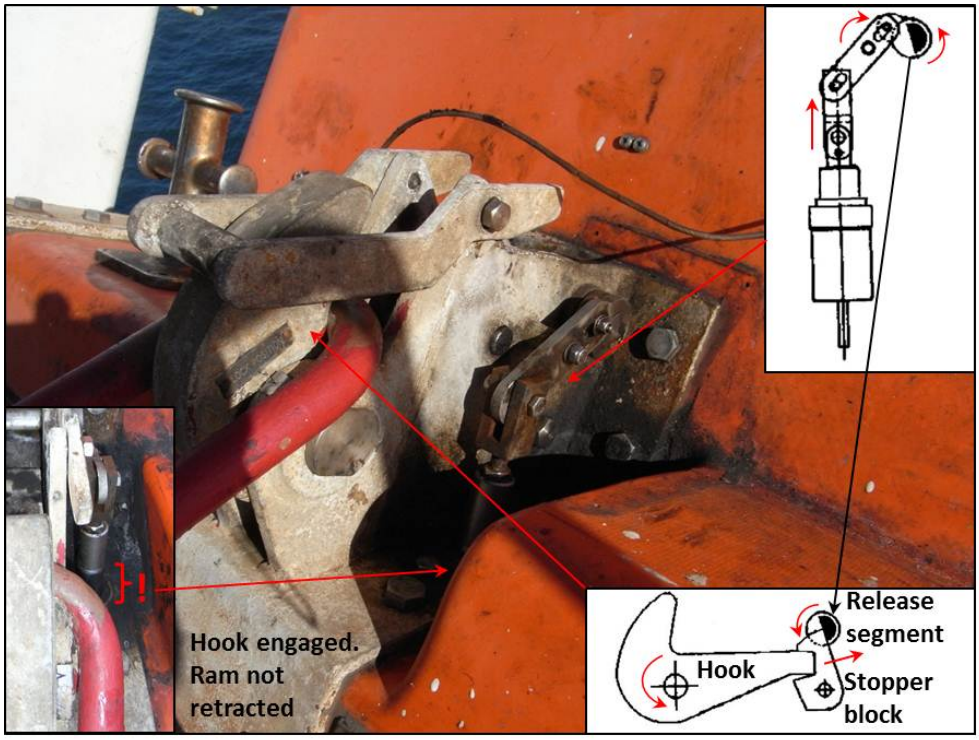
[6] Kilo Newton (kN) is a measure of load capacity in terms of force. One kN equals approximately 100 kilograms mass.

Figure 3: *Aquarosa*'s freefall lifeboat arrangement with appliance operating action (inset)



Source: ATSB and Aquarosa (inset)

Figure 4: Freefall lifeboat release hook



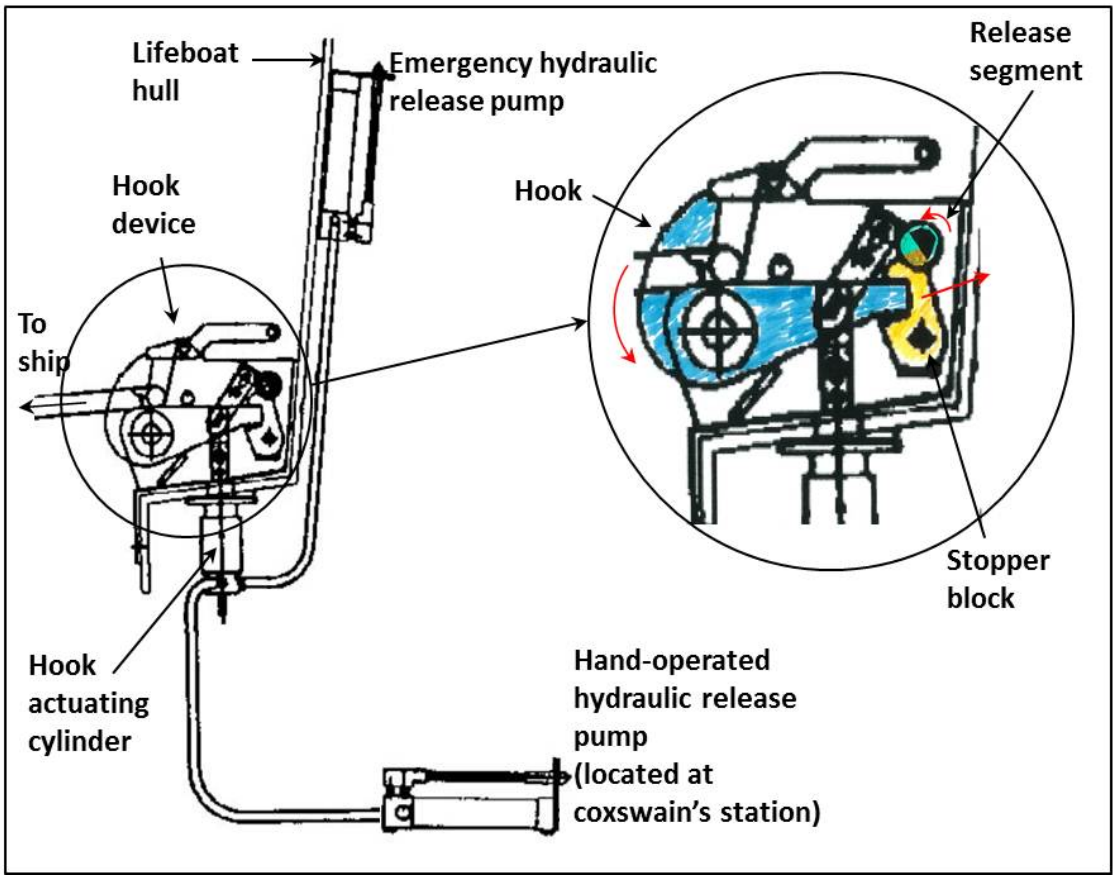
Source: ATSB and Aquarosa

To release the boat normally, the hydraulic pump handle needed to be operated 10-12 times (according to the operating manual) to extend the actuating cylinder ram which, through a series of linkages, released the hook stopper block. The hook was then free to rotate and release the ring link connecting the lifeboat to the ship. The pump also had a small valve on its body which when opened allowed the oil to circulate back to the oil reservoir without pressurising the discharge line. This valve had to be closed for the system to actuate the hook. The valve was, therefore, normally left in the closed position ready for use.

After the hook was released, it had to be reset before the lifeboat could again be secured in place. To do this, the hydraulic oil which had been pumped into the hook actuating cylinder had to be returned to the oil reservoir. This was achieved by opening the recirculating valve, positioning the ring link in the hook and then engaging the tail of the hook in the stopper block. The release segment could then be rotated into position by retracting the actuating cylinder ram, to lock the stopper block in place.

Once the hook was reset, the hydraulic pump recirculating valve had to be closed. This locked the oil in the system and the links in position. An indicator on the side of the hook provided a visual confirmation that the hook was in the correct position.

Figure 5: Freefall lifeboat hook release system



Source: Aquarosa

Aft lashing arrangement

In addition to the release hook attachment, the lifeboat was also fitted with an aft lashing unit which consisted of securing points on the port and starboard quarters. A wire rope could then be attached to these points and secured to eye plates that were welded into the lifeboat launching frame deck (Figure 6).

With the lifeboat secured to the ship via the release hook and links, the aft lashing unit wire ropes (known as simulation wires) were slack. This arrangement was designed so that the operation of

the release hook could be tested without launching the lifeboat over the stern of the ship. With the simulation wires attached, the hook could be tripped and the lifeboat would move about 150 mm down the launch ramp, at which point, the slack in the simulation wires would be taken up and the boat would be stopped. The lifeboat could then be repositioned and the hook reset.

The simulation wires were usually not connected when the ship was at sea. However, the ship's procedures required that any entry into the lifeboat, other than for emergency purposes, could not take place until the wires were securely in place.

Figure 6: Aft lashing arrangement showing one of the two simulation wires

Source: ATSB

The incident

In Singapore, 5 days prior to the incident, the second engineer was involved with multiple checks of the lifeboat release hook operation. During these checks, he noticed that the hydraulic system was low on oil and he topped it up. He also noted that the activation of the hook release required between 10 and 15 operations of the hydraulic pump handle.

On 1 March 2014, with this knowledge in mind, the second engineer entered the lifeboat to satisfy himself that all was in readiness for any possible upcoming port state inspection. He noted the oil level was low in the release pump and topped it up. He then pressurised the system to see if he could locate any leaks. He operated the pump 3 or 4 times, well short of the 10 to 15 pumps he believed it normally took to release the hook, but the hook unexpectedly released.

Inspection of the lifeboat, its release mechanism and analysis of the available evidence showed that the actuating cylinder ram did not always retract fully into the cylinder without some external force being applied. Furthermore, it was found that the hook stopper block (Figures 4 and 5) could be repositioned sufficiently to engage the hook and prevent it opening without the actuating cylinder ram being fully retracted. In such cases, with the hook reset, the hydraulic pump recirculation valve could be closed trapping the system in this position.

In such circumstances, the release hook could be activated with a reduced number of operations of the hydraulic pump because the actuating cylinder ram had less distance to travel before it released the stopper block and the hook.

It is likely that this is what happened when the lifeboat release system was reset following the tests in Singapore. Then, on 1 March, the second engineer only had to operate the pump handle three or four times for the actuating cylinder ram to move far enough to release the stopper block and the hook.

Investigation activities

Safety actions taken so far

On board *Aquarosa*, a safety pin that can be placed into the release hook when entering the boat for inspections and maintenance has been made up. Tool box meetings are now required before entry into the lifeboat to carry out maintenance and procedures which list the checks that are to be made prior to any lifeboat maintenance being carried out have been implemented. Further, the master's permission is now required before the lifeboat release system hand pumps are operated. Warning signs have been placed at the pump locations stating this requirement.

Aquarosa's managers have shared the details of the incident within their group and with industry colleagues through safety forums.

On 17 March 2014, the ATSB contacted V.Ships, Jiangsu Jiaoyan Marine Equipment Company, the Malta Maritime Directorate, the International Association of Classification Societies, Bureau Veritas and the Australian Maritime Safety Authority. These organisations were advised of the incident and the initial findings of the ATSB safety investigation. They were also urged to identify ships fitted with similar freefall lifeboats and to advise operators of those ships to take appropriate safety action to prevent similar accidents from occurring.

Safety investigation direction

The investigation is ongoing and will focus on determining how the lifeboat release mechanism could be reset incorrectly without an obvious visual indication and why the simulation wires, which were designed to hold the lifeboat on the launching slide when the release mechanism was tested, failed.

General details

Occurrence details

Date and time:	1 March 2014 – 1118 UTC + 8 hours	
Occurrence category:	Incident	
Primary occurrence type:	Equipment failure	
Location:	450 miles north-north-west of Dampier, Western Australia	
	Latitude: 13° 26.8' S	Longitude: 114° 36.2' E

Ship details

Name	*Aquarosa*
IMO number	9506708
Call sign	9HA2201
Flag	Malta
Classification society	Bureau Veritas
Ship type	Geared bulk carrier
Builder	Yangzhou Guoyu Shipbuilding, China
Year built	2010
Owner(s)	Aquarosa Shipping, Copenhagen
Operator	Falcon Maritime
Manager	V.Ships USA
Gross tonnage	33,005
Deadweight (summer)	56,723.99 t
Summer draught	12.80 m
Length overall	189.99 m
Moulded breadth	32.26 m
Moulded depth	18.00 m
Main engine(s)	Wartsila 6RT-Flex50B
Total power	9,480 kW
Speed	14 knots

Sources and submissions

Sources of information

On 6 March 2014, investigators from the Australian Transport Safety Bureau (ATSB) attended *Aquarosa* while the ship was at anchor off Fremantle, Western Australia. The master and directly involved crew members were interviewed and each provided their account of the incident. Photographs of the ship and copies of relevant documents were obtained, including log books, statutory certificates, reports, manuals and procedures.

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB 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 factors related to the transport safety matter being investigated.

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.