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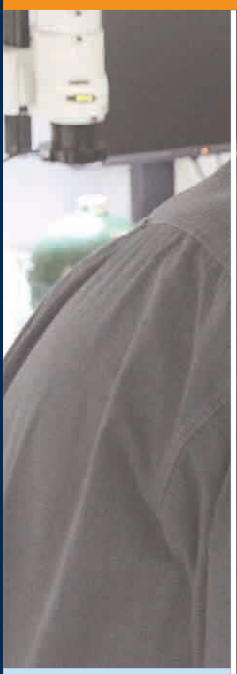
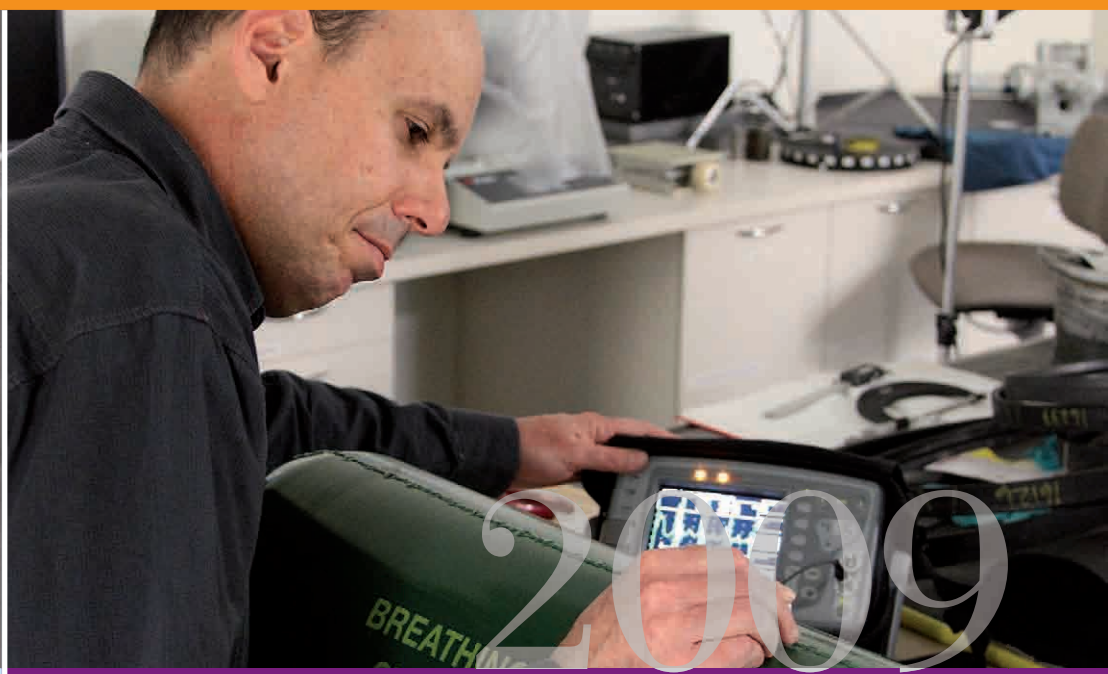
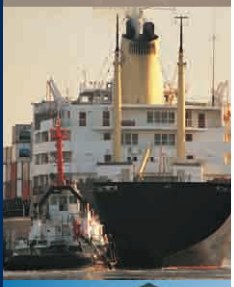
Australian Transport Safety Bureau





2009

Annual Review



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Executive Director's message

I am honoured to be given the opportunity to write this final message to complete my ten-year tenure as ATSB's Executive Director from 1 July 1999 to 30 June 2009. I believe I leave the ATSB in good heart and in good hands under CEO and Chief Commissioner Martin Dolan and his leadership team including Deputy CEO Kerryn Macaulay. I owe Kerryn and Peter Foley a large debt for acting so effectively as Executive Director for substantial parts of 2008-09 while I was offline, mainly reviewing and investigating offshore oil and gas safety regulation for Commonwealth and State Ministers, the Hon Martin Ferguson AM MP and the Hon Norman Moore MLC, following a major pipeline explosion at Varanus Island in Western Australia.

Like many bodies in the current global economic environment, the ATSB's resources are very tight but the Bureau nevertheless continued to perform well during 2008-09. In addition to the challenge of transitioning to a new commission structure with associated legislation and written material, the ATSB released 99 final investigation reports and 10 aviation safety research reports which contributed to improving future transport safety. However, it was possible to initiate only 85 new investigations and of the 97 investigations on hand at 30 June 2009, 30 were over a year old. Accordingly, timeliness remains a challenge. Some new strategies for addressing timeliness of smaller investigations have been developed for implementation in 2009-10 based on a new ATSB management structure.

In 2008-09, the ATSB continued to punch above its weight internationally and I was pleased to lead the delegation to the once-in-a-decade ICAO Accident Investigation Group meeting to consider desirable changes to Annex 13 of the Chicago Convention. Good work continued at the IMO, with our ITSAP assistance to Indonesia – for which Alan Stray received a Public Service Medal – and through MAIIF and ISASI. The ATSB was nominated for a major ISASI award based on its lifetime achievements in the field of human factors.

As daily media reports indicate, the ATSB has built a substantial positive reputation in its first decade based on the competencies and dedication of its professional staff. Mercifully, the ATSB has not faced the ultimate test of a major accident with scores of fatalities and serious injuries but constant vigilance and regular exercises are required against such an eventuality.

Based on decisions by COAG and ATC ministers, the ATSB is well positioned to pick up additional roles in intrastate rail safety investigation, marine investigation and possibly also including pipelines and offshore oil and gas. Our North American and some European sister bodies like the Dutch, Swedish and Finnish boards, show how the independent, no-blame systemic safety investigation model can provide major safety dividends for government and society across a range of transport and other sectors.

Whatever the future holds for the ATSB, I wish it and its dedicated staff every success and am grateful for the privilege of establishing the Bureau and leading it up to the establishment of its new and long-sought statutory commission structure.

Kym Bills

Commissioner's foreword

This publication represents the last in a series of annual reviews, dating back to 1999–2000.

Over the last ten years, the Bureau has built a reputation as a world class investigative organisation. This has been chronicled through the ten annual reviews which the ATSB has released.

From 1 July 2009, the ATSB has taken on new annual reporting responsibilities which will result in the publication of a very different document. This change is entirely appropriate given the ATSB's status as a newly established statutory agency. However, consistent with our new mandate, I know the Commission will be looking for additional vehicles, similar to the Annual Review, to share the insights our investigations have uncovered and to promote transport safety.

As the ATSB's first Chief Commissioner, I am proud to lead the fine organisation I have inherited from Kym Bills. The successes achieved over the last ten years provide us with a solid foundation on which to achieve the expectations of government. I thank Kym for his dedication, hard work and for his outstanding legacy.

Martin Dolan
Chief Commissioner

The ATSB's mission

Objective

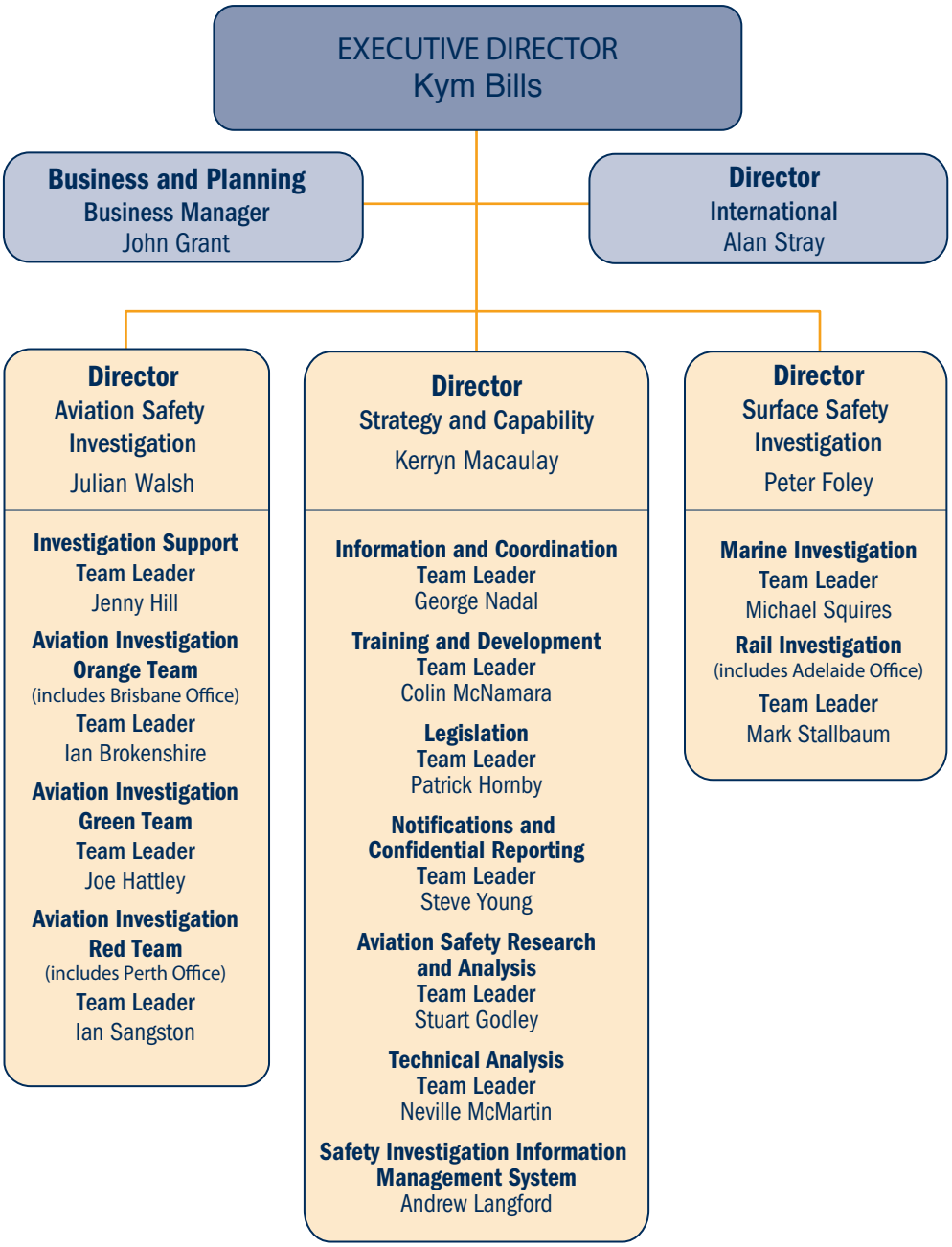
Safe transport.

Our mission

The Australian Transport Safety Bureau contributes to the wellbeing of all Australians by maintaining and improving transport safety and public confidence through excellence in:

- independent investigation of transport accidents and other safety occurrences
- safety data recording, analysis and research
- fostering safety awareness, knowledge and action.

ATSB organisation chart



as at 30 June 2009

Executive profile

Mr Kym Bills

Kym Bills was appointed foundation Executive Director of the newly formed Australian Transport Safety Bureau on 1 July 1999 and held the position until 30 June 2009. Prior to the ATSB, Mr Bills was First Assistant Secretary of the Department's Maritime Division from 1994. He was also a Director of the Commonwealth shipping line, ANL Limited, during its restructuring from September 1995 to the signing of sale contracts at the end of 1998 and a member of the Board of the Australian Maritime Safety Authority from 1995 to 1997. In 1998, Mr Bills led negotiations at the International Maritime Organisation, which established a new legal regime for archipelagic sea lanes including a precedent case for protecting Australia's shipping and other interests through the Indonesian archipelago. During 2005, Mr Bills was offline for several months as secretary to the review of airport security and policing led by the Rt Hon Sir John Wheeler. During 2009, Mr Bills was asked by the Hon Martin Ferguson to undertake a major review of Australia's offshore oil and gas safety regulation and by the Hon Norman Moore to complete a final investigation of the Varanus Island gas explosion that cost the state of Western Australia about $3 billion.

In addition to transport, Mr Bills has held a number of Australian Government public service positions since 1978 including in the Australian Taxation Office, the Department of Foreign Affairs, the Office of National Assessments, the Department of Immigration and Ethnic Affairs, the Department of Finance and the Department of Workplace Relations and Small Business. Mr Bills' initial degrees were from the universities of Adelaide and Oxford and he later completed degrees at Flinders University, the Australian National University and Charles Sturt University while working. He is a fellow of six professional bodies and a past Chairman of the International Transportation Safety Association. He was Chairman of the National Road Safety Strategy Panel from 1999 to 2008.

Mr Alan Stray, PSM

Alan Stray, PSM, is Director International, with responsibility for international engagement and liaison with government agencies, the International Civil Aviation Organization (ICAO) and industry.

Alan joined the then Bureau of Air Safety Investigation (BASI) as an air safety investigator in January 1987, bringing a wealth of aircraft engineering and flying experience to the role. Alan's experience in aviation operations and safety began in the mid-60s as an aircraft maintenance engineer, followed by years of flying in Papua New Guinea and as a regional airline pilot in Australia. His work as an aviation safety investigator and safety manager has involved most areas of the ATSB's activities, including aviation investigation, confidential reporting, aviation safety research, and information distribution. As an investigation exchange officer with the Transportation Safety Board of Canada between 1992 and 1994, Alan was involved in major accident investigations and also developed *Reflexions*, a multimodal Canadian safety magazine modelled on the successful BASI Journal, which he had produced in Australia. Between July 1997 and March 2006, as Deputy Director Aviation Safety Investigation, Alan was responsible for the oversight of aviation safety investigations in Australia.

Alan has been the Australian Accredited Representative on a number of overseas major airline accidents, including the Garuda and AdamAir Boeing 737 tragedies in Indonesia. He currently has the lead in-country role in the ATSB's cooperation with the Indonesian National Transportation Safety Committee, as part of the Australian Government's Indonesia Transport Safety Assistance Package (ITSAP). He continues to be a guest speaker at conferences and lecturer at training courses for investigators in the region.

In January 2005, he was awarded the Government's Australia Day Council Achievement Medallion for his contribution to aviation safety. In January 2008, he was again awarded a Medallion, this time for the support provided to the Indonesian Government in the investigation of the crash of Garuda 737 at Jogyakarta in March 2007. In January 2009, Alan was honoured in the Australia Day Honours with the award of a Public Service Medal. The citation: For outstanding Public Service improving aviation safety in Australia and Indonesia.

Alan holds a Diploma of Transport Safety Investigation and management qualifications.

Ms Kerryn Macaulay

Kerryn Macaulay is the Director of Strategy and Capability and is responsible for the oversight of the technical analysis facilities, aviation research and analysis, information and coordination, notifications and confidential reporting, legislative matters affecting the ATSB, the training and development needs of Bureau staff and the ATSB's Safety Investigation Information Management System. Kerryn is a commercial pilot and flight instructor with an Airline Transport Pilot Licence. She joined the then Bureau of Air Safety Investigation (BASI) in 1995 as an air safety investigator. Kerryn later managed the Safety Analysis Branch of BASI, which included the review and release of Safety Recommendations and safety study reports to organisations within the aviation industry including regulatory agencies, operators and manufacturers.

Since the formation of the ATSB in 1999, Kerryn has assisted in developing a capacity to investigate rail accidents and incidents and was appointed as the first Team Leader to the Rail Safety Unit. Kerryn completed a three-year project to develop and implement Commonwealth multi-modal legislation, which culminated in the introduction of the *Transport Safety Investigation Act 2003* and which enabled the ATSB to investigate accidents and serious incidents on the interstate rail system in addition to the investigation of accidents and incidents in the aviation and marine transport modes. Kerryn also assisted the Bureau to become a Registered Training Organisation and to develop a Diploma of Transport Safety Investigation, which enables the Bureau to meet its unique training requirements.

In October 2003, Kerryn was seconded to the newly established NSW Independent Transport Safety and Reliability Regulator for a period of eight months to assist in setting up the Office of Transport Safety Investigation. The role included the development of investigation protocols and the establishment of a confidential reporting scheme for employees of the rail, ferry and commercial bus industries.

Kerryn is a trained teacher and holds a Diploma of Transport Safety Investigation. She has also earned an Executive Master of Public Administration with the Australia and New Zealand School of Government. As part of being established as a separate statutory agency on 1 July 2009, Kerryn was appointed as the ATSB's first Deputy Chief Executive Officer.

Mr Julian Walsh

Julian Walsh is Director of Aviation Safety Investigation, a role he has held since March 2006. Prior to joining the Bureau as an air safety investigator in September 1998, Julian completed nearly 21 years of service as an officer in the Royal Australian Air Force.

While in the Air Force, Julian gained extensive experience both as an operative Air Traffic Controller and as an Air Traffic Services manager. He is a graduate of the Royal Australian Navy Staff College and has held a range of command, personnel and project management, training and aviation safety-related positions in Defence.

Since joining the Bureau, Julian has been responsible for a number of significant aviation investigations and has overseen a range of functions within the Bureau, including Team Leader of Notifications and Technical Analysis, and an Aviation Investigation Team Leader.

In January 2004, Julian was awarded an Australia Day Medallion for his leadership and ethics in major aviation safety investigations and analysis.

Mr Peter Foley

Peter Foley is Director of Surface Safety Investigation, a role he has held since August 2006. Peter is responsible for marine and rail safety investigations.

Peter joined the ATSB in 1999 after a career at sea as a marine engineer with Australian shipping companies including the Commonwealth shipping line, ANL Limited. Since joining the ATSB, he has been responsible for a large number of marine investigations, many significant, and has also had a close involvement in several rail investigations. He has represented Australia at the International Maritime Organization's Flag State Implementation Sub-committee and has been an active member of the Sub-committee's casualty analysis correspondence group for the past three years.

Peter holds professional qualifications in marine engineering and transport safety investigation, degrees in both marine and mechanical engineering, and a graduate diploma in business management.

Modal overviews
Rail investigations

Role

The ATSB's Rail Safety Investigation Team conducts investigations into rail safety occurrences (accidents and incidents) on the Defined Interstate Rail Network (DIRN) under the provisions of the *Transport Safety Investigation Act 2003* (TSI Act). Occasionally, if agreed by the Minister, the ATSB undertakes rail investigations on intrastate rail networks at the request of state and territory authorities. The ATSB also has a mandate from the Australian Transport Council to coordinate the publication of National Rail Occurrence Data from data supplied by the various state and territory rail regulators.

The purpose of rail investigations is to enhance rail safety by determining the factors and associated safety issues which contribute to accidents and incidents in order to assist in preventing similar occurrences in the future. The ATSB works cooperatively with organisations such as the state and territory rail regulators, the Australian Rail Track Corporation and rail operators, who are best placed to effect changes to improve safety.

Investigations result in a published report which includes the factual information relating to the incident, analysis and findings. The safety actions taken by directly involved parties are included in the reports, and any necessary recommendations and/or safety advisory notices are made to address the safety issues identified. The reports do not seek to assign fault or to determine civil or criminal liability. As with similar bodies worldwide, compliance with ATSB safety recommendations is not mandatory. All reports are available on the ATSB's website.

Key rail safety activities and results

In 2008-09, the ATSB initiated eight rail safety investigations on the DIRN under the TSI Act from a total of 61 rail accident and incident notifications recorded. In addition, the Bureau was asked to provide a senior rail safety investigator to chair two Queensland Transport investigations into two collisions at level crossings; one at Rungoo, north Queensland on 27 November 2008 and the other at Mundoo, north Queensland on 1 January 2009.

The Bureau completed 10 investigations (see Appendix B) and a Safety Bulletin, *ATSB rail safety investigation: key lessons learnt*[1]. The average completion time for the 10 rail investigations was 351.7 days, less than the target of 365 days.

The completed investigations related to four level crossing collisions, two derailments, two rolling stock irregularities, one Signal Passed at Danger (SPAD), and one track and civil infrastructure irregularity.

1 Note that whilst the ATSB's work on RO-2009-001 was completed on 22 June, 2009, it was not released by Queensland Transport until 13 August, 2009.

The completed investigation reports noted 18 safety actions that had been taken voluntarily by rail stakeholders. The reports also contained a total of 14 safety recommendations.

At 30 June 2009, the ATSB was continuing 10 rail safety investigations, one of which was an ATSB chaired rail safety investigation for Queensland Transport (see Appendix D).

Key rail investigations completed in 2008–09

RO-2007-007 - Level crossing collision near Virginia, South Australia

At approximately 0935 on 16 November 2007, a small passenger van drove into the path of a freight train (6117) at the Moloney Road passive level crossing near Virginia, South Australia. As a result of the collision, the two occupants in the van were fatally injured. The locomotive crew were shaken but not hurt. The train sustained minor damage but the van was destroyed.

The level crossing was passively controlled by signs that required road users to stop at the 'Stop' sign and give way to trains on or approaching the level crossing. The road crossed the rail line at an angle close to 70 degrees.

Travelling along Moloney Road in a south-westerly direction (the direction that the van was travelling before the collision) the sighting of the rail line to the south-east (the direction from which the train was approaching the crossing) was obstructed by a high galvanised iron fence and vegetation. The sighting along the rail line remained obstructed for a road vehicle approaching the crossing from this direction until it was about 12.6 m from the crossing and adjacent to the 'railway crossing width marker assembly' (RX-9). Visibility then improved to be in excess of 1,000 m at the stop line at the crossing.

Given the size and weight of most trains, it is not possible for them to brake at anywhere near the rate of a road vehicle. Heavy freight and passenger trains may take several kilometres to slow from high track speeds. In most circumstances a train driver is unlikely to sight an approaching motor vehicle and determine its intent to stop or not, until the train is relatively close to the level crossing, by which time a collision may be imminent. In such circumstances, a train driver is unable to take any effective action to avoid the collision other than sounding the locomotive horn to warn the motorist, and (if time permits) make an emergency brake application.

By comparison, a road vehicle can stop relatively quickly. It is for this reason that, regardless of the type of crossing control, the onus to take appropriate action is very much on the motorist. Consequently, it is important that road signage is effective at warning a motorist that they are approaching a level crossing and provides sufficient distance to stop safely. Similarly, it is important that from the stopped position there is sufficient sighting distance available for the motorist to decide whether it is safe to proceed across the level crossing.

The driver of the road vehicle probably did not come to a halt at the Stop sign as required and entered the level crossing while the train was approaching/on the crossing.

It is probable that the motorist's familiarity with the crossing and a low expectation of encountering a train were factors that contributed to the collision. Alternatively, the motorist may simply have had a lapse of concentration and failed to stop. Had the motorist come to a halt at the Stop sign/line, he should have been able to see the train.

The City of Playford Council closed the Moloney Road crossing to prevent similar accidents in the future.

RO-2008-012 - Derailment near Katherine, Northern Territory

At approximately 1310 on 4 November 2008, freight train 3DA2 derailed about 6 km west of Katherine in the Northern Territory. The Stuart Highway passes over the Central-Australia Railway line approximately 9 km to the north-west of Katherine. The line then tracks to the south for about 2 km before leading into a left curve.

The derailment occurred on this curve, about 6 km west of Katherine, 350 m before the 2,451 km mark and about 1,500 m to the north-west of the Florina Road level crossing. Six wagons derailed and sustained minor damage and about 1,300 m of track was destroyed. There were no injuries.

A track misalignment approaching Katherine, at or near the 2,450.650 km mark, probably caused the derailment of train 3DA2. The misalignment probably grew as train 3DA2 traversed the track and eventually became large enough to cause the trailing bogie of the 24th wagon/5-pack unit, 5th platform to derail.

The stress relief philosophy used by the northern team during the construction of the Darwin to Alice Springs railway line probably contributed to generating high longitudinal track forces and this increased

the risk of track misalignment/buckling. The risk of track misalignment increases as the difference between the ambient temperature and the rail neutral temperature increases.

The lack of monitoring points for rail creep at the derailment site made it impossible to determine whether there was any longitudinal track movement and so there was no simple way for maintenance staff to determine whether there was an increased risk of track misalignment/buckling. The effect of trains braking in the curve at/near the 2,450.650 km mark as they slow approaching Katherine would probably have led to an increased risk of localised 'bunching' of the track at the location of the derailment.

Following this derailment, the track owner is undertaking actions to mitigate the risks of derailments occurring as a result of track misalignment.

RO-2008-004 - Derailment near Pura Pura, Victoria

At about 1932 on 30 March 2008, freight train 1MA6Q, travelling from Melbourne to Adelaide, derailed on the Mt Emu Creek bridge near Pura Pura, Victoria. Twenty-one wagons derailed, coming to rest on the track past the bridge abutment. As a result of the derailment, some containers burst spilling their contents onto the rail corridor and the adjacent public road.

On 30 March 2008, the two train drivers involved in the derailment signed on for duty at 1400 and joined train 1MA6Q at North Dynon depot in Melbourne. They completed prescribed engine, brake and safety checks before departing from Melbourne at 1615, bound for Dimboola where the crew were rostered to change. Train 1MA6Q would then continue to Adelaide.

Just before Pura Pura, the train came around a curve and downhill towards the Mount Emu Creek bridge. The driver recalled that he had the throttle handle set in the eighth notch to climb the gradient on the other side of the bridge. The driver received an acknowledgement from the train controller as the train passed over the bridge. The driver glanced at the speedometer and recalled an indicated speed of about 95 km/h. At this time both drivers heard an 'enormous bang' and noticed the locomotive bounce. The driver said to the co-driver 'I wonder what that was.' The co-driver then noticed what appeared to be smoke in the rear vision mirror. The driver looked in the rear vision mirror and commented that it was not smoke, but dust.

At this point, the driver observed that the brake pipe pressure gauge was indicating a 'loss of air'. The driver left the throttle in the eighth notch until the train was nearly stopped to avoid the wagons bunching up. After stopping, the train brakes and locomotive handbrakes were applied to secure the train. Both drivers then walked back to the 21st wagon, RQKY2063, which had both bogies derailed. The driver called train control and the shift support officer and advised them of the occurrence before returning to the front of the train. The co-driver continued to walk further back to assess the other damage. Closer to the bridge the co-driver noticed a motor vehicle had stopped on the adjacent Vite Vite Road because the road had been blocked by large paper rolls thrown off the train during the derailment.

About 1,300 m of track was damaged. However, the Mount Emu Creek bridge was not damaged. Twenty-six wagons on train 1MA6Q received minor damage to wheels. Another 13 wagons were substantially damaged or destroyed, including the freight being transported.

No wheel flange or dragging equipment marks were found on the track before the point of derailment. Examination of the wagons revealed no mechanical defects before the accident that could have contributed to the derailment. There was no evidence of wheel flats that contribute to excessive wheel impact loading, that could have contributed to the derailment. Further examination of the site revealed a fractured rail on the Mount Emu Creek bridge, under the 43rd position in the consist.

The rail was manufactured in June 1961 to Australian Standard Specifications for Railway Permanent Way Materials, AS E22-1949 Steel Rails, the standard at that time. The track had been in service at Pura Pura for in excess of 20 years. Originally, the track was laid in 40 ft (12.182 m) lengths and connected by a mechanical joint consisting of fish-plates and bolts. At some time around the mid-1980's, based on the only records available, the mechanical joints were removed and the rail lengths welded together using an alumino-thermic process to form continuous welded rail. This process enabled the track to be less maintenance intensive. The redundant bolt holes were left in-situ and were periodically inspected for defects as specified for standard mechanical joint fish-plated track.

The investigation determined that the rail at the derailment site had low-load high-cycle fatigue cracking emanating from the unused bolt-holes in the rail web. Unused bolt-holes in the rail web are sufficient stress concentrators to result in the initiation and propagation of fatigue cracking, ultimately leading to the failure of the rail.

The ATSB issued two recommendations to address the safety issues identified.

Key rail safety actions and recommendations 2008–09

The ATSB prefers to encourage early and positive safety action following an accident or incident, and to record such action in its final investigation reports if this is possible, negating the need to issue formal safety recommendations. However, the ATSB will make recommendations when it believes that insufficient safety action may have been taken.

In 2008-09, ATSB reports noted 18 rail safety actions that had been taken voluntarily by rail stakeholders. The Bureau issued 14 rail safety recommendations to rail stakeholders. The recommendations related to:

- level crossing signage compliance with the applicable standard, ongoing rail corridor maintenance to ensure adequate sighting is available for train crews of road vehicles and vice versa, and completion of interface agreements between rail track managers and road owners/authorities

- the protection of recorded data and regular maintenance/validation of train data recorders
- the adequacy of signal sighting distances and non-adherence to safeworking rules
- the adequacy of track fault inspection and rectification procedures/processes, and guidance for train crews when possible problems with track are indicated.

Details of all rail safety recommendations and safety advisory notices, including any responses received relating to safety recommendations, are available at the ATSB's website <www.atsb.gov.au>.

During the period 2006 through 2009, the National Transport Commission developed national rail safety reforms that notably include requirements for road and rail regulatory authorities to have interface agreements. The ATSB's investigation reports have also provided information to the rail industry on ways to improve rail safety and, in particular, aspects of risk assessment and public education with respect to level crossings.

Rail safety promotion

A part of the ATSB's mission is to improve transport safety by raising safety awareness and knowledge. Together with state and territory rail regulators and other bodies, the ATSB provides a range of safety information to the rail industry to achieve this aim. The Bureau promotes rail safety by:

- publishing investigation reports and safety studies
- publishing safety recommendations and safety advisory notices
- providing information on its website
- delivering presentations at conferences and safety forums
- cooperating with international safety agencies
- contributing to Parliamentary inquiries
- participating in coronial inquests
- contributing to rail publications and journals.

These activities help to improve future rail safety by raising industry awareness of emerging safety issues and maintain public confidence that the safety of the transport system is not being compromised.

Participation in rail safety forums

During 2008–09, the ATSB participated in several rail safety forums. Participation helps the Bureau communicate various safety messages, maintain its industry contacts, and stay informed on relevant policy and technical issues. These forums included:

- the International Rail Safety Conference in Denver, USA, October 2008
- the AusRAIL 2008 Conference in Sydney, December 2008
- the Rail Safety 2009 conference in Sydney, February 2009
- NT Rail Safety Committee meetings in Darwin, November 2008 & June 2009
- The Railway Technical Society of Australasia, selected branch meetings in SA, WA and Qld.

Coronial inquests

In 2008-09, ATSB rail safety investigators were not required to appear as witnesses or to provide information to coronial inquiries.

Marine investigations

Role

The purpose of marine transport safety investigations undertaken by the ATSB is to enhance safety at sea by identifying the safety factors and associated safety issues which have contributed to accidents and incidents, with the aim of preventing similar occurrences in the future. The ATSB works cooperatively with international regulatory authorities, Australia's Commonwealth maritime regulator, the Australian Maritime Safety Authority (AMSA), the state and territory maritime regulatory authorities, other investigation agencies, ship owners and operators.

The ATSB's Marine Safety Investigation Team investigates accidents and incidents involving Australian-registered ships anywhere in the world and foreign ships in Australian waters or en route to Australian ports. Since 1 July 2003, these occurrences have been investigated under the provisions of the *Transport Safety Investigation Act 2003* (TSI Act) and associated regulations. Depending on the type and severity of an occurrence, the ATSB may conduct an investigation with the aim of producing a transport safety investigation report or seek further information from an owner, operator, crew or appropriate body to enhance the information available for input into the ATSB's marine occurrence database.

Investigations result in a published transport safety investigation report which includes the factual information relating to the incident, an analysis of the factors, and the findings. The safety actions taken by directly-involved parties are also included in the reports, as are any necessary recommendations and/or safety advisory notices to address the identified safety issues. The reports do not apportion fault or liability and, as with similar bodies worldwide, compliance with ATSB safety recommendations is not mandatory.

The ATSB prints and distributes copies of marine transport safety investigation reports and safety and educational material nationally and internationally, promoting maritime safety in Australia and overseas. Organisations receiving these reports include the international maritime community, Australian and overseas educational institutions and maritime administrations in Australia and overseas, including the International Maritime Organization (IMO).

Key marine safety activities and results

In 2008-09, the ATSB initiated 11 new investigations from a total of 94 recorded marine accident and incident notifications. Ten marine investigations were completed in this same time period (see Appendix B). The median completion time for these investigations was 342 days, below the 365 day target.

The completed investigations involved five groundings, two collisions, one close quarters situation, one engine room fire and one fatality. These reports recorded 27 safety actions that had been taken voluntarily by stakeholders. The reports also included a total of 10 safety recommendations and seven safety advisory notices directed towards stakeholders.

At 30 June 2009, the marine team was continuing its investigation work with 11 ongoing marine transport safety investigations (see Appendix D).

Key marine investigations completed in 2008-09

242-MO-2007-242 - *Endeavour River* – Grounding, Queensland

On the afternoon of 2 December 2007, the Australian-registered bulk carrier *Endeavour River* grounded in Gladstone, Queensland, during a mid-tide berthing manoeuvre at the South Trees Wharf.

The master was attempting to berth the ship on a flood tide, with a following wind, and was unable to position the ship correctly for its approach to the berth. Even with the use of two attending tugs, he was unable to counteract the tidal influence. Throughout the berthing manoeuvre, only the master, the chief mate and the deck cadet were on the bridge.

The ship grounded in the vicinity of A1 Beacon at the entrance to the Auckland Channel, destroying the beacon in the process. Despite the assistance of all five of the port's tugs, the ship could not be refloated that day.

On 7 December, *Endeavour River* was successfully refloated on the morning high tide and manoeuvred, with the aid of tugs, to South Trees Wharf.

The ATSB investigation found that Bridge Resource Management principles were not practiced by the bridge team and that no monitoring of the passage took place during the time leading up to the grounding. In addition, the bridge team lost situational awareness prior to the grounding. They became fixated on trying to berth the ship and were not responsive to other cues which would have warned them that the ship was being set down into an area of shallow water.

The report identified a number of safety issues and acknowledged the safety actions that were taken by the organisations involved to address those issues. This incident, and the ATSB report into it, is now being used as a case study in pilotage and Bridge Resource Management (BRM) training programs.

249-MO-2008-001 - *Allena/Northern Fortune* — Collision, Queensland

At about 2102 on 21 January 2008, the Australian fishing vessel *Allena* collided with *Northern Fortune*, an Antiguan- and Barbudan-registered container ship, off the Queensland coast. The fishing vessel's bow was badly damaged but the crew were able to control the ingress of water and navigate the vessel to Bowen, Queensland, its home port.

After the collision, *Northern Fortune*'s watch keeper did not stop to render assistance or ensure that the fishing vessel and its crew were safe. He claimed that he thought that a collision had not occurred, only a close quarters passing.

The investigation determined that the lookout on board both *Allena* and *Northern Fortune* was ineffective and that neither vessel's watch keeper saw the other vessel in sufficient time to avoid the collision.

Additionally, the fishing vessel was not required to be fitted with an Automatic Information System (AIS) unit or a radar reflector and, consequently, it may have been difficult for the ship's watch keeper to detect the fishing vessel in sufficient time to avoid a collision using the available electronic navigation aids.

The investigation also found that the Queensland regulations for fishing vessel certificates of competency were ambiguous and were not consistent with national standards. The regulations allowed *Allena*'s skipper to operate the vessel up to 200 nautical miles from the coast without appropriate training in navigation and the application of the collision regulations.

As a result of this investigation, safety actions were taken by the Department of Marine Services and Merchant Shipping in Antigua and Barbuda, Maritime Safety Queensland, and the owners, operators and skippers of the fishing vessel.

253-MO-2008-004 - *MSC Lugano* – Engine room fire, West Australia

At about 1115 on 31 March 2008, a fire started in the engine room of the Marshall Islands registered container ship *MSC Lugano* which was off the coast of Western Australia, en-route to Fremantle. The engine room oil pumps and tanks were isolated, ventilation was shut down and fire hoses were used to boundary cool the engine room. It was not until an hour later, after the fire had cut electrical power to the emergency fire pump supplying the hoses, that the ship's fixed fire extinguishing system was activated.

The fire was extinguished but the ship was disabled and began to drift towards the coast and the dangers that lie offshore. The Australian Maritime Safety Authority (AMSA) coordinated a response to the incident. However, it was late on 1 April by the time that the first Esperance harbour tug arrived to assist *MSC Lugano* and at one stage the next day, the nearest danger was just 6 nautical miles away. It was not until 5 April that a salvage tug had the ship under tow towards Fremantle, where it arrived on 13 April.

The investigation identified a number of safety issues; including deficiencies in engine room procedures and practices on board *MSC Lugano* and that its safety management system did not provide adequate guidance for fighting an engine room fire. It was also found that; the ship's electrical power distribution system did not meet international requirements for ships; AMSAs intervention strategies and procedures could be improved and; the harbour tugs were unsuitable for deep sea towage.

As a result of the investigation and the report, safety action to address the relevant safety issues was taken by AMSA, the ship's classification society and the harbour tug company. The action included AMSA reviewing its procedures and undertaking action to improve its emergency response strategy and the tug company better equipping its tugs. Repairs made to the ship's electrical systems complied with relevant requirements and the class society undertook a review to identify other ships with similar non-compliant arrangements.

Key marine safety actions and recommendations 2008-09

The ATSB prefers to encourage early and positive safety action by stakeholders following an accident or incident, and to record such action in its final investigation reports, negating the need to issue formal safety recommendations. However, the ATSB will make recommendations when it considers that insufficient safety action may have been taken.

In 2008-09, ATSB reports noted 27 marine safety actions that had been taken voluntarily by rail stakeholders. The Bureau issued 20 marine safety recommendations to marine stakeholders. The safety issues identified in the marine transport safety investigation reports completed in the year 2008-09 included:

- safety management systems that either lacked sufficient guidance or were not effectively implemented
- ineffective implementation of bridge resource management principles and procedures
- ineffective passage planning and monitoring
- the lack of a proper and effective lookout on the bridges of both ships and fishing vessels
- an ineffective on board fatigue management regime
- a poorly-designed power distribution system which resulted in the disruption of the electrical supply to a ship's fire pump during an emergency response to an engine room fire.

Details of all marine safety recommendations and safety advisory notices, including responses received relating to safety recommendations, are available at the ATSB's website <www.atsb.gov.au>.

Marine safety promotion

The ATSB aims to improve future marine safety by raising industry awareness of both ongoing and emerging safety issues, and by maintaining public confidence in the fact that transport safety is not being compromised. Together with AMSA, state and territory maritime regulators and other bodies, the ATSB provides a range of safety information to the maritime industry to achieve this aim. This information includes:

- publishing investigation reports
- publishing safety recommendations and safety advisory notices
- providing information on its website
- delivering presentations at conferences and safety forums
- cooperating with international safety agencies
- analysing international marine casualties
- contributing to Parliamentary inquiries
- participating in coronial inquests
- contributing to maritime publications and journals
- maintaining the marine confidential reporting scheme.

Participation in marine safety forums

Participation in both local and international safety forums helps the ATSB communicate various safety messages, maintain its industry contacts, and stay up-to-date with relevant policy and technical issues.

During 2008–09, the ATSB Marine Investigation Team presented at various marine safety forums, including:

- the International Marine Pilots Association (IMPA) conference in Bangkok, August 2008
- the Nautical Institute in Sydney, August 2008
- the Marine Accident Investigators International Forum (MAIIF) in Malta, September/October 2008
- the Australian Maritime College (AMC) Marine Investigation Course in Melbourne, September 2008
- a Bridge Resource Management training course in Melbourne, November 2008
- a Maritime Law Association of Australia and New Zealand (MLAANZ) Maritime Interest Group Lecture in Canberra, March 2009
- the 17th meeting of the International Maritime Organization's Flag State Implementation (FSI) Sub-Committee in London, April 2009
- the National Shipping Conference (Natship 2009) in Sydney, June 2009
- a number of Advanced Marine Pilots Training (AMPT) courses.

Coronial inquests

While the ATSB's Marine Safety Investigation Team were not directly involved in any coronial inquests in 2008-09, the ATSB investigation into the disappearance of *Malu Sara* with five people on board in the Torres Strait in October 2005 was reopened as a result of evidence that had been provided to the Queensland State Coroner. This evidence was not made available to the ATSB investigators at the time of the initial investigation. The investigation was ongoing as of 1 July, 2009 and the supplementary report into the loss of *Malu Sara* is due for release in the third quarter[2] of the 2009 calendar year.

2 The second supplement to the independent investigation into the loss of the Department of Immigration and Multicultural and Indigenous Affairs vessel *Malu Sara* was released on 24 September 2009.

Aviation investigations

Role

The ATSB's Aviation Safety Investigation Branch investigates accidents and other occurrences involving civil aircraft in Australia. It does so in accordance with Annex 13 to the Convention on International Civil Aviation (Chicago Convention 1944), which has legal force through the *Transport Safety Investigation Act 2003* (TSI Act) for aviation occurrences occurring after 1 July 2003.

The Bureau does not investigate all aviation occurrences. Instead, the Bureau investigates selectively, allowing a more thorough analysis of those occurrences the Bureau believes will yield the most useful safety benefits within the budget available after meeting international obligations and community expectations with respect to fatal accidents. The ATSB may also assist in investigations of accidents and serious incidents involving Australian-registered aircraft overseas, or with overseas investigations involving foreign aircraft if an overseas investigating authority seeks assistance and the Bureau has suitable available resources.

The purpose of aviation safety investigations is to enhance aviation safety by determining the factors and associated safety issues which contribute to accidents and incidents in order to assist in preventing similar occurrences in the future. The ATSB works cooperatively with organisations such as the Civil Aviation Safety Authority (CASA), Airservices Australia, aircraft manufacturers and operators, who are best placed to effect changes to improve safety.

Investigations result in a published report which includes the factual information relating to the accident or incident, analysis and findings. Any safety actions taken by directly involved parties are included in the reports, and any safety recommendations and/or safety advisory notices to address outstanding safety issues are made. The investigation reports do not seek to assign fault or to determine civil or criminal liability, and the results of investigations are not binding on the parties through any legal, disciplinary or other proceedings. As with similar bodies worldwide, compliance with ATSB safety recommendations is not mandatory. All reports are available on the ATSB's website.

Key aviation safety activities and results

In 2008–09, the ATSB initiated 64 new aviation safety investigations from approximately 17,831 notifications received (7,814 were recorded as aviation occurrences).

During 2008-09, the ATSB completed 79 aviation investigations, an increase from 73 in 2007-08 (see Appendix B). The median time for investigations was 463 days, an increase from 443 days last year and well above the target of 365 days. The increase in median completion time was significantly affected by the release of a number of older, less complex investigations that were delayed due to higher priority tasking and ATSB's involvement with three significant investigations into passenger transport accidents.

There were 132 separately-identified safety actions voluntarily taken by aviation safety stakeholders. The reports also included one safety recommendation and three safety advisory notices to aviation stakeholders.

At 30 June 2009, the ATSB was continuing 74 aviation safety investigations (see Appendix D), down from 91 in 2007-08.

Key aviation investigations completed in 2008–09

AO-2007-018. Engine Failure, VH-HYY, Cirrus SR22, Cecil Park, New South Wales

On 5 February 2007, a Cirrus SR22 aircraft, registered VH-HYY, with a pilot and one passenger on board, was being operated on a private flight from Canberra, ACT to Bankstown, NSW. As the aircraft approached the Cecil Park area, the pilot reported to air traffic control that the engine had lost power and he was attempting a forced landing. Soon after, the aircraft impacted terrain close to the M7 motorway and both occupants sustained serious injuries.

The investigation determined that the engine stopped due to the in-flight loss of a blanking cap from the un-metered fuel pressure test port in the engine fuel system. Testing showed that the engine would not operate with the cap missing.

The investigation determined that, instead of the normal steel cap, a plastic blanking cap had probably been fitted to the test port on the engine during maintenance and had been inadvertently left there, and that the plastic cap had detached from the test port just prior to the accident.

Prior to impact, the pilot activated the Cirrus Airframe Parachute System (CAPS), but the system malfunctioned and the parachute did not deploy correctly.

Following examination of the CAPS components from this aircraft and further functional testing of production CAPS components in the US, the aircraft manufacturer issued an Alert Service Bulletin incorporating design changes to the CAPS in the worldwide fleet of Cirrus aircraft.

The aircraft and engine manufacturers are also making a number of other changes to their processes and procedures based on lessons learnt from this accident.

The Australian Transport Safety Bureau forwarded copies of this report to the relevant state emergency authorities to alert them to the dangers posed by ballistic parachute systems in light aircraft.

AI-2007-010. Ground proximity warning events on the Lockhart River Runway 12 RNAV (GNSS) non-precision approach, Lockhart River, Queensland

During the Australian Transport Safety Bureau investigation into the accident at Lockhart River, on 7 May 2005, involving the Metro 23 aircraft registered VH-TFU, it was established that it was possible to receive ground proximity warning system (GPWS) warnings while conducting the Runway 12 RNAV (GNSS) non-precision approach, even when the aircraft was on the correct profile and track. After several reports of crews receiving such warnings, an investigation into the potential safety implications of these 'nuisance' warnings' was commenced. It was found that nuisance warnings could condition flight crews to ignore the warnings in order to complete the approach procedure, rendering the warning system ineffective in preventing controlled flight into terrain.

The safety issue identified as a result of this investigation related to the generation of 'nuisance' GPWS warnings while conducting the Runway 12 RNAV (GNSS) non-precision approach at Lockhart River. Airservices Australia have commenced designing a revised approach using new approach design criteria, and the Civil Aviation Safety Authority has undertaken to flight validate the revised approach when available.

AO-2008-010. Mid-air collision, VH-OUS, Piper Aircraft Corp. PA 18 Super Cub and VH-ZDP, Robinson Helicopter Company R44 Raven, Kennedy Range National Park, Western Australia

On 13 February 2008, a Piper Aircraft Corporation PA 18 Super Cub aircraft and a Robinson Helicopter Company R44 Raven helicopter were engaged in feral goat culling operations in the Kennedy Range National Park, Western Australia.

The two aircraft collided in mid-air as the pilot of the helicopter executed a climbing left turn that brought the two aircraft into close proximity. The pilot and shooter occupants of the R44 were aware that the Super Cub was approaching them at the same height, and the helicopter pilot was aware of the position of the aeroplane during the helicopter's climbing turn, but it appeared probable that the pilot and spotter occupants of the Super Cub did not see the helicopter.

The helicopter's main rotor blades struck the Super Cub's right wing, severing the lift struts. The right wing detached in flight, and the Super Cub fell to the ground. The pilot and spotter were fatally injured. The helicopter was able to land safely.

The investigation determined that the occupants of the Super Cub were probably unaware of the proximity of the R44, and that the R44 pilot did not recognise the collision hazard until there was insufficient time to prevent contact with the Super Cub.

The investigation also identified that there were no formalised operating procedures detailing the conduct of culling operations involving multiple aircraft that may have assisted in the maintenance of aircraft separation.

In response to this accident, a number of safety actions were undertaken by the R44 and Super Cub operators. In addition, extensive safety action was carried out by the Western Australia Government departments that were involved in the operation. These included in the areas of risk management, the review and amendment of guidelines and procedures affecting multiple aircraft operations, the adoption of Safety Management Systems, and the provision of training for departmental personnel.

AO-2007-049. Engine power loss (fuel tank exhaustion), VH-TMP, Cessna Aircraft Company C404, Adelaide, South Australia

On 18 October 2007, the pilot of a Cessna Aircraft Company C404 Titan aircraft, registered VH-TMP, was conducting a charter flight from Adelaide Airport, South Australia to Parafield Airport, Beverley airstrip, and return to Adelaide. The pilot had commenced descent into Adelaide on the final sector of the flight when the right engine lost power. There were no apparent anomalies and the fuel quantity gauges were showing adequate fuel in each tank. After securing the right engine, the pilot continued to Adelaide Airport and landed without further incident.

Aircraft maintenance engineers who inspected the aircraft reported that 3 L of fuel was drained from the right tank and 90 L was drained from the left tank. The fuel quantity gauge was indicating 150 lbs (95 L) in the right tank. An engineer found that one of the electrical circuits in the right fuel quantity indication system had a high resistance. After wiring in the circuit was repaired, the fuel quantity gauge correctly indicated zero fuel in the right tank. Calibration of the fuel quantity indication system was carried out and during that process, the left and right signal conditioners were found to be unreliable and were replaced or repaired.

The operator amended its fuel documentation and fuel planning procedures to include a secondary means of verification of fuel on board to cross-check the electric fuel indication system.

CASA advised that a Civil Aviation Regulation (CAR) 215 direction [WRA3130] had been issued to the operator.

AO-2007-017. Fuel starvation, VH-XUE Empresa Brasileira de Aeronáutica S.A., EMB-120ER, Jundee Airstrip, Western Australia

On 26 June 2007 at 0639 Western Standard Time, an Empresa Brasileira de Aeronáutica S.A. EMB-120ER aircraft, registered VH-XUE, departed Perth, Western Australia on a contracted passenger charter flight to Jundee Airstrip. There were two pilots, one flight attendant, and 28 passengers on the aircraft.

While passing through 400 ft above ground level on final approach to Jundee Airstrip, with flaps 45 set, the aircraft drifted left of the runway centreline. When a go-around was initiated, the aircraft aggressively rolled and yawed left, causing the crew control difficulties. The crew did not immediately complete the go-around procedures. Normal aircraft control was regained when the landing gear was retracted about 3 minutes later.

The left engine had sustained a total power loss following fuel starvation, because the left fuel tank was empty. The investigation identified safety factors associated with the fuel quantity indicating system, the ability of the crew to recognise the left engine power loss, and their performance during the go-around. There were clear indications that the operator's fuel quantity measurement procedures and practices were not sufficiently robust to ensure that a quantity indication error was detected. The failure of that risk control provided the opportunity for other safety barriers involving both the recognition of, and the crew's response to, the power loss, to be tested. Organisational safety factors involving regulatory guidance, the operator's procedures, and flight crew practices were identified in those two areas. The operator introduced revised procedures for measuring fuel quantity, and the Civil Aviation Safety Authority initiated a project to amend the guidance to provide better clarity and emphasis.

The crew's endorsement and other training did not include simulator training and did not adequately prepare them for the event. There was no EMB-120 flight simulator facility in Australia and no Australian regulatory requirement for simulator training. In March 2009, an EMB-120 flight simulator came into operation in Melbourne, Victoria. A workshop and discussion forum was conducted on 27 to 28 April 2009 for Australian Embraer 120 aircraft operators. All those operators were expected to commence utilising the simulator for flight crew endorsement training following that workshop.

AO-2007-066. Controlled flight into terrain, Lake VH-LIS, Air Tractor AT-802, Lake Liddell, New South Wales

On 7 December 2007, the pilot of an Air Tractor Inc. AT-802 aircraft, registered VH-LIS, was conducting a test flight at Lake Liddell, New South Wales. The purpose of the flight was to test an experimental in-flight water collection system using skis attached to the aircraft's main landing gear. At about 0910 Eastern Standard Summer Time, the pilot was conducting the second test run of the day. After the skis had been in contact with the surface of the lake for 36 seconds, witnesses observed the aircraft pitching nose down, about its right main landing gear while rotating to the right. The aircraft then overturned and sank. The aircraft was substantially damaged and the pilot was fatally injured.

The investigation concluded that the right experimental ski breached the surface of the water which caused a substantial amount of drag to act on the right side of the aircraft, rendering the aircraft uncontrollable. The circumstances of this accident highlight the need for due diligence and detailed risk assessments to be performed as part of experimental test programs. As a result of this incident, the Civil Aviation Safety Authority has proposed amendments to Advisory Circular 21-10 - Experimental Certificates to provide updated guidance information to persons applying for the issue of experimental certificates, and advice on risk management for test pilots during experimental flight testing.

In addition, the ATSB issued a safety recommendation to CASA in respect of the need to consider the safety of third parties, including on the ground or water, before issuing a Special Certificate of Airworthiness.

Key safety actions and aviation safety recommendations 2008–09

The ATSB prefers to encourage early and positive safety action following an accident or incident, and to record such action in its final investigation reports if this is possible, negating the need to issue formal safety recommendations. However, the ATSB will make recommendations when it believes that insufficient safety action may have been taken.

In 2008-09, 132 separately-identified safety actions were voluntarily taken by aviation stakeholders. Also, the ATSB issued one aviation safety recommendation and three safety advisory notices to aviation stakeholders.

Key safety action included the following:

(AO-2008-070) in relation to anomalous air data inertial reference unit (ADIRU) behaviour and subsequent uncommanded pitch-down events

Airbus published an Operator Information Telex/ Flight Operations Telex which was issued to Airbus operators, who were asked to distribute it to all A330/A340/A340-500/A340-600 flight crews without delay. The telex provided brief details known about the occurrence. It also provided operational recommendations applicable for A330/A340 aircraft fitted with Northrop Grumman ADIRUs. The telex stated that, pending final resolution, Airbus would issue an OEB [Operations Engineering Bulletin] that would instruct flight crew to select OFF the whole ADIRU in the case of an inertial reference (IR) failure, instead of switching OFF only the IR part.

An OEB was dispatched, applicable to all A330 aircraft fitted with Northrop Grumman ADIRUs. The OEB stated that, in the event of a NAV IR FAULT (or an ATT red flag being displayed on either the captain's or first officer's PFD), the required procedure was for the crew to select OFF the relevant ADR and then select OFF the relevant IR. A compatible temporary revision was issued to the Minimum Master Equipment List at the same time. The procedure in the OEB was subsequently issued as an Emergency Airworthiness Directive by the European Aviation Safety Agency (EASA), effective on 19 November 2008 and CASA, effective on 20 November 2008.

The OEB procedure was subsequently amended in December 2008 to cater for a situation where the IR and ADR pushbuttons are selected to OFF and the OFF lights did not illuminate. If the lights did not illuminate, the new OEB required crews to select the IR rotary mode selector to the OFF position.

This OEB was subsequently issued as an Emergency Airworthiness Directive by EASA, effective on 22 December 2008 and CASA, effective on 22 December 2008.

Following the 27 December 2008 event, Airbus issued another OEB on 4 January 2009. This OEB provided a different procedure for responding to a similar ADIRU-related event to ensure erroneous data would not be used by other aircraft systems. The procedure required the crew to select OFF the relevant IR, select OFF the relevant ADR, and then turn the IR rotary mode selector to the OFF position. The modified procedure was subsequently issued as an Emergency Airworthiness Directive by EASA, effective on 19 January 2009 and CASA, effective on 19 January 2009.

Similar OEBs were issued by Airbus for A340 aircraft, and the EASA Airworthiness Directives also applied to A340 aircraft.

Airbus is in the process of developing a modification to its PRIM software to make it more robust to AOA spikes.

In response to the Airbus releases, the operator issued a Flight Standing Order for its A330 operations. On 24 October 2008, this order was replaced by a new Flight Standing Order, which incorporated the material from the Airbus OEB.

A program of focussed training during simulator sessions and route checks was initiated to ensure that flight crew undertaking recurrent or endorsement training were aware of the contents of the Flight Standing Order.

Subsequent Flight Standing Orders were issued in response to the modified OEBs in December and January 2009.

CASA issued a media release that stated that the occurrence was a timely reminder to passengers to 'remain buckled up when seated at all stages of flight'. The media release also highlighted the importance of passengers following safety instructions issued by flight crew and cabin crew, including watching and actively listening to the safety briefing given by the cabin crew at the start of each flight.

Note that as at 30 June, 2009, this investigation was ongoing.

(AO-2008-010) in relation to the lack of procedures for ensuring separation of multiple aircraft during culling operations

The R44 operator advised that a Job Safety Analysis (JSA) risk assessment process was introduced. The JSA process is conducted prior to all flying activities undertaken by the operator to aid in the identification and mitigation of the associated risks.

The Super Cub operator advised that, following the accident, a briefing was provided to all of the operator's pilots that emphasised the need to maintain separation with other aircraft through the use of assigned levels, radio communication, and the maintenance of situational awareness. That briefing, which was delivered by the chief pilot, was also incorporated as part of the operator's induction program for newly employed pilots.

The operator also advised that procedures detailing the conduct of close proximity operations have been included in the company operations manual, and that a JSA risk assessment process will be introduced and applied to all company flying activities.

The Western Australia Department of Environment and Conservation (DEC) conducted a risk assessment of all aviation activities conducted by the department, including the conduct of aerial

culling programs. That assessment identified a number of areas of high risk associated with the current conduct of aviation activities within the DEC, and led to the preparation of a business case and feasibility study in support of the following potential reforms:

- Appointment of an Aviation Manager with state wide responsibility and oversight for quality assurance in aviation and aircraft operations in DEC.
- Formation of an Aviation Reference Group to provide advice on aviation services within DEC.
- Establishment of an aviation organisational structure that integrates and coordinates state-wide aviation and aircraft operations in DEC.
- Development and implementation of a DEC aviation policy that provides the approved framework for state-wide air operations conducted by, or on behalf of, the department.
- Adoption of an aviation 'safety management system' in DEC incorporating project and site specific safety management plans, and written standard operating procedures.
- Development of comprehensive training for aircrew and DEC staff engaged in aircraft operations.
- Planning for the optimum aircraft mix to meet the expanded demand for aviation services in DEC.

The Department of Agriculture and Food, WA (DAFWA) conducted an internal review of remote area aerial guidelines and procedures related to multiple aircraft operations. The recommendations from that review included:

- Introduction of a minimum separation standard of 200 m horizontally and 200 ft vertically between aircraft that were involved in multiple aircraft operations.
- Investigation of the feasibility of fitting proximity alarms to all aircraft involved in multiple aircraft operations.
- Amendment of existing guidelines to emphasise the need for continuous communication and the conduct of operations with reference to the same Global Positioning System (GPS) waypoint(s), when conducting multiple aircraft operations.
- Clearly defined division of responsibility for all future operations involving other government departments through the use of formal memorandums of understanding.
- Review and approval of the documented plan and procedures/guidelines prior to the conduct of all aerial operations involving DAFWA personnel.
- Review of whether aerial culling programs should be conducted in the hotter months of the year.

(AO-2007-049) in response to fuel quantity measurement procedures being predicated solely on fuel quantity indication system readings, with no provision for regular independent checks of fuel quantity

The aircraft operator issued a memo to all pilots to direct that all fuel dockets/receipts be retained and filed. Pilots were also reminded that the fuel added on the trip card should reflect the fuel on the receipt and that accuracy was required in completion of the trip card and maintenance release.

The operator made a sight gauge for the Cessna 404 by attaching a fitting to a clear plastic hose to allow connection of one end to the inboard fuel drain of either fuel tank. As known amounts of fuel were added, marks were added to each engine nacelle to indicate various fuel levels.

The operator also amended its operations manual, effective from 1 November 2007. In Part A, the Fuel Documentation sub-section was expanded with the following text:

- Fuel dockets/receipts shall be checked by the Pilot in Command who shall ensure that the documentation reflects the quantity and grade of fuel delivered to the aircraft. The Pilot in Command is also responsible to ensure that the correct quality control measures have been certified on the delivery docket and is retained/returned to the main base for retention.
- In addition the Pilot in Command shall ensure that a secondary means of verification of fuel on board has been used to cross check the electric fuel indication system as per CAR 215 direction instrument no. WRA3130 appendix 12 (refer Part B of applicable aircraft).

In Part B of the operations manual, the following text was added to the Cessna 404 fuel planning procedures:

> Secondary verification of fuel is required prior to departure and after every refuel in the C404. The minimum fuel load for all operations shall be 300 lts. Visual verification of 300 lts can be achieved by using the visual site tubing located in the right hand wing locker.
>
> PROCEDURE: press rubber ended valve on to under wing fuel drain, outboard of engine cowl, while holding open end above wing and against fuel markings on cowl to achieve a reading when fuel has stabilised in the tube. NOTE confirmation via Turn and Bank co-ordinator that the aircraft is on level ground and wings level is required prior [to] procedure.
>
> If a discrepancy exists, of greater than 20 lts between the anticipated end fuel load, after refuelling (that is the end figure from the previous flight and the fuel added) a special occurrence report will be submitted to the chief pilot for investigation.

Similar text was added to the fuel planning procedures applicable to the operator's other aircraft.

(AO-2007-049) in reference to guidance promulgated by the Civil Aviation Safety Authority in Civil Aviation Advisory Publication 234-1 regarding aircraft fuel requirements allowed for a fuel quantity cross-check to be conducted after refuelling and without reference to an independent source of onboard fuel quantity information

CASA advised that a Civil Aviation Regulation (CAR) 215 direction [WRA3130] had been issued to the operator to ensure that a secondary means of verification of fuel on board was used to cross check the electric fuel indication system.

CASA is also considering:

- Advising Air Safety Auditors of the circumstances of the incident and the need for operators to have fuel quantity measurement procedures that provide a high level of assurance that the required fuel is actually on board an aircraft
- Reviewing the information in Civil Aviation Advisory Publication 234-1(1) Guidelines for Aircraft Fuel Requirements that refers to fuel quantity cross-checking
- In late 2007, CASA withdrew Airworthiness Bulletin 28-002.

Details of all aviation safety recommendations and safety advisory notices, including any responses received relating to safety recommendations, are available at <www.atsb.gov.au>, the ATSB's website.

Aviation safety recommendations and safety advisory notices 2008-09

The one recommendation and three safety advisory notices (SANs) issued during 2008-09 covered important issues including:

- for CASA to seek information to address the safety issue of establishing whether conditions '...necessary for the safety of other airspace users and persons on the ground or water' are required prior to issuing the Special Certificate of Airworthiness. (AO-2007-066-SR-081)
- for all organisations performing inspection, testing, maintenance and repair activities on aviation oxygen cylinders, to note the circumstances detailed in the preliminary report on the depressurisation event that took place on a Boeing 747-438 aircraft with a view to ensuring that all relevant procedures, equipment, techniques and personnel qualifications satisfy the applicable regulatory requirements and established engineering best practices (AO-2008-053-SAN-006)
- that operators of transport category aircraft fitted with pressurised gaseous oxygen systems note the circumstances detailed in preliminary report AO-2008-053, with a view to ensuring that all oxygen cylinders and cylinder installations are maintained in full accordance with the relevant manufacturer's requirements, statutory regulations, and established engineering best practices (AO-2008-053-SAN-007)
- that pilots operating into non-towered aerodromes should consider the safety implications of not fully understanding the significance of hearing (or not hearing) the various ARFU transmissions, and that they take action where considered appropriate (AO-2007-006-SAN-037.

Aviation safety promotion

A part of the ATSB's mission is to improve transport safety by raising safety awareness and knowledge. Along with the Civil Aviation Safety Authority and other bodies, the ATSB provides safety information to the aviation industry to achieve this aim. The Bureau promotes aviation safety by:

- publishing investigation reports and safety studies
- publishing safety recommendations and safety advisory notices
- providing information on its website
- delivering presentations at conferences and safety forums
- cooperating with international safety agencies
- contributing to Parliamentary inquiries
- participating in coronial inquests
- publishing the ATSB Supplement in CASA's *Flight Safety Australia* (Appendix A lists articles published during 2008-09)
- contributing to aviation publications and journals
- maintaining the Aviation Self Reporting Scheme and the REPCON confidential aviation reporting scheme.

These activities help to improve future aviation safety by raising industry awareness of emerging safety issues and maintain public confidence that the safety of the transport system is not being compromised.

Participation in aviation safety forums

During 2008–09, the ATSB participated in several aviation safety forums. Participation helps the Bureau communicate various safety messages, maintain its industry contacts, and keep informed on relevant policy and technical issues. The ATSB attended and/or presented, or provided training, at various industry forums, including:

- aero clubs and flying training schools
- airshows
- Royal Aeronautical Society
- New South Wales Regional Airspace and Procedure Advisory Committee
- Australasian Society of Aerospace Medicine
- Australian Defence Force Air Traffic Control Safety Officers briefing
- Queensland Police Service Forensic Crash Unit seminar
- Australian Aviation Wildlife Hazard Group Forum
- New Zealand Transport Accident Investigation Commission
- HMAS Albatross 'Safety Stand-Down' Day
- Australian Defence Force Academy
- 34 Squadron of the RAAF
- North Queensland Regional Airspace Users Advisory Committee
- Swinburne University Aviation Safety Seminar
- Qantas Safety Week
- Colegio Oficial de Pilotos de la Aviacion Comercial

Professional conferences address engineering, human factors, flight operations, air traffic control, cabin safety and flight recording issues. In 2008-09, ATSB executive, aviation and technical staff attended and/or presented at the following conferences:

- Airservices Australia Waypoint Conference, June 2009
- Australian & New Zealand Societies of Air Safety Investigators Conference, Rotorua, June 2009
- ICAO Cooperative Development of Operational Safety & Continuing Airworthiness Programme Meeting, Bangkok, June 2009
- Aviation Law Association of Australia and New Zealand seminar, Canberra, August 2008
- Australian Airports Association Technical Working Group, Melbourne, March 2009
- Structural Integrity and Failure Conference, University of Western Australia, July 2008
- International Society of Air Safety Investigators Conference, Halifax, Canada, September 2008
- International Confidential Aviation Safety Systems Association, Madrid, October 2009
- Flight Safety Foundation Annual Seminar, Honolulu, October 2008
- Australian Aviation Psychology Association Annual General Meeting, Canberra, December 2008
- Asia Pacific Cabin Safety Working Group, Sydney, November 2008
- Australasian Airports Association Conference, Perth, November 2008
- SIA Visions Conference 2008, November 2008.

Coronial inquests

Coronial inquest attendance involved considerable ATSB resources for both preparation and attendance. In 2008-09, ATSB aviation investigators provided evidence at the following coronial inquests:

- VH-MFI, Wirestrike 15 km east of Parkes, New South Wales held in Forbes, NSW over the period 21 July to 1 August 2008
- VH-TNP, controlled flight into terrain at Benalla, Victoria coronial inquest held in Melbourne from 4 to 20 August 2008
- Sting Sport Ultralight accident held in Goulburn New South Wales on 4 December 2008
- VH-OAO, Mt Hotham, coronial inquest held in Melbourne Victoria from 28-30 April 2009
- VH-HBS helicopter accident coronial inquest held in Brisbane, Queensland from 6 to 9 April 2009
- VH-FTT coronial inquest held in Esperance, Western Australia from 13 to 16 April 2009
- VH-FVF coronial inquest held in Wagga Wagga, New South Wales from 27 to 30 Jan 2009.

The Aviation Safety Investigation Branch continued to provide briefings to State Coroners and next of kin on the outcome of Bureau investigations involving fatalities, negating, in a number of instances, the need for an open inquest.

Strategy and Capability

Role

The Strategy and Capability Branch of the ATSB has responsibilities primarily concerned with the strategic positioning of the ATSB and its organisational capability. In particular, the branch seeks to ensure effective Bureau responsiveness to internal and external stakeholders. The Strategy and Capability Branch responsibilities include Information and Coordination, Technical Analysis, Notifications and Confidential Reporting, Aviation Safety Research and Analysis, Legislation, Training and Development, and the ATSB's Safety Investigation Information Management System (SIIMS).

Information and Coordination

The Information and Coordination Team plays a pivotal role within the ATSB in releasing and publishing rail, marine and aviation safety investigation and research reports, and summaries of safety action and safety recommendations. The team also facilitates public communication and media activities, and maintains the ATSB website. Through its information dissemination, the team aims to build industry and public safety awareness and knowledge. The team coordinates parliamentary and departmental briefings including Question Time and Senate Committee hearings, provides responses to subpoenas and Freedom of Information requests. It also assists with the production of the ATSB's Annual Review and quarterly performance reports, and the Annual Report for the Department of Infrastructure, Transport, Regional Development and Local Government (the Department.)

Media

Community interest in the ATSB's transport investigation activities and findings require a well-planned process for coordinated media response. The ATSB can be reached through its media contact officer or rostered duty officer 24 hours a day, seven days a week. It maintains a 24-hour contact number for inquiries at 1800 020 616. During 2008-09, the ATSB received in excess of 1,000 telephone calls from members of the public and media organisations requesting updates of investigations.

In 2008-09, the team organised five media conferences related to aviation and marine investigations. These media conferences helped ensure that the extensive media coverage of ATSB activities, in particular, the reporting of the progress and results from transport accident investigations, was informative and helped to promote the ATSB's contribution to transport safety.

Information requests

During 2008-09, the Information and Coordination team responded to an estimated 4,500 requests for safety information. The timely responses ranged from giving verbal information on transport safety-related issues to distributing accident and incident investigation reports, research and analysis reports, and ATSB corporate materials.

The team also fielded media inquiries and promoted community awareness of the Bureau's activities.

Freedom of Information and legal matters

At the start of the 2008-09 financial year, the ATSB had one Freedom of Information (FOI) request on hand. During the financial year the ATSB received 14 requests. The Bureau completed seven FOIs within 30 days; and two FOIs between 30 and 60 days. Five FOIs were withdrawn. At 30 June 2009, one FOI was on hand. No ATSB FOI decisions were subject to internal reviews.

During 2008-09, the ATSB responded to a summons by the Indonesian Public Prosecutor for three ATSB staff members to attend and give evidence in relation to the criminal trial of a pilot who was involved in the fatal Boeing 737-497 aircraft accident at Adi Sucipto Airport, Yogyakarta, Indonesia on 7 March 2007. The ATSB had assisted the National Transportation Safety Committee with an investigation into the accident. The summons was not pursued after the ATSB advised of the limitations on ATSB staff members giving evidence in criminal proceedings under Australian legislation and the fact that all three staff members had provided written statements to the Indonesian National Police in December 2008 to address the handling of evidence.

Two subpoenas were processed in the financial year 2008-09 for civil proceedings. The *Transport Safety Investigation Act 2003*, which has been in operation since 1 July 2003, means that it is not possible to subpoena the ATSB in relation to most documents unless the ATSB has issued a certificate for those documents. During the year, the ATSB processed seven requests related to issuing these certificates.

The ATSB was not involved in any other court hearings (apart from coronial inquests), or the Administrative Appeals Tribunal (AAT), or with any applications to the Ombudsman.

Departmental and Ministerial coordination

Ministerial correspondence

During 2008-09, the ATSB helped draft seven responses to letters for Ministers.

Questions on Notice

During 2008-09, the ATSB drafted one Question on Notice response and made significant contributions to other responses, excluding the Senate Committee responses listed below.

Parliamentary Committees

In 2008-09, the ATSB appeared at three Senate Estimates Hearings of the Rural and Regional Affairs and Transport Legislation Committee:

- Supplementary Estimates in October 2008, in which the ATSB received no questions on notice
- Additional Estimates in February 2009, in which the ATSB received no questions on notice
- Budget Estimates in May 2009, in which the ATSB received no questions on notice.

Publishing Services

The Information and Coordination Team continued to provide quality control of publications produced internally and externally, as well as maintaining the Bureau's corporate identity and website. This helped maintain and enhance the international reputation of the ATSB as Australia's prime agency for transport safety investigations.

Once approved by the ATSB Executive Director, the Information and Coordination Team disseminates ATSB investigation and research reports, and summaries of safety action and safety recommendations to the Minister, Departmental Executive, regulatory authorities, directly-involved parties and those with a special interest in the investigation, the industry and members of the public.

Users of the ATSB website can access information by selecting navigation links within each transport mode, or by searching directly for specific information using a customised search engine. The site contains:

- aviation, marine and rail safety investigation reports
- reporting forms for both mandatory and confidential transport safety reporting systems
- research and analysis reports
- accident statistics
- safety recommendations
- media alerts and releases
- speeches and 'audio grabs' of media briefings
- safety articles and links of interest
- a free 'subscription' information service.

Users can request copies of ATSB published material by telephoning 1800 020 616.

The site's online notification forms for accidents and incidents, the aviation and marine confidential reporting schemes (REPCON and REPCON Marine), the aviation self reporting scheme (ASRS), provide a secure option for reporting transport accidents and incidents and submitting confidential reports. The site's free subscription information service continues to announce new releases and developments to interested parties and industry stakeholders by regular e-mail notifications, which may be customised to provide information on specific modes to individual subscribers.

In 2008–09, the site attracted almost a million visitor sessions. The number of hits increases markedly following the release of high-profile information or reports, particularly in the aviation mode.

Technical Analysis

Role and Capability

The ATSB Technical Analysis Team provides the Bureau with the capability to examine, in detail, the physical and recorded evidence associated with safety occurrences from all modes of transport. Specialists in the investigation and analysis of materials, systems and recorded data collaborate with ATSB investigation team members and external parties, to provide in-depth insight into the technical issues surrounding transport safety occurrences.

During 2008-09, Technical Analysis Team commenced around 100 investigation tasks. That work included the provision of investigation assistance and consultation to internal teams and external agencies, the commencement of 18 stand-alone investigations (where a Technical Analysis staff member was the investigator-in-charge) and the ongoing investigation and development of new

technologies for data recovery from recording devices. Key investigation involvements for the Technical Analysis team over 2008-09 have included:

- Boeing 747 oxygen cylinder explosion and depressurisation, near Manila, Philippines
- Airbus A330 in-flight upset, near Learmonth, Western Australia
- Airbus A340 tail-strike at Melbourne, Victoria
- assistance to the Indonesian National Transportation Safety Committee (NTSC), as part of the Australian Governments' Indonesia Transport Safety Assistance Program (ITSAP), in the download and analysis of flight data and cockpit voice recorders from five serious aviation safety occurrences
- Airbus A330 in-flight cockpit fire, near Guam
- Pacific Adventurer container loss
- Cairns Tilt Train level crossing collision, near Rungoo, Queensland.

Industry involvement

Active industry liaison continued throughout the year, with participation and presentation at regional, national and international fora, including the Accident Investigation Recorders (AIR) meeting (Taipei, Taiwan), Flightscape user's conference (Ottawa, Canada), Aviation Safety seminar series (Monash University, Melbourne) and the 2009 Australia & New Zealand Societies of Air Safety Investigation (ANZSASI) regional seminar (Rotorua, New Zealand).

New facilities

A significant milestone for the Technical Analysis Team came in September 2008, with the relocation to new and enhanced laboratory and technical facilities, as part of the ATSB's transfer to its current premises. This event represented the culmination of many months of planning and preparation, and ensures that the Technical Analysis Team will remain capable and responsive into the future.

Notifications and Confidential Reporting

Notifications

The Notifications Team is primarily responsible for receiving and classifying all aviation safety notifications reported to the ATSB. Other responsibilities include the staffing of the aircraft accident hotline during normal working hours and the coding of aviation occurrence details into the Safety Investigation Information Safety Management System (SIIMS) aviation occurrence database. The occurrence data provides the basis for much of the aviation research and safety analysis undertaken by the ATSB and other organisations, making an important safety contribution.

For the financial year 2008-09, the ATSB received a total of 17,831 aviation notifications of which 7,814 were classified as occurrences and entered into the database. The remaining reports are identified as either:

- duplicates – reports of a unique occurrence received from more than one source which are matched to the original and 'value added' accordingly; or
- level 6 occurrences – reports assessed as not satisfying the definitional requirements of a transport safety matter.

The Notifications team is also responsible for the management of:

- system security and integrity
- training for all users
- the continued development, enhancement and redesign of the SIIMS database
- extraction of aviation data, ranging in levels of complexity, for analysis and reporting to internal and external customers.

The ATSB retains an electronic record of all aviation notifications, regardless of classification status.

Confidential Reporting

The Confidential Reporting Team manages the confidential aviation reporting scheme (REPCON), the confidential marine reporting scheme (REPCON Marine), and the voluntary reporting aspects of the Aviation Self Reporting Scheme (ASRS). During the year, the Confidential Marine Reporting Scheme (CMRS) was switched over to a new format – REPCON Marine. As a result, both the aviation and marine confidential reporting systems operate under the same arrangements, enabling any person to submit confidential reports of general or specific safety concerns, while the ASRS enables Civil Aviation Authorisation holders who are seeking to claim protection from administrative action by CASA to submit voluntary self reports of unintentional regulatory breaches.

During 2008-09, two reports were processed through CMRS and three REPCON Marine reports were received. There were 130 reports processed through REPCON. The larger numbers for REPCON reflects the broader nature of the jurisdictional responsibility for aviation. During the same period, seven reports were processed through the ASRS. Selected REPCON reports were included in six editions of the *Flight Safety Australia* magazine.

Aviation Safety Research and Analysis

The Aviation Safety Research and Analysis Team conducts a program of research to examine aviation safety issues and produce high quality research reports to promote safety within the aviation industry. The research program aims to fulfil Australia's obligations under International Civil Aviation Organization (ICAO) requirements, to analyse information held in the Bureau's aviation safety accident and incident database to determine if preventative safety measures are needed. The program also covers topics that complement ATSB investigations and engages industry experts and stakeholders to ensure research is focused, timely and relevant.

The ATSB released 10 aviation safety research reports in 2008–09:

- *Staying Safe during an Aircraft Depressurisation: Passenger Information Bulletin*
- *An Overview of Human Factors in Aviation Maintenance*
- *Aircraft Depressurisation: Cabin crew information bulletin*
- *Runway excursions: Part 1 – A worldwide review of commercial jet aircraft runway excursions*
- *Trends in immediately reportable matters involving charter operations 2001 to 2006*
- *Aviation statistics: 1 January 1999 to 31 March 2009*
- *Threat and Error Management: Attitudes towards training and applicability of TEM to general aviation and low capacity air transport operations*
- *Runway excursions, Part 2: Minimising the likelihood and consequences of runway excursions, an Australian perspective*

- *Amateur-built and experimental aircraft – Part 1: A survey of owners and builders of VH- registered non-factory aircraft*
- *Australian Aviation Safety in Review: 1998 to 2007 (3rd edition).*

A short description of each ATSB aviation research report is provided in Appendix A. Two higher profile studies released during the year were:

Amateur-built and experimental aircraft – Part 1: A survey of owners and builders of VH-registered non-factory aircraft

Non-factory amateur-built and experimental (ABE) aircraft are a popular alternative to general aviation aircraft. While they are an integral part of Australian aviation, making up about eight per cent of all VH-registered aircraft, there is little comprehensive data on these aircraft and what people do when building or buying them second-hand.

This study, the first in a two-part series, examined non-factory ABE aircraft in Australia. It looked at the ABE community, including pilots and their aircraft, regulatory changes and growth and development of aircraft associations over time. Data for this report was gathered using a survey distributed electronically and in hard copy to owners of VH-registered ABE aircraft. About 50 per cent of active ABE aircraft owners responded to the survey.

This report outlined some of the key features of the ABE population. Specifically, it identified that:

- ABE owners were primarily of retirement age and private pilots
- on average, 30 per cent of their total flying hours were flown in ABE aircraft
- on average, ABE aircraft accumulated 42 airframe hours in the previous year
- build challenge, personal satisfaction, aircraft performance, price, operational costs, and ability to perform maintenance were important reasons for purchasing an ABE aircraft
- ability to customise was less important as a reason for purchase
- 33 per cent of builders made major modifications during the build process
- 70 per cent of ABE owners undertook transition training and this was more likely among private pilots and those with fewer total hours
- automotive engines and avionics were associated with the greatest build challenge.

Although many of these facts have been known anecdotally, this report placed greater specificity on different aspects of ABE aircraft building and operation, presenting an interesting picture of VH-registered ABE aviation in Australia. This report provides a valuable reference point for aircraft operators, those considering ABE aircraft, aviation regulators, and aircraft associations. In developing a more comprehensive understanding of this sector of aviation, relevant parties are in a better position to plan, build and operate ABE aircraft in the future.

Runway excursions, Part 2: Minimising the likelihood and consequences of runway excursions, an Australian perspective

While most runway excursions (overruns and veer-offs) are relatively minor with no serious injuries or aircraft damage occurring, they do have the potential to pose a serious risk to public safety and infrastructure. This has been illustrated by several significant runway overruns around the world in 2007 and 2008, resulting in hundreds of on-board fatalities, as well as ground fatalities and significant property damage in communities adjacent to airports.

The purpose of this report, the second in a two-part series, was to discuss the impact of runway excursion accidents on communities located near airports across the world and the risk controls that have been or could be put in place to minimise this risk, or mitigate its effects if a serious excursion did occur in Australia or overseas.

In Australia, previous runway excursions have led to little more than minor damage to the aircraft, with few (if any) injuries to passengers or crew. However, as runway excursions occur at airports (which are often located in built-up urban areas), a potential exists for injury to both people on board the aircraft and people who work, live or travel in close proximity to airports. A telephone survey of 43 major airports in Australia found that runway end safety areas meet or will soon meet Civil Aviation Safety Authority requirements. A large majority of airports had good quality runway surfaces that reduced the risk of a runway excursion occurring in the first place.

Serious runway excursions can pose risks to public safety and infrastructure. It is imperative that airlines, airport operators and safety regulators have risk controls in place to manage the contributing factors that can lead to runway accidents.

Legislation

The ATSB's legislative responsibilities involve the implementation and management of legislation critical to the Bureau's operations, including the *Transport Safety Investigation Act 2003* (TSI Act). Supporting memoranda of understanding with ATSB stakeholders and input into development of international instruments, is also coordinated.

Transport Safety Investigation Act 2003 and Regulations

The TSI Act facilitates the ATSB's independent, no-blame, systemic transport safety investigations. On 26 March 2009, the *Transport Safety Investigation Amendment Act 2009* (TSIA Act) and the *Aviation Legislation (2008 Measures No.2) Amendment Act 2009* (ALA Act) received royal assent. These Acts amended the TSI Act and came into effect on 1 July 2009.

The TSIA Act amended the TSI Act to establish the ATSB as a statutory agency for the purpose of the *Public Service Act 1999*. The TSIA Act provided for a commission structure with a Chief Commissioner and two part-time Commissioners appointed by the Minister.

The ALA Act amended the TSI Act and Part IIIB of the *Civil Aviation Act 1988* (CA Act). It amended the TSI Act to improve the mandatory reporting regime for accidents and incidents. It amended the CA Act to clarify the legality of copying and disclosing Cockpit Voice Recorder (CVR) information for the purpose of checking the functioning and reliability of the CVR.

Amendments to the *Transport Safety Investigation Regulations 2003* came into effect on 1 July 2009. These amendments were made largely in support of the changes to the mandatory reporting regime bought about the amendments to the TSI Act by the ALA Act.

ATSB staff members receive training on interpreting and applying the TSI Act. Staff members are also required to consult the ATSB's Safety Investigation Quality System policies, procedures and guidelines, and other supporting material which provides guidance on the Act's application. Externally, the ATSB has continued to work with industry and Government agencies in promoting awareness and understanding of the TSI Act and associated legislation through presentations and discussion forums.

Confidential Marine Reporting Scheme

The Navigation (Confidential Marine Reporting Scheme) Regulations 2008 came into effect on 2 February 2009. These regulations replace the Navigation (Confidential Marine Reporting Scheme) Regulations 2004. The regulations update the marine scheme confidential reporting scheme (REPCON Marine) to make it consistent with the aviation confidential reporting scheme (REPCON) introduced in 2007.

Memorandums of Understanding

Adding to the existing Memorandums of Understanding (MoUs) with industry and Government agencies, in 2008-09 the ATSB signed a new MoU with the Australian and International Pilots Association (AIPA). The purpose of the MoU is to trial an expertise sharing arrangement in the interests of improving aviation safety through accident investigation. Work continues on updating and revising existing MoUs. This will be a particularly strong focus given the ATSB is now a separate statutory agency.

Copies of MoUs that the ATSB has signed are available on the ATSB website. <www.atsb.gov.au>

Training and Development

As a Registered Training Organisation (RTO), the ATSB awarded an additional four Transport Safety Investigation (TSI) Diplomas to staff in 2008-09, with a further 12 in progress.

Diploma of Transport Safety Investigation core training courses for 2008-09 included:

- Accident/incident investigation fundamentals
- Investigation analysis
- Basic and advanced OH&S (including blood-borne pathogens)
- *Transport Safety Investigation Act 2003*
- Coronial witness
- Media awareness and media release (including advanced applications for senior staff)
- Human factors
- Negotiation skills
- Cognitive interviewing
- Critical incident stress debriefing
- Cultural intelligence
- Digital photography
- Senior (advanced) and remote first aid.

In terms of the Bureau's ongoing commitment to staff professional development and maintenance of industry awareness, this financial year has presented many productive and worthwhile opportunities.

Professional development and maintenance of industry awareness opportunities for 2008-09 included:

- Rolls Royce and General Electric gas turbine investigation training
- Crew Resource Management in the wire and obstruction environment course
- Fundamentals of oxygen system design, analysis and hazard mitigation course
- Cabin safety training

- Various aircraft general familiarisations (including the completion of Air Transport Pilot – Aeroplane License subjects)
- Maritime revalidations (Master Mariner)
- Bridge Resource Management course
- Parliamentary processes
- Internal leadership program
- Ongoing coaching and mentoring.

ATSB support of relevant tertiary education opportunities for 2008-09 included:

- Bachelors degree in Training and Development - new
- Masters degree in Fire Investigation - continuing
- Masters degree in Materials Engineering - continuing
- Masters degree in Aviation Management - continuing
- Masters degree in Business Administration – continuing
- Advanced Diploma of Engineering (Aerospace) - continuing
- Masters degree in Education (Adult Education and Training) -completed
- Masters degree in Business (Management) - completed
- Graduate Certificate of Statistics - completed

The ATSB has also recently updated its certificate of accreditation. This will allow the Bureau to continue delivering the diploma for a further five years.

Safety Investigation Information Management System

The Safety Investigation Information Management System (SIIMS) is the ATSB's system for tracking, managing and reporting on notifications, occurrences and investigations.

Following the successful completion of the final phase of the SIIMS project in the second quarter of 2007-08, the system is now being maintained as a live application. The goal of this maintenance is to ensure that SIIMS remains aligned with ATSB business processes and continues to use supported software products. A number of changes have been implemented in 2008-09, including semi-automated notification processing for major transport operators and a refinement of the investigation report approval workflows. Some changes were also necessary to separate SIIMS from the Department's computer systems to prepare for the ATSB's separation on 1 July 2009. There are plans for further improvements to the safety analysis and reporting functionality to build on the initial work completed in 2007.

International

The Convention on International Civil Aviation (Chicago Convention), and the International Maritime Organization through a number of Conventions, allocate responsibility for safety, including accident and incident investigation, to individual countries. At the November 1997 Conference of Directors-General of Civil Aviation, ICAO highlighted the findings of its safety oversight assessments, which indicated that a significant number of Contracting States were experiencing problems in implementing Standards and Recommended Practices (SARPs), recruiting qualified personnel and, in general, fulfilling their safety oversight obligations.

For the investigation of major aviation accidents in States which do not have the resources to carry out the investigation, other interested States (e.g. the State of Design and Manufacture) may assist and provide support to the State of Occurrence. However, many States also lack the capability to investigate accidents other than the major ones and to investigate serious incidents. For many of those States, ICAO believes that the establishment of a regional accident investigation organisation, or the creation of a regional pool of qualified investigators might be the only options to enable the establishment of an effective accident and incident investigation and prevention system. This continues to be the topic of much discussion in the international aviation community, especially in our region.

Australia, through the ATSB, has undertaken a significant program of cooperation with its regional neighbours for many years, assisting with investigations and conducting flight recorder replay and analysis. The ATSB has also had a regular role in training workshops in the region in a number of countries. It has also played a key role in the development of the IMO Investigation Code. This is extremely important to ensure that Australian citizens and travelers to and from Australia are afforded a high level of safety. In an era of massive expansion of transport services globally, cooperation with regional neighbour States is fundamentally important.

Indonesia Transport Safety Assistance Package

On 31 January 2008, the Governments of Australia and the Republic of Indonesia signed a landmark agreement to work together to improve Indonesia's transport safety. Mr Albanese, the Australian Minister for Infrastructure, Transport, Regional Services and Local Government and the Indonesian Minister for Transportation, Jusman Syafi'i Djamal, signed a Memorandum of Understanding on Co-operation in the Transport Sector during a ceremony in Jakarta.

Under the agreement, Australia is providing almost $24 million over three years for a package of training and technical assistance, helping to improve aviation, marine, rail, and road transport safety in Indonesia.

Australia has worked closely with the Government of Indonesia to develop a package of measures to address areas identified by Indonesia as its key safety priorities.

The ITSAP projects undertaken as part of the assistance package have included:

- Training of Indonesian airworthiness inspectors to international standards

- Mentoring and training in air traffic management services
- Provision of expertise and guidance on transport safety investigations to enhance Indonesia's capacity to undertake investigations of aviation, marine, and rail transport accidents
- Training Indonesian Search and Rescue Mission Coordinators, ferry operators and maritime vessel inspection staff.

The cooperation with the National Transportation Safety Committee (NTSC) has involved a significant amount of accident investigation and report writing assistance in Indonesia since March 2007, with a number of major accident investigation reports completed to ICAO Standards. Some of the flight recorder (black box) replay and analysis in support of these investigations is conducted in Australia. In addition, an ATSB investigator provided assistance to the NTSC investigation into the sinking of the passenger ferry Teratai Prima in January 2009.

Between July 2008 and June 2010, six investigators will complete the 12-month ATSB Transport Safety Investigation Diploma in Australia; two aircraft maintenance engineers, one air traffic controller, two marine, and one rail. In January 2009, an aeronautical engineer commenced a 6-month flight recorder replay and analysis course at the ATSB's recorder laboratories in Canberra and another engineer is planned to commence training in late 2009. Three administration staff of the NTSC completed a 2-week investigation support course in Canberra and other staff in Jakarta completed the ICAO ECCAIRS accident and incident data reporting system training. A number of separate courses and seminars have been conducted in Indonesia in 2008-09 covering accident investigation for aviation, marine and rail, human factors, air traffic control investigation, and the role and international obligations of the NTSC for police and media. Other courses for NTSC investigators and administration staff are planned for completion by June 2010. These will include an advanced investigation report-writing workshop and accident site safety training. These courses are designed to provide the knowledge base for conducting and reporting on investigations according to ICAO and IMO Standards.

This cooperation between the ATSB and the NTSC is one of the key elements in ensuring lasting transportation safety for the people of Indonesia and foreign travellers to Indonesia.

International Civil Aviation Organization

The International Civil Aviation Organization (ICAO) is a specialised agency within the United Nations. It provides a global forum for civil aviation. ICAO works to achieve its vision of safe, secure and sustainable development of civil aviation through cooperation amongst its 190 member States.

A comprehensive audit pursuant to the ICAO Universal Safety Oversight Program <www.icao.int/fsix/auditRep1.cfm> was conducted between 18 and 28 February 2008. The audit focussed on all the Australian agencies with a responsibility for aviation safety oversight and service provision - the Department (including the ATSB), the Civil Aviation Safety Authority, Airservices Australia, the Bureau of Meteorology and the Australian Maritime Safety Authority's search and rescue function (AUSSAR). The final report was handed down by ICAO on 29 January 2009. Two findings were made in relation to ATSB responsibilities under ICAO Annex 13 'Aircraft Accident and Incident Investigation'. One finding remains extant and is subject to a current difference notified against the relevant standard while the second finding will be addressed by 31 December 2009.

More than 200 safety experts including delegates from 75 Contracting States and 12 international organisations met at the headquarters of the International Civil Aviation Organization (ICAO) in Montreal from 13 to 18 October 2008 for the eighth ICAO Accident Investigation and Prevention (AIG) Divisional Meeting.

The Australian delegation, which consisted of representatives from the ATSB, the Civil Aviation Safety Authority and Australia's representative on the ICAO Air Navigation Commission, was led by the Executive Director of the ATSB. This meeting was the first of its kind in 10 years. Attention centred on Annex 13 - Aircraft Accident and Incident Investigation to the Chicago Convention on Civil Aviation which establishes international Standards and Recommended Practices (SARPS) for aircraft accident and incident investigation. Overall, Australia had a major influence on the outcomes of the meeting due to the preparation and quality of submitted papers, pre-meeting preparation, Australia's perceived lack of bias, and the skill and substance of interventions during debate regarding various agenda issues.

A number of important recommendations were agreed, aimed at improving accident and incident investigation for the enhancement of safety worldwide. Notable recommendations included focussing on those accidents and serious incidents where safety lessons are expected to be learned and improving regional cooperation in accident and incident investigations to assist those States lacking the necessary means. It has also been proposed that a working group be established to review the current regime of protections for sensitive safety information within Annex 13. It is likely that the ATSB will be an active participant in this working group.

International Maritime Organization

The International Maritime Organization (IMO) is a specialized agency of the United Nations, responsible for measures to improve the safety and security of international shipping and to prevent marine pollution from ships. It is also involved in legal matters, including liability and compensation issues and the facilitation of international maritime traffic.

The ATSB represents Australia's interests at the IMO in the annual meeting of the Flag State Implementation Sub-Committee where the Casualty Analysis Working Group is convened. Between meetings, investigators from the ATSB also participate in the IMO's Casualty Analysis Correspondence Group. The role of these groups is to analyse marine casualty investigations from around the world to promulgate the safety lessons learned and, if appropriate, to instigate changes to relevant IMO regulatory instruments. In the last three years the ATSB has been the main driving force in developing the IMO's International Standards and Recommended Practices for a Marine Safety Investigation into a Marine Casualty or Marine Incident (the Code) which was adopted by the IMO on 16 May 2008. The Code has been annexed to the IMO's International Convention of the Safety of Life at Sea and will come into effect on 1 January 2010. The ATSB is already fully compliant with the Code's mandatory provisions and recommended practices.

In August 2008, the work of the ATSB was also audited by the IMO as part of Australia's participation in the Voluntary IMO Member State Audit Scheme. The scheme is designed to audit each Flag state administration's compliance with relevant IMO instruments. The ATSB's work in investigation marine casualties and reporting marine casualties to the IMO was audited. The ATSB was found to be fully compliant with the relevant IMO provisions and the work of the ATSB, in particular, the quality of the *Transport Safety Investigation Act 2003*, attracted favourable comments from the IMO auditors.

International Transportation Safety Association

The ATSB is a member of the International Transportation Safety Association (ITSA), which consists of 14 independent transport safety investigation bodies from around the world. The objectives of ITSA are to improve transport safety in each member country by learning from the experiences of others,

promoting the practice of independent investigations, exchanging and sharing information, discussing transportation safety issues and contributing to safer transportation systems.

The 2009 annual meeting of Chairmen and CEOs of the International Transportation Safety Association was held in Stockholm from 15 June to 17 June and hosted by the Swedish Accident Investigation Board (Statens haverikommission). All 14 ITSA member bodies were represented and there were 27 participant attendees.

As Executive Director, Kym Bills was the ATSB's representative. Kym was active in all the discussions and summarised the decision and legislation involving the ATSB's transition to a statutory agency governed by a Commission on 1 July 2009. Kym also led three major presentations: a summary of the once-in-a-decade ICAO AIG Division meeting and its decisions; an overview of the benchmarking exercise involving the TSB, NTSB and ATSB; and an exposition of the Varanus Island explosion and inquiries that he had been undertaking since January.

Other international activities

The ATSB participated in several international conferences, including the International Society of Air Safety Investigators (ISASI) and the Marine Accident Investigators' International Forum (MAIIF). Representation at those meetings provided opportunities to share insights on best practice and to seek solutions to emerging challenges in the field of no-blame safety investigation.

The ISASI conference was held in September 2008 in Halifax, Canada. Dr Mike Walker from the ATSB provided a presentation on causation, associated with the work conducted in recent years by the ATSB in the area of analysis methodology. Other presentations covered a variety of relevant topics, including safety management systems, the development of low-cost flight recorders for helicopters, and the development of analysis methods for major investigations at the NTSB. The seminar provided an excellent opportunity to interact with a wide range of international agency personnel from whom the ATSB regularly seeks investigation support.

The 17th session of the Marine Accident Investigators' International Forum was held in Malta from 29 September to 3 October 2008, hosted by the Malta Maritime Authority. Fifty-two delegates from 28 countries took part, under the chairmanship of Mr Doug Rabe, Chief of the Marine Investigation Division of the United States Coast Guard. The meeting followed the well-established format, which consisted of reports from members on the previous twelve months' activities, papers and general discussion on safety issues, as well as debate on the future direction of MAIIF. In particular, debate centred on MAIIF's new role at the International Maritime Organization (IMO) as a non-government organisation (NGO) with observer status.

Every administration made one or more presentations. Investigations of groundings and fires featured prominently in the presentations and the ATSB presented factual findings of the Pasha Bulker grounding. The meeting was highly constructive with a pervading sense of common purpose and shared experience. The network of international investigators continues to be strengthened, particularly with the participation of the major flags of Panama and Liberia, and the attainment of NGO status by MAIIF at the IMO.

The ATSB also participated in an ongoing benchmarking exercise with the Transportation Safety Board of Canada and the US National Transportation Safety Board. The exercise commenced in March 2008 and was completed in August 2008. The purpose of the exercise was to compare resource consumption and the efficiency of services in the safety investigation function and to identify best

practices with regard to the delivery of safety investigation programs and services. The scope of the exercise included comparisons between organisations in respect of:

- safety investigations for all modes
- technical facilities including engineering laboratories
- safety research
- report production
- communications
- statistics and macro analysis
- support and involvement with international working groups.

In areas that were comparable, the ATSB demonstrated that it was operating at or above the standards of Canada and the US.

Transport safety performance statistics

Rail safety trends

The responsibility for rail safety in Australia is shared by government and industry. To assist in both maintaining and continuously improving rail safety, each state and territory government has implemented rail safety legislation and established a rail safety regulator. The regulators are responsible for establishing standards in rail safety management and monitoring the rail industry's compliance with the standards in order to meet community expectations and maintain public confidence.

Industry operators are responsible for addressing risks to rail safety by identifying and implementing the most effective and efficient solutions via their safety management systems. They are also accountable for achieving required safety outcomes.

As part of this process of shared responsibility, industry operators are required to report rail safety occurrences to the state/territory regulators. The regulators evaluate those reports, and provide those classified as Immediately Reportable Matters to the ATSB (Table 6). Regulators and operators use this data to assist with their safety analyses and programs.

The present count data is designed to assist rail safety professionals and researchers in understanding and mitigating risk. In addition, it can be used for international comparative research, while informing the public about emerging issues in rail safety. The present database, the National Rail Occurrence Database (NROD), contains frequency counts of the following safety-critical event types:

- Derailment
- Collision
- Level Crossing Occurrence
- Signal Passed at Danger (SPAD)
- Loading Irregularity
- Track and Civil Infrastructure Irregularity.

These data are collected and published on a jurisdictional basis. Frequency counts for each of the above occurrences are normalised by the state/territory regulators, according to the size of the rail operation. The normalising data provided is:

- Train kilometres
- Freight-train kilometres
- Passenger-train kilometres
- Total track kilometres.

In addition, frequency counts are provided for:

- Deaths
- Serious Injuries.

The definitions for data provided in each of the categories are taken from ON–S1: Occurrence Standard Notification 1, and OC–G1: Occurrence Classification Guideline 1. These definitions have been developed by rail safety regulators in collaboration with industry operators. Rail regulators provide the data to the ATSB for national publication.

The data is published at <www.atsb.gov.au/rail/statistics.aspx> and also features in Table 1.

Table 1: National Rail Safety Occurrence Data 2004 to 2008

Occurrence type	2004	2005	2006	2007	2008
Deaths (non-suicide)	44	36	41	36	33
Serious injuries (exc. NSW)	74	70	132	177	105
Derailments [+]	182	146	119	144	121
Collisions [+] with					
infrastructure	87	103	107	99	153
persons	53	49	45	40	52
road vehicles	31	16	15	11	9
rollingstock	12	12	15	6	8
other trains	6	20	18	16	21
Level Crossing collisions with					
road vehicles	73	72	79	55	58
persons	8	6	9	9	6
Signals passed at danger	465	430	370	439	470
Loading irregularities	470	503	510	480	521
Track/infrastructure irregularities	1626	1094	1068	1095	1319

[+] Running line

Source: Rail Safety Regulators Panel (RSRP), ATSB

The information contained in Table 2 represents those rail accidents and serious incidents (collectively termed Immediately Reportable Matters) that have been reported to the ATSB. The reporting of rail occurrences is primarily confined to Immediately Reportable Matters that have occurred on the national Defined Interstate Rail Network. Information about those occurrences is entered into the ATSB's rail occurrence database and decisions are made about which of those occurrences will be investigated by the ATSB. The legislative basis for this reporting requirement is contained in the *Transport Safety Investigation Act 2003* and the *Transport Safety Investigation Regulations 2003*. This data is a subset of the data presented in Table 1. The table shows that over the last five years, collisions with road vehicles at level crossings and running line derailments were the most frequent occurrences reported to the ATSB, followed by running line collisions.

Table 2: Rail Occurrences Reported to the ATSB by Occurrence Type

		Occurrence Year (# Rail Occurrences)					
Occurrence Type Level 1	**Occurrence Type Level 2**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
	Alcohol or Drugs Irregularity					2	2
Collision	Running Line Collision	6	7	6	6	10	34
	Yard Collision	1	1		1	2	5
Derailment	Running Line Derailment	11	6	5	12	16	50
	Yard Derailment	2	4	3	2	6	17
Fire	Lineside Fires			1			1
	On Train	1			2	2	5
Level Crossing Occurrence	Collision with Person	1	3		1		5
	Collision with Road Vehicle	8	10	14	13	7	52
	Near Miss with Road Vehicle					1	1
Load Irregularity	Door Open				1		1
	Load Shift		1	1	1		3
	Loose Load Fastening		1				1
	Other Load Irregularity					1	1
Proceed Authority Exceeded	Completely Missed While Running	1	1				2
	Driver Misjudged	1					1
Rollingstock Irregularity	Braking System	1				1	2
	Defective Bearing	2	3	2	2	1	10
	Other Rolling Stock Irregularity	1		5	1	1	8
	Train Parting	3		1			4
	Wheel/Axle Failure	3		3			6
Safeworking Rule or Procedure Breach	Other Safeworking Rule or Procedure Breach	4	5		1	2	12
	Safeworking Rules or Procedures Deficiency			1			1

		Occurrence Year (# Rail Occurrences)					
Occurrence Type Level 1	**Occurrence Type Level 2**	**2004**	**2005**	**2006**	**2007**	**2008**	**Total**
	Track Work Procedure/Rule Breach					2	2
	Wayside Signalling System Procedure/Rule Breach					1	1
Signal Passed at Danger	Completely Missed While Running	1					1
	Driver Misjudged	2	1			3	6
	Other signal passed at danger		1			1	2
	Starting Against Signal			1			1
Signalling and other Proceed Authority Systems Irregularity	Wayside Signalling System Irregularities					1	1
Slip, Trip or Fall	Other slip trip or fall					1	1
	To/From Train	1					1
Suspected Suicide or Attempted Suicide	Suspected Suicide	1	1		2		4
Track and Civil Infrastructure Irregularity	Buckled Track	2	2	1			5
	Other Natural Events				1		
	Other Track infrastructure irregularity				1		1
	Spread Track	1					1
Total		**54**	**47**	**44**	**46**	**61**	**252**

Marine safety trends

The information contained in Table 3 represents those marine accidents and serious incidents (collectively termed Immediately Reportable Matters) that have been reported to the ATSB. The reporting of marine occurrences to the ATSB is primarily confined to Immediately Reportable Matters that have occurred in relation to ships that are engaged in interstate and international trade and commerce. Information about those occurrences is entered into the ATSB's marine occurrence database and decisions are made about which of those occurrences will be investigated by the ATSB. The legislative basis for this reporting requirement is contained in the *Transport Safety Investigation Act 2003* and the *Transport Safety Investigation Regulations 2003*. The table shows that over the last five years, serious injuries sustained by crew members is the most frequent occurrence reported to the ATSB followed by fires/explosions, then groundings/strandings and equipment failures.

Table 3: Marine Occurrences Reported to the ATSB by Occurrence Type, 2004 to 2008

Occurrence Type	2004	2005	2006	2007	2008	Total
Capsizing/listing	1		1			2
Close quarters	4	3	2	2	1	12
Collision	6	7	8	7	3	31
Contact	1	6	3	4	4	18
Damage to ship or equipment	2	6	6	4	1	19
Equipment failure	4	13	11	14	6	48
Fatality	5	6	8	6	3	28
Fire/explosion	3	10	11	10	18	52
Flooding	1		2	2	1	6
Foundered		1				1
Grounding/stranding	10	11	11	6	10	48
Hull failure/failure of watertight openings				2		2
Lifeboat accident	1	4	4	1	2	12
Machinery failure	16	4	17	5	2	44
Missing assumed lost			1			1
Other	2	6	10	11	7	36
Pollution			1	2	1	4
Serious injury	1	17	17	16	13	64
Total	**57**	**94**	**113**	**92**	**72**	**428**

Aviation safety trends

In contrast to rail and marine, the ATSB is the keeper of the national record for all reported aviation occurrences, including accidents and serious incidents (collectively termed Immediately Reportable Matters) and incidents (termed Routine Reportable Matters). The reporting of aviation occurrences is required across all aviation sectors. For this reason, more comprehensive aviation occurrence statistics are able to be generated by the ATSB than for rail and marine. The legislative basis for this reporting requirement is contained in the *Transport Safety Investigation Act 2003* and the *Transport Safety Investigation Regulations 2003*.

Australia has a good international aviation safety record in comparative terms.

Accident information has been presented in terms of Australia's aviation sectors:

- **Commercial air transport:**
  - High-Capacity (Regular Public Transport aircraft with a seating capacity greater than 38 seats or a maximum payload exceeding 4200 kg)
  - Low-Capacity (Regular Public Transport aircraft with a seating capacity of 38 or less seats or a maximum payload of 4200 kg)
  - Charter (non-scheduled passenger and freight operations)

- **Other commercial:**
  - Aerial work (Aerial agricultural, surveying and photography, spotting, ambulance, stock mustering, search and rescue, towing (including glider, target and banner towing), advertising, cloud seeding, fire fighting, and coastal surveillance).
  - Flying training (Flying under instruction for the issue or renewal of a licence, rating, aircraft type endorsement or conversion training, including solo navigation exercises conducted as part of a course of applied flying training).
  - Business (Operations where an aircraft is used in the support of a business or profession, but the aircraft is not operated directly for hire or reward).
- **Private/sports aviation:**
  - Private(flying conducted for non-commercial purposes for recreation or personal transport).
  - Sports aviation (operations by hang gliders, balloons, autogyros, gliders/sailplanes, ultralights and airships).

The information contained in Table 4 represents those aviation accidents, serious incidents and incidents that have been reported to the ATSB. Information about those occurrences is entered into the ATSB's aviation occurrence database and decisions are made about which of those occurrences will be investigated by the ATSB. The table shows that over the last 5 years, bird/animal strike is the most frequent occurrence reported to the ATSB followed by operational non-compliance and airspace incursion events.

Aviation occurrences by occurrence category

Table 4: Aviation occurrences by occurrence category, 1999 to 2008

Occurrence category	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Accident	5,377	5,764	5,490	5,841	4,855	5,128	6,712	7,482	7,785	7,871	62,305
Serious incident	7	9	9	8	6	20	28	24	42	63	216
Incident	193	222	199	164	155	168	133	103	153	181	1,671
Total	**5,577**	**5,995**	**5,698**	**6,013**	**5,016**	**5,316**	**6,873**	**7,609**	**7,980**	**8,115**	**64,192**

Note: Data includes all occurrences including non-VH registered recreational aircraft and parachute accidents not specifically relating to aircraft safety.

Occurrences by operation type

Explanatory notes

Data is based on the number of aircraft involved in an occurrence. Occurrences involving more than one aircraft are recorded once for each aircraft involved.

If an injury or fatality was recorded for one aircraft in a multi-aircraft accident, that injury or fatality was recorded only in the operation type where the injury or fatality occurred.

Likewise, in a multi-aircraft fatal accident, an accident is recorded as a fatal accident only within the operation type of the aircraft where the fatal injury was contained.

Incident numbers may be under-reported as the following tables provide data for occurrences where only the aircraft registration type is known. That is, if an aircraft is Australian registered (VH-) or foreign-registered.

Data excludes occurrences involving Australian non-VH registered recreational aircraft.

Data for serious injury occurrences and fatal accidents are based on the highest injury level involved with the occurrence.

Fatalities do not include those resulting from: parachuting operations where aircraft safety was not a factor; suicides; and criminal acts.

Rates are calculated as accidents and fatal accidents per 100,000 hours flown (all operation types) and per 100,000 departures (commercial air transport only).

Commercial air transport

Table 5: Commercial air transport occurrence statistics, 1999 to 2008 (VH- and foreign registered aircraft)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	3,155	3,190	3,072	2,975	2,658	3,385	3,998	3,598	3,864	3,955	33,850
Serious incidents	2	9	8	8	6	16	25	20	39	53	186
Serious injury occurrences	0	2	1	3	1	0	2	0	2	4	15
Fatal accidents	3	4	4	4	2	0	2	1	2	3	25
Total accidents	32	33	38	27	31	16	12	12	20	30	251
Number of injuries											
Serious injuries	2	3	4	8	4	0	2	0	2	17	42
Fatalities	10	19	10	12	8	0	18	2	2	6	87

Note: Data includes high capacity RPT, low capacity RPT and charter.
Data provided is for VH- registered aircraft operating within and outside Australian territory, and foreign registered aircraft operating within Australian territory only.

Figure 1: All commercial air transport (VH-only) rates per 100,000 hours flown

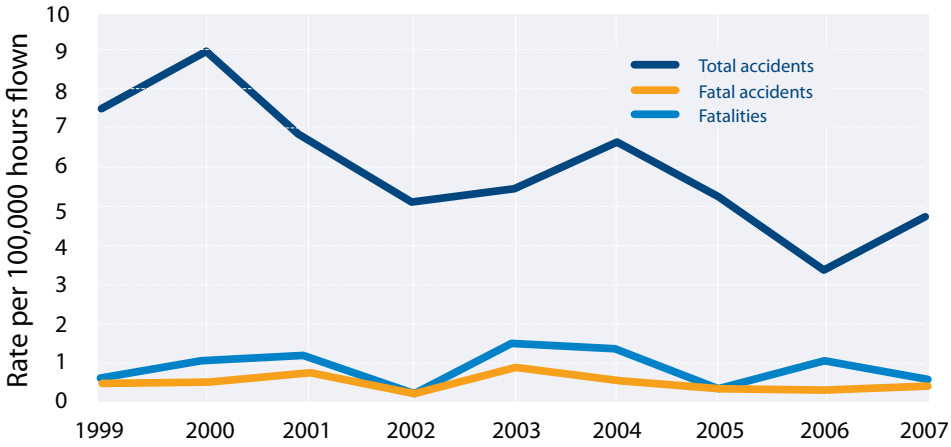


Table 6: High capacity RPT occurrence statistics, 1999 to 2008 (VH- only)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	1,670	1,711	1,733	1,773	1,476	1,955	2,365	2,149	2,221	2,436	19,489
Serious incidents	1	4	5	6	5	10	10	8	18	27	94
Serious injury occurrences	0	1	1	1	1	0	1	0	2	1	8
Fatal accidents	0	0	0	0	0	0	0	0	0	0	0
Total accidents	7	3	3	1	1	1	1	1	3	3	24
Number of injuries											
Serious injuries	0	2	1	1	4	0	1	0	2	12	23
Fatalities	0	0	0	0	0	0	0	0	0	0	0
Rates per 100,000 departures											
Accident rate	2.39	0.93	0.88	0.32	0.31	0.26	0.25	0.24	0.69	-	-
Fatal accident rate	0	0	0	0	0	0	0	0	0	-	-
Rates per 100,000 hours flown											
Accident rate	0.99	0.39	0.38	0.14	0.13	0.11	0.11	0.10	0.30	-	-
Fatal accident rate	0	0	0	0	0	0	0	0	0	-	-

Note: Data includes high capacity RPT, low capacity RPT and charter.
Data provided is for VH- registered aircraft operating within and outside Australian territory, and foreign registered aircraft operating within Australian territory only.
- Not available

Table 7: Low capacity RPT occurrence statistics, 1999 to 2008 (VH- only)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	697	808	748	555	576	625	676	523	593	488	6,289
Serious incidents	0	3	1	1	1	5	5	4	10	11	41
Serious injury occurrences	0	0	0	0	0	0	0	0	0	0	0
Fatal accidents	0	1	0	0	0	0	1	0	0	0	2
Total accidents	3	3	3	4	3	0	2	0	1	0	19
Number of injuries											
Serious injuries	0	0	0	0	0	0	0	0	0	0	0
Fatalities	0	8	0	0	0	0	15	0	0	0	23
Rates per 100,000 departures											
Accident rate	0.91	0.92	1.09	1.82	1.47	0.00	1.02	0.00	0.62	-	-
Fatal accident rate	0.00	0.31	0.00	0.00	0.00	0.00	0.51	0.00	0.00	-	-
Rates per 100,000 hours flown											
Accident rate	1.05	1.05	1.20	1.92	1.52	0.00	1.00	0.00	0.63	-	-
Fatal accident rate	0.00	0.35	0.00	0.00	0.00	0.00	0.50	0.00	0.00	-	-

- Not available

Table 8: Charter occurrence statistics, 1999 to 2008 (VH- only)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	422	433	356	412	371	448	519	566	696	712	4,935
Serious incidents	1	0	0	0	0	1	3	4	6	12	27
Serious injury occurrences	0	1	0	2	0	0	1	0	0	3	7
Fatal accidents	3	3	4	4	2	0	1	1	2	3	23
Total accidents	21	26	32	20	26	15	9	10	16	27	202
Number of injuries											
Serious injuries	2	1	3	7	0	0	1	0	0	5	19
Fatalities	10	11	10	12	8	0	3	2	2	6	64
Rates per 100,000 departures											
Accident rate			4.21	2.93	3.75	2.40	1.28	1.63	2.40	-	-
Fatal accident rate			0.53	0.59	0.29	0	0.14	0.16	0.30	-	-
Rates per 100,000 hours flown											
Accident rate	4.10	5.37	6.77	4.43	5.98	3.07	1.84	2.06	2.90	-	-
Fatal accident rate	0.59	0.62	0.85	0.89	0.46	0	0.20	0.21	0.36	-	-

Table 9: Commercial air transport foreign-registered aircraft occurrence statistics, 1999 to 2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	366	238	235	235	235	357	438	360	354	319	3,137
Serious incidents	0	2	2	1	0	0	7	4	5	3	24
Serious injury occurrences	0	0	0	0	0	0	0	0	0	0	0
Fatal accidents	0	0	0	0	0	0	0	0	0	0	0
Total accidents	1	1	0	2	1	0	0	1	0	0	6
Number of injuries											
Serious injuries	0	0	0	0	0	0	0	0	0	0	0
Fatalities	0	0	0	0	0	0	0	0	0	0	0

Note: Data provided is for foreign registered aircraft operating within Australian territory only.
Data includes high capacity RPT, low capacity RPT and charter operations.
- Not available

Table 10: Other commercial occurrence statistics, 1999 to 2008 (VH- and foreign-registered aircraft)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	616	574	503	511	521	544	666	663	638	562	5,798
Serious incidents	2	2	1	0	0	4	2	2	7	5	25
Serious injury occurrences	7	11	5	1	5	7	2	3	2	7	50
Fatal accidents	5	5	7	2	8	5	3	4	4	8	51
Total accidents	79	88	65	49	53	60	52	33	50	58	587
Number of injuries											
Serious injuries	12	20	7	2	11	11	2	3	2	8	78
Fatalities	6	9	11	2	14	12	3	9	5	10	81

Note: Data provided is for foreign registered aircraft operating within Australian territory only. Data includes high capacity RPT, low capacity RPT and charter operations.

Figure 2: All other commercial aviation (VH-only) rates per 100,000 hours flown

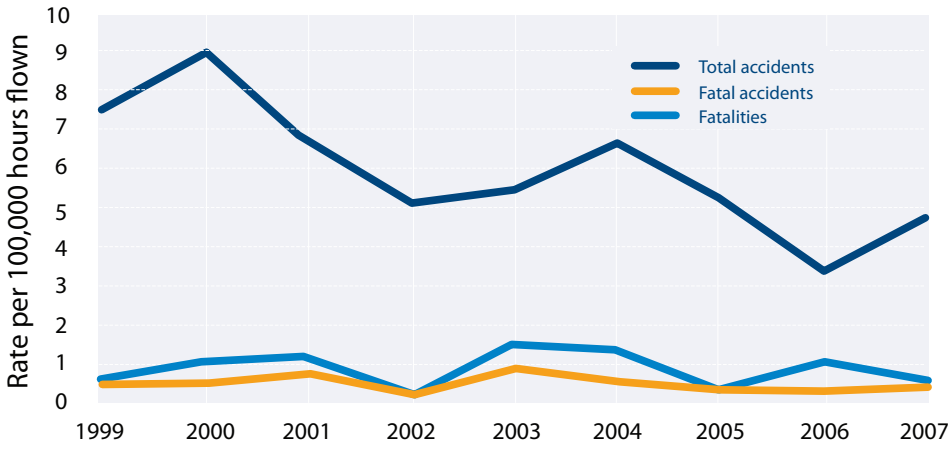


Table 11: Aerial work occurrence statistics, 1999 to 2008 (VH- only)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	185	222	189	219	216	214	279	281	264	284	2,353
Serious incidents	2	2	0	0	0	2	2	0	3	2	13
Serious injury occurrences	5	6	3	0	4	6	2	2	2	7	37
Fatal accidents	1	5	5	1	3	3	2	4	3	5	32
Total accidents	41	48	42	23	34	44	29	22	29	36	348
Number of injuries											
Serious injuries	5	9	5	1	9	9	2	2	2	8	52
Fatalities	2	9	9	1	7	4	2	9	3	6	52
Rates											
Accident rate	9.33	11.46	10.33	5.71	8.56	10.88	6.92	5.43	6.65	-	-
Fatal accident rate	0.23	1.19	1.23	0.25	0.76	0.74	0.48	0.99	0.69	-	-

Note: Aerial work occurrences include those involving aerial agriculture, mustering, surveying and photography, emergency services, search and rescue, fire control, and test and ferry operations.
- Not available

Table 12: Flying training occurrence statistics, 1999 to 2008 (VH- only)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	384	315	286	281	291	304	376	372	351	264	3,224
Serious incidents	0	0	0	0	0	2	0	2	4	3	11
Serious injury occurrences	2	3	2	1	1	1	0	1	0	0	11
Fatal accidents	2	0	2	1	5	1	1	0	0	3	15
Total accidents	32	37	19	25	19	14	23	11	17	21	218
Number of injuries											
Serious injuries	4	4	2	1	2	2	0	1	0	0	16
Fatalities	2	0	2	1	7	2	1	0	0	4	19
Rates											
Accident rate	7.03	8.80	4.61	6.01	4.46	3.92	5.46	2.56	3.68	-	-
Fatal accident rate	0.44	0	0.49	0.24	1.17	0.28	0.24	0	0	-	-

Note: - Not available

Table 13: Business occurrence statistics, 1999 to 2008 (VH- only)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	44	36	27	9	13	25	9	9	21	11	204
Serious incidents	0	0	1	0	0	0	0	0	0	0	1
Serious injury occurrences	0	2	0	0	0	0	0	0	0	0	2
Fatal accidents	2	0	0	0	0	1	0	0	1	0	4
Total accidents	6	3	4	1	0	2	0	0	4	0	20
Number of injuries											
Serious injuries	3	7	0	0	0	0	0	0	0	0	10
Fatalities	2	0	0	0	0	6	0	0	2	0	10
Rates											
Accident rate	3.86	2.16	2.72	0.69	0	1.38	0	0	2.57	-	-
Fatal accident rate	1.29	0	0	0	0	0.69	0	0	0.64	-	-

Note: - Not available

Table 14: Other commercial foreign-registered aircraft occurrence statistics, 1999 to 2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	3	1	1	2	1	1	2	1	2	3	17
Serious incidents	0	0	0	0	0	0	0	0	0	0	0
Serious injury occurrences	0	0	0	0	0	0	0	0	0	0	0
Fatal accidents	0	0	0	0	0	0	0	0	0	0	0
Total accidents	0	0	0	0	0	0	0	0	0	1	1
Number of injuries											
Serious injuries	0	0	0	0	0	0	0	0	0	0	0
Fatalities	0	0	0	0	0	0	0	0	0	0	0

Note: Data provided is for foreign registered aircraft operating within Australian territory only.
Data includes aerial work, flying training, and business operations.
- Not available

Private/sports aviation

Table 15: Private/sports aviation occurrence statistics, 1999 to 2008 (VH- and foreign-registered aircraft)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	336	258	199	202	187	191	210	226	245	237	2,291
Serious incidents	3	0	0	1	1	4	3	2	2	4	20
Serious injury occurrences	2	9	11	9	6	7	2	5	5	9	65
Fatal accidents	15	9	11	4	4	7	13	15	8	13	99
Total accidents	76	92	86	81	62	82	62	54	58	62	715
Number of injuries											
Serious injuries	5	15	15	13	8	10	3	10	7	14	100
Fatalities	26	10	20	10	12	12	18	25	16	23	172

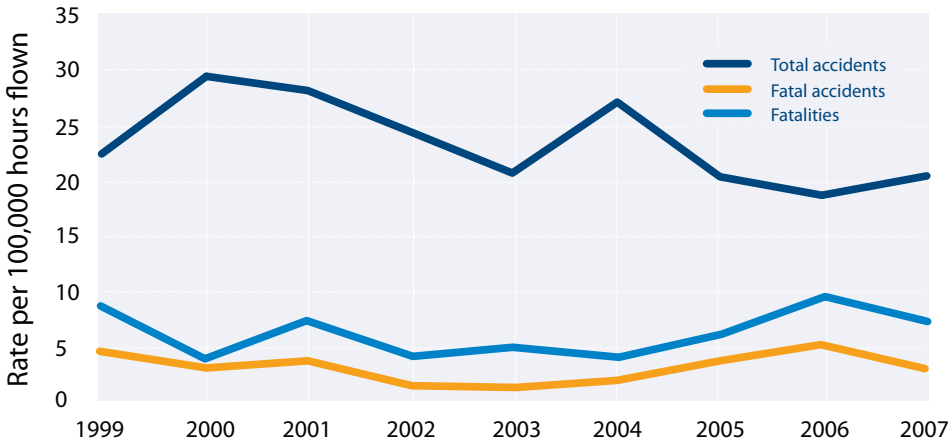
Note: Data includes private and sports aviation.
Data provided is for VH- registered aircraft operating within, and outside Australian territory; and foreign registered aircraft operating within Australian territory only.

Table 16: Private occurrence statistics, 1999 to 2008 (VH- only)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	283	203	154	158	143	142	174	210	209	186	1,862
Serious incidents	3	0	0	1	1	4	3	2	1	4	19
Serious injury occurrences	1	5	7	5	2	3	0	4	3	7	37
Fatal accidents	13	8	10	4	3	5	9	12	7	11	82
Total accidents	65	76	77	69	52	70	51	45	48	54	607
Number of injuries											
Serious injuries	3	11	9	8	2	6	1	9	5	12	66
Fatalities	23	9	19	10	11	9	14	21	15	20	151
Rates											
Accident rate	23.22	30.09	29.02	25.22	21.42	27.94	21.04	19.55	21.25		
Fatal accident rate	4.64	3.17	3.77	1.46	1.24	2.00	3.71	5.21	3.10		

Note: Rates are calculated as accidents and fatal accidents per 100,000 hours flown.

Figure 3: Private aviation (VH-only) rates per 100,000 hours flown



Note: Rates are not provided for sports aviation as complete hours flown data is unavailable.

Table 17: Sports aviation occurrence statistics, 1999 to 2008 (VH- only)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	47	53	41	42	43	47	34	14	34	46	401
Serious incidents	0	0	0	0	0	0	0	0	0	0	0
Serious injury occurrences	1	4	4	3	4	4	2	1	2	2	27
Fatal accidents	1	0	1	0	1	1	4	3	1	2	14
Total accidents	9	14	9	9	10	11	11	8	10	8	99
Number of injuries											
Serious injuries	2	4	6	4	6	4	2	1	2	2	33
Fatalities	1	0	1	0	1	1	4	4	1	3	16

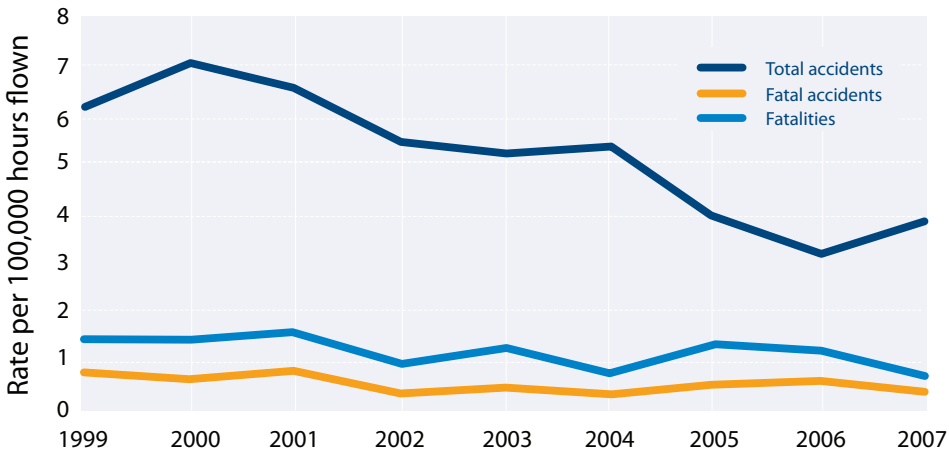
Note: Data excludes occurrences involving Australian non-VH registered recreational aircraft.
Rates are not provided for sports aviation as complete hours flown data is unavailable.
Sports aviation includes aircraft such as hang gliders, balloons and gliders.

Table 18: Sports aviation occurrence statistics, 1999 to 2008 (VH- only)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Number of aircraft involved in occurrences											
Incidents	6	2	4	2	1	2	2	2	2	5	28
Serious incidents	0	0	0	0	0	0	0	0	1	0	1
Serious injury occurrences	0	0	0	1	0	0	0	0	0	0	1
Fatal accidents	1	1	0	0	0	1	0	0	0	0	3
Total accidents	2	2	0	3	0	1	0	1	0	0	9
Number of injuries											
Serious injuries	0	0	0	1	0	0	0	0	0	0	1
Fatalities	2	1	0	0	0	2	0	0	0	0	5

Note: Data provided is for foreign-registered aircraft operating within Australian territory only. Data includes private and sports aviation.

Figure 4: All VH-aviation rates per 100,000 hours flown



Aviation Accidents by primary occurrence type

Explanatory notes

For occurrences involving multiple aircraft, aircraft with the same operation type are recorded once; and aircraft with different operation types are recorded against the corresponding operation type.

Data provided is based on the primary occurrence type associated with the occurrence, that is, the key or pivotal event in the occurrence sequence.

Data includes accidents, serious incidents and incidents involving VH- registered aircraft within and outside Australian territory, and foreign-registered aircraft within Australian territory only.

Commercial air transport

Table 19: Commercial air transport occurrence types – accidents and serious incidents, 1999 to 2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Airspace											
Aircraft separation	0	1	1	2	1	2	3	1	7	12	30
Airspace incursion	0	0	0	0	0	0	0	1	0	0	1
Procedural error	0	1	0	0	0	0	0	0	0	0	1
Operational non-compliance	0	0	0	0	1	0	0	0	2	2	5
Mechanical											
Airframe	10	5	4	3	5	7	5	2	6	4	51
Powerplant / propulsion	2	3	4	3	5	3	2	6	9	9	46
Systems	3	2	4	1	0	1	4	1	3	4	23
Operational											
Significant event	4	15	13	12	10	8	8	7	13	25	115
Collision	4	2	9	4	6	2	3	2	5	8	45
Ground operations	4	4	0	3	2	1	2	5	1	2	24
Aircraft control	3	2	2	2	0	0	2	3	4	5	23
Fuel-related	0	3	2	2	3	4	2	0	1	4	21
Weather / environment	3	1	2	0	1	2	0	1	2	1	13
Bird / animal strike	1	0	4	1	0	0	0	0	2	0	8
Navigation / flight planning	0	0	0	0	0	0	4	0	1	1	6
Cabin Safety	0	1	1	0	0	0	0	0	1	0	3
Miscellaneous	0	0	0	1	0	0	0	2	0	0	3
Warning device	0	0	0	0	0	1	0	1	0	1	3

Note: Data excludes occurrences involving Australian non-VH registered recreational aircraft.

Other commercial

Table 20: Other commercial occurrence types – accidents and serious incidents, 1999 to 2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Airspace											
Aircraft separation	0	0	0	0	0	2	0	0	3	2	7
Airspace incursion	0	0	0	0	0	0	0	1	0	0	1
Mechanical											
Powerplant / propulsion	5	11	8	4	5	10	4	6	9	5	67
Airframe	2	6	1	1	2	2	3	4	1	4	26
Systems	1	1	0	0	2	2	0	1	1	0	8
Operational											
Collision	26	34	33	18	26	27	22	13	20	31	250
Significant event	18	21	12	11	9	15	11	1	10	11	119
Ground operations	12	4	5	6	5	2	6	2	3	1	46
Aircraft control	4	2	1	0	1	1	1	5	6	2	23
Bird / animal strike	4	5	3	3	1	2	3	0	1	1	23
Fuel related	8	3	3	3	2	0	2	0	1	1	23
Regulations and SOPs	0	0	0	0	0	1	1	0	0	0	2
Warning device	0	0	0	0	1	0	0	0	0	0	1
Weather / environment	0	0	0	0	0	0	0	1	0	1	2
Miscellaneous	0	0	0	0	0	1	0	0	0	0	1

Note: Data excludes occurrences involving Australian non-VH registered recreational aircraft.

Private/sports aviation

Table 21: Private/sports aviation occurrence types – accidents and serious incidents, 1999 to 2008

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Aerodrome and airways facility											
Aerodrome related	0	0	0	0	1	0	0	0	0	0	1
Airspace											
Aircraft separation	0	0	0	0	1	2	0	1	1	1	6
Operational non-compliance	1	0	0	0	0	0	0	0	0	0	1
Mechanical											
Powerplant / propulsion	6	11	12	8	4	17	8	7	12	9	94
Airframe	6	6	3	4	7	3	1	3	3	2	38
Systems	2	1	1	0	0	0	1	0	0	1	6
Operational											
Collision	24	26	31	17	21	22	25	21	22	27	236
Significant event	22	31	16	29	18	22	17	6	4	13	178
Ground operations	10	10	8	10	8	8	2	3	2	4	65
Aircraft control	3	2	7	7	2	7	5	5	8	5	51
Fuel related	2	3	2	1	1	1	2	3	0	3	18
Weather / environment	2	1	1	1	1	0	0	1	2	0	9
Cabin Safety	0	0	2	0	0	1	1	1	1	0	6
Bird / animal strike	0	0	1	0	0	0	1	0	1	1	4
Miscellaneous	0	1	1	0	0	0	1	0	0	0	3
Navigation / flight planning	0	0	1	0	0	0	0	0	2	0	3
Warning device	0	0	1	0	0	0	0	0	0	0	1

Note: Data excludes occurrences involving Australian non-VH registered recreational aircraft.

Internal management and processes

Financial overview

In 2008-09, the ATSB utilised $14.567m of operating expenditure (including $0.468m revenue from cost recovery), and $1.045m.of capital expenditure to deliver its outputs.

This result was 5.0 per cent under its budget for the period which reflected:

- $0.468m in revenue which had not been anticipated. Revenues were raised from cost recovery activities, including the Executive Director's work on the Varanus Pipeline inquiry in Western Australia and the ATSB's assistance provided to Queensland in the investigation of two level crossing accidents at Mundoo and Rungoo; and
- A $0.243m underspend on suppliers.

From 1 July, the ATSB became a separate agency under the *Financial Management & Accountability Act 1997* (FMA Act) and received a transfer of resources from the Department of Infrastructure, Transport, Regional Development and Local Government under S32 of the FMA Act. This comprised existing operating budgets of approximately $16.8m plus $5.5m for new corporate staff as well as funding for a Chief Commissioner, two part-time Commissioners and to enable the ATSB to meet its property and other operating costs.

Table 22: Budget Comparisons

	2005-06	2006-07	2007-08	2008-09	2009-10
	ACTUAL	ACTUAL	ACTUAL	ACTUAL	BUDGET [3]
	$m	$m	$m	$m	$m
ATSB Operating Result					
Employee Expenses	11.733	11.460	11.089	11.639	13.587
Supplier Expenses	4.343	3.451	3.794	3.385	7.305
Depreciation expenses	0.583	0.587	1.420	1.500	1.444
Other expenses	0.814	0.675	0.094	0.011	0.000
Total expenses	17.473	16.172	16.396	16.535	22.336
Revenue (own source)	0.203	0.111	0.125	0.468	0.000
Operating Result	17.269	16.061	16.271	16.067	22.336
Capital Expenditure					
Plant and Equipment	0.110	0.043	0.109	1.045	0.000
SIIMS Project	0.289	0.671	0.163	0.000	0.000
Staffing					
Average staffing level (FTE)	109	113	97	95	106

The 2009-10 Portfolio Budget Statements include a separate section for the ATSB for the first time. The ATSB has one outcome:

> **Improved transport safety in Australia including through: independent 'no blame' investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.**

The price of this output for 2009-10 is $22.336m which compares with $23.557m in 2008-09. Since 2007-08, approximately $1.9m of each year's funding has been for the Indonesia Transport Safety Assistance Package. This funding will lapse at the end of 2009-10.

3 With the ATSB's transition to a separate statutory agency, the new budget now encompasses the corporate overhead for key support functions previously performed by the corporate division of the Department of Infrastructure, Transport, Regional Development and Local Government. In addition, the budget includes an appropriation of $1.9m from the continuing Indonesia Transport Safety Assistance Package, which is in the final year of a 3-year program.

Table 23: ATSB Price of Outputs[4]

	2006-07	2007-08	2008-09	2009-10
	ACTUAL	ACTUAL	ACTUAL	BUDGET
	$m	$m	$m	$m
Output 2.1.1 Transport Safety Investigations				
ATSB[5]	16.779	16.102	17.226	16.053
Corporate	7.622	7.361	7.472	7.943
Total	24.401	23.463	24.699	23.996
Output 2.3.2 Road safety and vehicle policy, programs and regulation				
ATSB	0.294	0.2941[6]		
Corporate	0.156	0.154		
Total	0.45	0.448		
Summary				
ATSB	17.073	16.396	17.226	16.053
Corporate	7.778	7.515	7.472	7.943
Total	24.851	23.911	24.699	23.996

4 The 2008-09 Portfolio Budget Statements show the revised output structure following the change of Government and subsequent issuing of the Administrative Arrangements Order of 3 December 2007. The ATSB Annual Review 2007 reflects the former structure under which the ATSB contributed to Outputs 1.1.1 Investigation and 1.1.2 Safety (see Department of Infrastructure, Transport, Regional Development and Local Government Annual Report 2007-08 for mapping between the present and former output structures).

5 Includes Indonesia Transport Safety Assistance Package ($1.624m actual 2008-09, $1.9m budget 2009-10).

6 Most expenditure relating to the ATSB's former Road Safety functions was transferred effective 1 July 2007. However a small component was transferred effective 1 April 2008. Expenditure of $0.294m incurred on this component prior to this date remained included in the ATSB's 2007-08 result.

Table 24: Comparison of staffing levels (year end FTE)

	2008-09	2009-10
	Actual	BUDGET
	30-Jun-09	30 June 09
Commissioners		2
SES Band 1		1
Executive Director	1	0
Director Transport Safety Investigation	4	3
Team Leader Transport Safety Investigation	6	6
Senior Transport Safety Investigator	55	54
Transport Safety Investigator	2	2
Executive Level 2	4	7
Executive Level 1	7	9
Australian Public Service Level 6	3.3	6.3
Australian Public Service Level 5	7.2	8.2
Australian Public Service Level 4	3.5	5
Australian Public Service GAPS	0	2
TOTAL (year end FTE)	93	105.5

Note: The increase in staff numbers between 08-09 and 09-10 is primarily the result of the establishment of the ATSB as a separate agency on 1 July 2009 which required the resourcing of new corporate functions.

People profile

At 30 June 2009, the ATSB comprised 94.6 Full Time Equivalent Staff. At 30 June 2010, the ATSB will have increased its staffing levels to approximately 109 FTEs, largely reflecting the transfer of staff from the Department of Infrastructure, Transport, Regional Development and Local Government and some new appointments to provide corporate support to the Commission and the investigation staff.

The ATSB values staff who are committed to helping prevent transport deaths and injuries. It seeks to develop a satisfied, capable and productive workforce that is well managed to achieve results through people.

ATSB staff work within the APS Values and Code of Conduct set out in the *Public Service Act 1999*. Further responsibilities are outlined in the *Financial Management and Accountability Act 1997* and other legislation.

The ATSB ensures there are clear linkages between individual work plans (Plans on a Page), unit business plans and the Portfolio Budget Statements. Six-monthly performance reviews with staff allow supervisors to give and receive feedback comments, review Results-on-a-Page and discuss learning and development needs.

The ATSB is a diverse community of team players and encourages staff to work efficiently and effectively and reach their potential in a safe, fair and flexible workplace.

Overview of key safety outputs

Figure 6: ATSB occurrence investigations initiated/in process/completed (aviation, marine and rail)

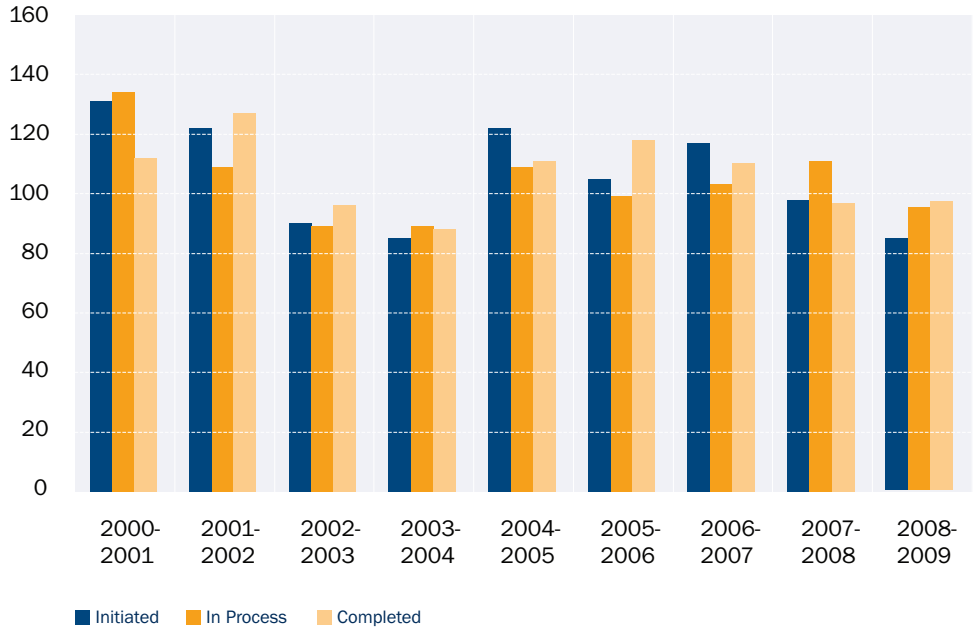
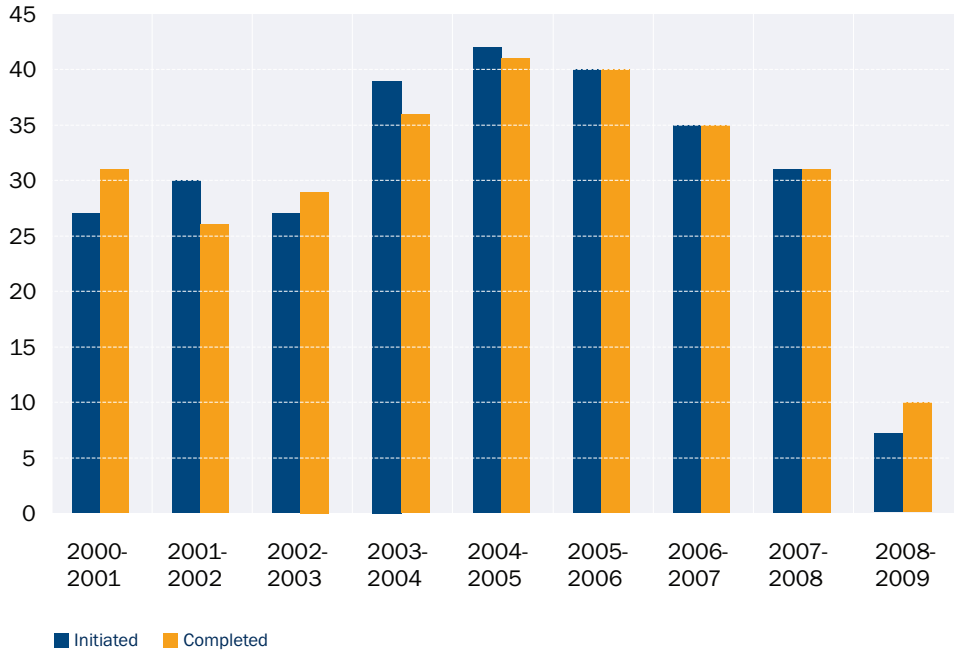


Figure 7: ATSB statistical and research publications initiated/completed



Note: Up to March 2008, the data includes road safety publications

Major accident preparedness

The 2008-09 review and testing of the response capabilities of ATSB staff complemented previous testing of ATSB operational readiness, with the major accident preparedness program focussing on collaboration with a major accident exercise held over four months at Sydney airport. In September 2008, ATSB staff participated in a hypothetical desktop discussion exercise that had been planned to explore the boundaries of scope and authority between participating agencies.

The September exercise drove the design of a full-scale deployment exercise at Sydney airport on 18 November, with 10 ATSB staff participating on site and a similar number of supporting Canberra-based staff. The ATSB continued with its own exercise in Canberra on the next day as it developed its own process to initiate a full-scale investigation. The lessons from all agencies were developed and shared over the following month, and the ATSB has since modified its procedures to reflect what had been found in the light of the exercise. The main changes include:

- Providing greater liaison input and advice to the emergency response commander from as early as possible
- Ensuring a more complete understanding of the use of the ATSB's Safety Investigation Information Management System (SIIMS) to record information during the response initiation and deployment phase, and
- Clearer protocols for admitting outside parties into the investigation effort.

The exercise program also highlighted the need to ensure a consistent expectation among key stakeholders of what could be expected from the ATSB as it responded to a major accident. This need is being managed by increased ATSB input for airport response planners.

Additionally, ATSB staff members participated in collaborative exercises for rail accidents. These included a simulated/desktop exercise projecting the derailment of the Indian Pacific passenger train, and a review of a derailment at Golden Ridge in Western Australia.

Workforce planning

Replacing the ATSB's specialist staff is generally not easy and resources constrain duplicating or actively recruiting certain specialist positions ahead of time. To ensure that critical positions, such as those of transport safety investigators, remain filled, the ATSB monitors expected staff departures. The ATSB also considers consultancy assistance to augment its staff if needed.

Asset management

The ATSB has assets with a book value of $5.044m at 30 June 2009 including SIIMS, specialist computer equipment and software (such as for air traffic control and aircraft data recorder analysis), a teleconferencing suite, laser site survey and other technical equipment such as electron and optical microscopes. These assets are subject to depreciation.

Access and equity

The ATSB continued to participate in the Department's Diversity and Equity Network which hosted a Departmental event for NAIDOC week as well as an event for International Day of People with Disability.

Aboriginal Reconciliation

The ATSB supported the Department's Reconciliation Action Plan outlines how the Department contributes to the wellbeing and quality of life of Indigenous Australians.

Disability strategy

As a Division of the Department, the ATSB is also committed to the Australian Government's Disability Strategy. ATSB website documents are in a PDF format that is accessible to screen readers for sight and hearing impaired people.

Government online and e-services initiative

The ATSB provides online information and services and supports the Australian Government Online Strategy objectives concerning accessibility for the disabled, and copyright and privacy concerns.

The ATSB website provides aviation, marine and rail accident and incident safety investigation reports, online accident and incident notification forms, a flight crew licence check application form, an aviation statistics request form and aviation safety research and statistics.

Occupational health and safety

The principles of sound occupational health and safety (OH&S) practices and management remain a cornerstone of ATSB operations. All investigators receive direct and specific occupational health and safety training during their initial employment induction. In addition, they are provided with vaccinations against any blood-borne pathogen hazards that may be encountered while conducting on-site investigations. Staff then complete periodic refresher courses, delivered and assessed using an in-house designed CD-ROM-based system, to maintain a continued awareness and competency in practical blood-borne pathogen and OH&S risk management. The ATSB training team also continues to make the blood-borne pathogen awareness training available to selected external organisations. Investigation staff members are trained to Senior level in first-aid techniques, ensuring that teams remain fully prepared.

Management

During 2008-09, the ATSB Occupational Health and Safety Panel continued and consolidated as an effective supplement to the Departmental OH&S Committee. The Panel has provided the ideal framework necessary for its movement to a full committee structure, as part of the ATSB's transition to a statutory agency at the commencement of the 2009-10 financial year. Early in 2009, several of the panel members were successful in being elected as formal Health and Safety Representatives (HSR's) under the existing Departmental-designated work-group (DWG) structure.

Performance

The following OH&S-related events were reported by ATSB staff during 2008-09.

Injuries sustained:

- Back injury – two reports (one notifiable and compensable event)
- Gastro infection arising overseas
- Anxiety
- Head wound

Incidents occurring:

- Building odour emission
- 'White Powder' incident and exposure (notifiable event)

Hazards identified:

- Stairwell surface problems – three reports
- Basement floor surface problems
- Basement bicycle cage issue

Initiatives

During 2008-09, the ATSB (through its OH&S panel) has implemented a number of workplace health and safety initiatives, including:

- the procurement and installation of a portable automatic electronic cardiac defibrillating device
- the commencement of a full review of clothing standards for staff employed at field investigation sites
- the introduction of a formal heat stress management policy
- a review of the risks associated with helicopter winching operations as they apply to ATSB staff
- a review of the newly-implemented Civil Aviation Safety Regulations Part 99 drug and alcohol testing requirements, as they apply to ATSB operations within safety-sensitive areas.

Looking ahead

As a newly-established statutory agency (1 July 2009), the ATSB anticipates facing many challenges in the next financial year. Accordingly, the Bureau will continue work on a range of necessary activities to ensure that it has appropriate governance arrangements in place. This important work will enable the ATSB to operate efficiently and effectively and to meet both internal and external reporting requirements, while continuing to support its core business of transport safety investigations. One of the key priorities is establishing the working arrangements of the Commission, including to ensure that the Commission adds value to the investigation processes through an appropriate level of review, and that it provides ongoing assurance to the Government that the ATSB continues to contribute to improved transport safety.

The ATSB plans to receive, assess, classify and record around 12,000 potential accident and incident notifications and around 100 confidential reports in 2009-10.

In addition, the Bureau plans to commence and conduct up to 80 aviation, approximately 10 marine and 10 rail investigations, and to facilitate associated actions to enhance transport safety.

The Bureau will seek to complete its investigations in a timely, high-quality manner. This will include a review of current investigation workloads and management practices, along with the implementation of strategies aimed at making further improvements to the timeliness of reports.

In 2009-10, the Bureau will complete about 10 aviation research and analysis reports focussing on safety priorities, occurrence trends and human factors issues. It will release and publicise safety investigation reports, including summaries of safety action and safety recommendations to foster improved safety.

The ATSB will maintain compliance with international safety investigation obligations, and contribute to major international working groups/conferences including the; International Maritime Organisation, International Civil Aviation Organization, International Society of Air Safety Investigators, International Transport Safety Association, and the Marine Accident Investigators International Forum.

The Bureau will review and test major accident response capabilities to ensure that it can meet the significant resource demands that will be presented in the immediate aftermath of any accident involving multiple fatalities, and which is likely to attract global attention.

The ATSB will also complete endorsed projects as part of the Indonesia Transport Safety Assistance Package and provide other international assistance in transport safety investigations. This includes an ongoing diploma program for Indonesian marine, aviation and rail investigators in 2009-10.

The Commonwealth Government has an ambitious national regulatory reform agenda in the marine and rail industries aimed at improving the efficiency, safety, sustainability and competitiveness of those industries. The ATSB is considering the implications of this reform agenda, and will work with its portfolio agencies and the industry in developing plans to ensure it is able to respond accordingly.

Appendix A: Research, statistical and other non-investigation publications released in 2008-09

All of the reports are available on the Bureau's website <www.atsb.gov.au> or can be obtained by telephoning 1800 020 616.

2008-09 Rail statistics report

Australian Rail Safety Occurrence Data, 1 January 2001 to 31 December 2008

This report tables rail safety occurrence data by state and territory between 1 January 2001 and 31 December 2008. Data is adjusted annually to reflect new information that comes to light during the reporting period. There is a lag period of approximately three to four months between the end of the reporting period and publication of these data. Previous versions of this publication should be discarded. These data are presented as counts and normalised using kilometres travelled and number of track kilometres. Data presented in this report between 1 January 2001 and 30 June 2008 conforms to Standard No. ON-S1: Occurrence Categories and Definitions; data from 1 July 2008 onwards conforms to Guideline No. OC-G1: Guideline for the Top Event Classification of Notifiable Occurrences. This report excludes tram and light rail or monorail operations.

2008-09 Aviation safety research and analysis reports

Staying Safe during an Aircraft Depressurisation: Passenger Information Bulletin

Although aircraft pressurisation occurrences are rare, events over the years have proven that passengers may be involved in a depressurisation accident or incident. This information bulletin, the first in a series, will help ensure that passengers can recognise and appropriately react to an aircraft depressurisation if one should occur. The bulletin provides a general overview of aircraft depressurisation events – why they occur, the crew's response, and what passengers should do if they are involved in such an event.

An Overview of Human Factors in Aviation Maintenance

The aviation industry could not function without the contribution of maintenance personnel, yet maintenance error is a significant and continuing threat to aviation safety. In the past, maintenance errors were often viewed as nothing more than failures of individuals to perform their assigned tasks,

and organisations often responded with punishment or dismissal. There is now worldwide recognition that maintenance errors reflect the interplay of personal, workplace, and organisational factors. This report provides an overview of the human factors issues facing aviation maintenance personnel. Authored by Dr Alan Hobbs, a leading authority on maintenance human factors, this educational report was written for aircraft maintenance engineers, managers and trainers. The report contains information on human limitations, how maintenance errors can be minimised, and how errors that are made can be captured before they lead to incidents and accidents.

Aircraft Depressurisation: Cabin crew information bulletin

In December 2008, the ATSB released the first in a collection of information bulletins on aircraft depressurisation. This information bulletin, the second in the series, was designed for cabin crew members and provides an overview of aircraft depressurisation events, highlighting key information that cabin crew should know in the event of an aircraft depressurisation or failure to pressurise. The aim of this bulletin is to increase cabin crew's knowledge about depressurisations and to supplement their airline's emergency procedures.

The safety bulletin also provides additional information on the common physical effects of depressurisation and how to use an oxygen mask.

Runway excursions: Part 1 – A worldwide review of commercial jet aircraft runway excursions

Over the last decade there has been a noticeable reduction in the number of non-fatal and fatal accidents involving the worldwide commercial jet aircraft fleet. Despite this, runway excursions continue to remain prevalent, accounting for approximately a quarter of all incidents and accidents in air transport, and 96 per cent of all runway accidents. Overruns and veer-offs – collectively termed runway excursions – have gained significant media attention and brought this issue very much into the public eye due to the catastrophic consequences to life and property often associated with such accidents. This report, the first in a two-part series, provides a statistical picture of runway excursion accidents over a 10-year period (1998 to 2007) involving the worldwide commercial jet aircraft fleet; how frequently they occur, why they occur, and what factors contributed to those accidents.

Trends in immediately reportable matters involving charter operations 2001 to 2006

In December 2007, the ATSB released a research report that examined immediately reportable matters (IRMs) involving regular public transport (RPT) operations. The purpose of this report was to inform the aviation community of any important safety trends, and to provide the travelling public with a better appreciation of the types of occurrences that are reported to the ATSB. To present a complete picture of air transport operations, which encompasses both RPT and charter operations, the ATSB conducted a follow on study that reviewed IRMs in charter operations for the period 1 January 2001 to 31 December 2006.

Similar to the previous report, a subset of generally more serious IRMs was reviewed.

The results of this study provided encouraging data on the charter accident rate, emphasised the stability of the rate of airspace related occurrences, and the rarity of uncontained engine failures and crew incapacitation in charter operations.

Aviation statistics: 1 January 1999 to 31 March 2009

Each year, the ATSB receives accident and incident notifications from pilots, airline operators, air traffic control, maintenance personnel, and emergency services authorities. The reporting of these aviation accidents and incidents, collectively termed occurrences, assists the ATSB in monitoring safety through its core function of independent investigations, and the analysis of data to identify emerging trends. The purpose of this report is to provide both the aviation community and members of the general public with an overview of the number and types of occurrences reported to the ATSB during the period 1 January 1999 to 31 March 2009.

Threat and Error Management: Attitudes towards training and applicability of TEM to general aviation and low capacity air transport operations

The threat and error management (TEM) model provides a non-technical tool to help pilots identify and manage threats (hazards) and errors during flight. From 1 July 2009, TEM became part of the Civil Aviation Safety Authority's pilot licence testing in Australia. In preparation for these requirements, the Guild of Air Pilots and Air Navigators (GAPAN) developed a TEM 'train-the-trainer' course for general aviation and low capacity air transport operations. Between August and October 2007, GAPAN conducted TEM training in 10 locations throughout Australia. Two surveys were administered to TEM course participants by the ATSB: one immediately after the training session and the other about 8 months after the training. This report reviewed the appraisals of the course participants about the concept of TEM and investigated whether the participants had implemented TEM training since the course and the reasons behind this.

Runway excursions, Part 2: Minimising the likelihood and consequences of runway excursions, An Australian perspective

While most runway excursions are relatively minor, with no serious injuries or aircraft damage occurring, they do have the potential to pose a serious risk to public safety and infrastructure. This was illustrated by several significant runway overruns around the world in 2007 and 2008, resulting in hundreds of on-board fatalities, as well as ground fatalities and significant property damage in communities adjacent to airports. This report discussed the impact of runway excursion accidents on communities located near airports across the world, and the risk controls that have been or could be put in place to minimise the likelihood of an excursion occurring, or mitigate its consequences if one did occur, with a particular focus on Australia.

Amateur-built and experimental aircraft – Part 1: A survey of owners and builders of VH- registered non-factor aircraft

In the last three decades, both in Australia and overseas, there has been significant growth in the number of amateur-built and experimental (ABE) aircraft. While these aircraft continue to increase in popularity, there has been little formal study of them in Australia and worldwide. Operational and demographic data on ABE aircraft are largely incomplete in comparison to data held for other types of aircraft. This report examines non-factory amateur-built and experimental aircraft in Australia. Data for this report was gathered using a survey distributed to owners of VH-registered ABE aircraft. It focussed on choice of aircraft, construction and modifications, test flights, transition training, and maintenance. This report provides a valuable reference point for aircraft operators, those considering ABE aircraft, aviation regulators, and aircraft associations.

Australian Aviation Safety in Review: 1998 to 2007

In June 2009, the ATSB produced its third edition of *Australian Aviation Safety in Review*. The Review has been developed to provide a readily accessible analysis of the Australian aviation industry, with a major focus on communicating the key safety trends. This publication covers the major aircraft operational categories of passenger transport (regular public transport and charter) and general aviation. Sport and recreational aviation is also discussed, as is the burgeoning trend towards amateur-built and experimental aircraft. Demographic and activity data on Australian aviation is presented to provide a context within which to examine accident and incident (occurrence) trends. A new feature of this edition is a 10-year look at safety trends, focusing on total occurrences, all accidents, and fatal accidents separately. An exploration behind what occurred (occurrence types) and why they occurred (safety factors) is also a major focus of this edition.

Aviation safety articles in CASA's *Flight Safety Australia* (including ATSB supplement)

July-August 2008

- Executive Director's message – Direct reporting for major airlines & ICAO's wake turbulence categorisation scheme
- Research Report: Fibre composite research
- Strikemaster in-flight break-up
- Safety Briefs (navigation event, engine power loss, engine power less, engine failure, VFR flight into IMC, crew incapacitation)
- REPCON briefs (In-flight airframe vibrations, LAME schedule of experience, ATC short breaks, airport safety concerns, low level aerobatics)

September-October 2008

- Executive Director's message – Qantas flight QF30 explosive decompression
- Research Report: An analysis of birdstrikes
- Engine in-flight shutdown
- Safety Briefs (in-flight turbulence, breakdown of separation, electrical system event, depressurisation, loss of control, in-flight malfunction)
- REPCON briefs (non-directional beacon performance, LAME schedule of experience, design tailing-edge flap drive torque tubes, aircraft pushback procedures)

November-December 2008

- Executive Director's message – Review of the past financial year
- Research Report: Reporting trends in airline operations
- Airprox event
- Safety briefs (fumes event, hydraulic system event, In-flight engine failure, In-flight engine failure, In-flight engine malfunction, main rotor blade skin separation)
- REPCON briefs (Recreational Aviation Australia (RA-Aus) aircraft propellers, operator maintenance human factor training, engine failure during takeoff, helicopter operation at a caravan park)

January-February 2009

- Executive Director's message – Eighth ICAO Accident Investigation and Prevention (AIG) Divisional meeting.
- Research Report: An overview of human factors in aviation maintenance
- Wirestrike
- Safety briefs (fumes event, collision with terrain, engine failure and ditching, operational event, warning device event, collision with terrain)
- REPCON brief (close proximity of two aircraft)

March-April 2009

- Executive Director's Message – National Aviation Policy Green and White papers
- Research Report: Aircraft depressurisation – What cabin crew need to know
- Cirrus changes parachute system design
- Safety briefs (collision with terrain, collision with water, loss of control, uncontained engine starter failure, rotor strike, collision with terrain)
- REPCON briefs (operator maintenance human factors training – update, engine failure during takeoff – update, catering loading procedures)

May-June

- Executive Director's Message – Varanus Island pipeline inquiry
- Research Report: Runway excursions
- Fuel mismanagement issues
- Safety briefs (controlled flight into terrain, loss of control, breakdown of separation, collision with terrain, warning placards, collision with terrain)
- REPCON briefs (arrival procedures, aerodromes in close proximity with the same frequency, unsecured baggage on a commercial flight, Traffic Information Broadcast by Aircraft (TIBA) procedures

ATSB transportation safety articles in the Safety Institute of Australia's Australian Safety & Health Matters

August - September 2008

- Level crossing safety

October - November 2008

- Confidential reporting

December 2008 – January 2009

- Working together in the interests of safety

February 2009

- Pasha Bulker

Appendix B: Investigations completed in 2008-09 by mode

Rail investigations completed in 2008–09

Investigation Number	Date	Description	Location	Registration	Report Release Date
RO-2007-007	16-Nov-07	Level Crossing	Virginia, SA	Train 6117	14-Jul-08
RO-2007-001	10-Mar-07	Collision	Back Creek, NSW	3835	31-Jul-08
RO-2008-003	11-Mar-08	SPAD (signal passed at danger)	Gloucester, NSW	Train 2WB3	15-Aug-08
RO-2007-005	6-Aug-07	Level Crossing	Two Wells, SA	Train 7DA8	20-Aug-08
RO-2008-006	22-Apr-08	Derailment	near Manton Dam, NT	Train 3DM4	5-Mar-09
RO-2008-002	10-Mar-08	Derailment	Hines Hill, WA	Train 6MP9	26-Mar-09
RO-2008-004	30-Mar-08	Derailment	Pura Pura, Vic	1MA6Q	19-Jun-09
RO-2009-001	1-Jan-09	LX collision	Mundoo, Qld	Train 3936	22-Jun-09
RO-2008-012	4-Nov-08	Derailment	Katherine, NT	Train 3DA2	26-Jun-09
RO-2007-006	17-Aug-07	Derailment	Stewart, WA	Train 6413	26-Jun-09
RO-2007-008	13-Dec-07	Collision	Virginia, SA,	4SA8	27-Jun-08
RO-2007-003	22-May-07	Derailment	Roopena, SA	3MR2	30-Jun-08

Note: While the ATSB's work on RO-2009-001 was completed on 22 June, 2009, it was not released by Queensland Transport until 13 August, 2009.

Marine investigations completed in 2008–09

Investigation Number	Date	Description	Location	Registration	Report Release Date
242	16-May-07	Close quarters	South Channel Port Phillip Bay, Vic.	*Ormiston/ Searoad Mersey*	23-Jul-08
248	2-Dec-07	Grounding	Gladstone, Qld	*Endeavour River*	3-Sep-08
247	30-Nov-07	Collision	Off Mooloolaba, Qld	*Namhae Gas/ Rexandra*	25-Sep-08
246	25-Aug-07	Fatality	Coral Sea, Qld	*Geosounder*	6-Nov-08
252-MO-2008-005	23-Feb-08	Grounding	Devonport, Tas.	*Van Gogh*	7-Nov-08
241	10-May-07	Grounding	Grassy Harbour, King Island, Tas.	*Enterprise*	27-Jan-09
253-MO-2008-004	31-Mar-08	Engine Room Fire	Off West Australian coast	*MSC Lugano*	5-Feb-09
254-MO-2008-006	9-May-08	Grounding	Port Phillip, Vic.	*Francoise Gilot*	20-May-09
255-MO-2008-007	15-Jul-08	Grounding	Off Albany, WA	*Atlantic Eagle*	21-May-09
249-MO-2008-001	21-Jan-08	Collision	Off Bowen, Qld	*Allena/ Northern Fortune*	3-Jun-09

Aviation investigations completed in 2008–09

Investigation Number	Date	Description	Location	Registration	Report Release Date
AE-2008-028	21-Dec-07	Collision	12 km SE Bindoon ALA, WA	24-4148	17-Jul-08
AO-2007-006	17-May-07	Aircraft Separation	Port Macquarie, NSW	VH-TQP/ VH-ILS/ 24-4422	28-Aug-08
AE-2008-040	6-Mar-08	Airframe	Wamena Airport, Irian Jaya, Indonesia	PK-VTQ	22-Sep-08
AO-2007-031	5-Aug-07	Fumes Event	Sydney Airport, NSW	VH-RXX	23-Sep-08
AO-2006-154	28-Feb-06	Warning Devices	39km NNW EROPA	VH-NXH	26-Sep-08
AO-2007-063	23-Nov-07	Fumes Event	19km East of Melbourne, Vic.	VH-OGG	26-Sep-08
AO-2008-017	1-Mar-08	Collision	7 km NNW, Hornsby, NSW	VH-NBP	3-Oct-08
AO-2007-009	26-May-07	Collision	near Esperance Aerodrome, WA	VH-FTT	17-Oct-08
AO-2007-007	23-May-07	Collision	15NM SW Warraber Island, Torres Strait	VH-PYD	27-Oct-08
AO-2007-004	25-Apr-07	Aircraft Separation	Princess Charlotte Bay, Qld	VH-YJD/ VH-FGW	29-Oct-08
AO-2007-058	10-Nov-07	Collision	20 km north of Elliott, NT	VH-WLQ	30-Oct-08
AO-2007-032	7-Aug-07	Fuel Related	Perth, WA	VH-NJT	5-Nov-08
AO-2008-002	31-Dec-07	Significant Event	Melbourne Airport, Vic.	VH-VQT	14-Nov-08
AE-2008-061	1-Sep-08	Collision	Watts Bridge Memorial Airfield, Qld	VH-KPK	14-Nov-08
AO-2006-002	9-Dec-06	Collision	56km E Collarenebri, NSW	VH-CJZ	3-Dec-08
AO-2007-052	24-Oct-07	Powerplant / Propulsion	Darwin Aerodrome, NT	VH-QPE	5-Dec-08
AO-2006-006	20-Dec-06	Collision	5NM northeast Mt Gambier, SA	VH-LFK	8-Dec-08
AO-2007-026	24-Jul-07	Collision	Maryfield Station, NT	VH-VHQ	19-Dec-08
AE-2008-011	22-Jan-02	Collision	Gaborone Airport, Botswana	A2-HDB	22-Dec-08
AO-2007-018	5-Feb-07	Powerplant / Propulsion	Cecil Park, NSW	VH-HYY	24-Dec-08
AO-2007-061	17-Nov-07	Collision	24 km SE Inverloch, Vic.	VH-CHU	5-Jan-09
AO-2007-060	15-Nov-07	Collision	Uaroo Station, Pilbara, WA	VH-TCS	16-Jan-09

Aviation investigations completed in 2008–09

Investigation Number	Date	Description	Location	Registration	Report Release Date
AO-2007-049	18-Oct-07	Powerplant / Propulsion	102km N Adelaide, SA	VH-TMP	23-Jan-09
AO-2006-001	31-Oct-06	Collision	Raglan, Qld	VH-ZGZ	27-Jan-09
AE-2008-054	27-Jul-08	Ground Operations	Honiara Aerodrome, Soloman Islands	VH-SWO	28-Jan-09
AO-2007-035	15-Aug-07	Significant Event	145 km W Cunnamulla, Qld	PK-GPF	2-Feb-09
AO-2007-037	16-Aug-07	Collision	24 km S Tully, Qld	VH-XMN	3-Feb-09
AO-2008-021	18-Mar-08	Collision	Camden Airport E/6 km, NSW	VH-NUK	10-Feb-09
AO-2007-003	8-May-07	Aircraft Separation	19 km WSW of Sydney Airport, NSW	VH-OGI/ VH-OLL	12-Feb-09
AO-2008-058	23-Aug-08	Collision	Mataranka Township Aerodrome, NT	VH-HPY	12-Feb-09
AO-2007-023	14-Jul-07	Significant Event	Sydney, NSW	ZK-PBF	18-Feb-09
AO-2007-039	27-Aug-07	Systems	39 km W Mildura, NSW	VH-SGA	25-Feb-09
AO-2008-050	28-Jul-04	Collision	34 km SE Benalla, Aero., Vic.	VH-TNP	2-Mar-09
AO-2007-025	23-Jul-07	Systems	7 NM North, Adelaide, SA	VH-FKZ	3-Mar-09
AO-2006-005	16-Dec-06	Powerplant / Propulsion	Mount Isa, Qld	VH-UYA	4-Mar-09
AO-2007-045	13-Oct-07	Collision	Sydney Aerodrome, NSW	VH-EEB	10-Mar-09
AO-2007-011	31-May-07	Systems	6 km south of Ballarat, Vic.	VH-XCB	18-Mar-09
AO-2008-022	3-Apr-08	Fuel Related	Brampton Island, Qld	VH-ZMP	20-Mar-09
AE-2008-051	13-Jul-08	Collision	12km NE New Moon ALA, Qld	19-5046	26-Mar-09
AO-2007-028	22-Jul-07	Significant Event	Near Palmer River HLS, Qld	VH-ESB	30-Mar-09
AO-2007-030	25-Jul-07	Powerplant / Propulsion	23 km NNE Ardrossan, SA	VH-OAA	1-Apr-09
AO-2008-048	17-Jul-08	Collision	Mount Isa Aero 342 deg/24 km, Qld	VH-IHR	2-Apr-09
AO-2007-024	13-Jul-07	Significant Event	56km SSW Newman, WA	VH-NXK	6-Apr-09
AO-2008-060	2-Sep-08	Fuel Related	Brisbane NE 50NM, Qld	VH-SXK	8-Apr-09

Aviation investigations completed in 2008–09

Investigation Number	Date	Description	Location	Registration	Report Release Date
AO-2007-034	13-Aug-07	Significant Event	148 km SE Rockhampton, Qld	VH-VBR	14-Apr-09
AO-2006-153	2-Dec-06	Aircraft Control	50 km north of Cairns, Qld	VH-BTD	6-May-09
AO-2008-082	25-Dec-08	Collision	25 km WNW of Leongatha, Vic.	VH-ROO	7-May-09
AO-2007-069	29-Dec-07	Collision	near Westgate Bridge (VFR), Vic.	VH-MEB	8-May-09
AO-2008-056	10-Aug-08	Aircraft Control	Melbourne Airport 90 deg M/22 km, Vic.	VH-ZHA	21-May-09
AO-2008-013	25-Feb-08	Significant Event	Cullin, 270 degrees/93 km, NSW	VH-EBY	29-May-09
AO-2007-038	27-Aug-07	Aircraft Separation	Townsville Airport, Qld	VH-TIX	1-Jun-09
AO-2007-041	29-Aug-07	Aircraft Separation	Adelaide Airport, SA	VH-ZLR	2-Jun-09
AO-2008-005	14-Jan-08	Powerplant / Propulsion	Townsville Airport, Qld	VH-PSQ	5-Jun-09
AE-2008-041	26-Apr-08		Levroux, France		12-Jun-09
AO-2008-049	17-Jul-08	Failure to comply with ATC clearance/ instruction	Sydney Airport, NSW	RP-C3333	16-Jun-09
AO-2007-027	22-Jul-07	Powerplant / Propulsion	Near Ketut (IFR), Indonesia	VH-EBE	17-Jun-09
AO-2008-004	11-Jan-08	Significant Event	near Brisbane Airport, Qld	VH-OBN	17-Jun-09
AO-2008-001	31-Dec-07	Significant Event	Port Moresby, PNG	VH-OZX	23-Jun-09
AO-2008-015	26-Feb-08	Collision	Kalumburu Aerodrome, WA	VH-KUZ	23-Jun-09
AO-2008-037	28-May-08	Communications	19 km NNE of Perth Airport, WA	PK-GGE	23-Jun-09
AE-2008-066	27-Aug-08	Collision	Sumatra, Indonesia	PK-CJG	23-Jun-09
AO-2008-074	23-Oct-08	Significant Event	Brisbane Airport, Qld	VH-NJM	23-Jun-09
AO-2006-007	27-Nov-06	Powerplant / Propulsion	50 NM north of Perth, WA	VH-XDB	24-Jun-09
AE-2008-029	7-Mar-08	Technical Analysis assistance to the RA-Aus regarding CH601XL accident	22 km NNE Gold Coast Airport, Qld	VH-ZRS	24-Jun-09
AO-2008-032	8-May-08	Systems	Camden Aerodrome W/19 km, NSW	VH-MWY	24-Jun-09

Aviation investigations completed in 2008–09

Investigation Number	Date	Description	Location	Registration	Report Release Date
AO-2008-073	16-Oct-08	Aircraft Separation	Mackay Aerodrome, Qld	VH-UZA, VH-EEO	24-Jun-09
AO-2008-035	15-May-08	Collision	Abingdon Downs Airstrip, Qld	VH-IDM	25-Jun-09
AO-2008-046	6-Jul-08	Airframe	Orange, NSW	VH-ZLC	25-Jun-09
AO-2007-066	7-Dec-07	Collision	Lake Liddell, NSW	VH-LIS	25-Jun-09
AO-2007-002	19-Apr-07	Aircraft Separation	157km East of Darwin Aero., NT	VH-AZJ, VH-TFF	25-Jun-09
AO-2008-020	12-Mar-08	Regulations & Standard Operating Procedures	Launceston Airport, Tas.	VH-VQY	25-Jun-09
AO-2008-010	13-Feb-08	Collision	Gascoyne Junction 344deg/54 km, WA	VH-ZDP	26-Jun-09
AO-2008-025	9-Apr-08	Collision	Townsville, Qld	VH-PLU	29-Jun-09
AO-2007-055	4-Nov-07	Regulations & Standard Operating Procedures	Melbourne Aerodrome, Vic.	HS-TJW	29-Jun-09
AI-2007-010	29-May-07	Warning Devices	Lockhart River Aerodrome, Qld	N/A	29-Jun-09
AO-2008-033	8-May-08	Significant Event	Perth Airport, WA	PK-GEF	30-Jun-09
AE-2008-031	10-Mar-08	Aircraft Control	Batam Airport, Riau Islands, Indonesia	PK-KKT	30-Jun-09
AE-2008-047	7-Jul-08	Systems	Polonia International Airport, Medan Indonesia	PK-YVE	30-Jun-09
AE-2009-020	14-Apr-09	Systems	Jakarta, Indonesia	PK-GSH	30-Jun-09

Appendix C: Transport Safety Recommendations and Safety Advisory Notices issued in 2008-09

Transport Safety Recommendations and Safety Advisory Notices Issues in 2008-09

	Safety Actions	Safety Advisory Notices	Recommendations
Aviation	132	3	1
Marine	35	7	10
Rail	18	0	14

Appendix D: Investigations underway by mode as at 30 June 2009

Rail investigations underway at 30 June 2009

Investigation Number	Date	Occurrence Type	Location	Train Type
RO-2009-005	23-Mar-2009	LX collision	Moorine Rock, WA	Freight Train
RO-2009-004	30-Jan-2009	Derailment	Tottenham, Vic.	Freight Train
RO-2009-003	30-Jan-2009	Derailment	Golden Ridge, WA	Freight Train
RO-2009-002	14-Jan-2009	SafeWkg Irreg/Breach	Tarana, NSW	Passenger Train
RO-2008-014	27-Nov-2008	LX collision	Rungoo, Qld	Passenger Train
RO-2008-013	11-Nov-2008	Derailment	Loongana, WA	Freight Train
RO-2008-010	1-Sep-2008	Rollingstock Irreg	Mt Christie, SA	Freight Train
RO-2008-009	31-Jul-2008	Derailment	Winton, Vic.	Freight Train
RO-2008-005	19-Apr-2008	Track&Civil Infra Irreg	Bates, SA	Freight Train
RO-2008-001	5-Mar-2008	LX collision	Birkenhead, SA	Freight Train

Marine investigations underway at 30 June 2009

Investigation Number	Date	Occurrence Type	Location	Vessels
MO-2009-004	21-May-09	Fatality	360 miles off coast of WA	Thor gitta
MO-2009-003	16-Apr-09	Collision	Groote Eylandt, NT	F&k/jolly roger
MO-2009-002	11-Mar-09	Cargo loss /oil spill	Off Cape Moreton, Qld	Pacific adventurer
MO-2009-001	7-Feb-09	Grounding	Torres Strait, Qld	Atlantic blue
MO-2008-013	24-Dec-08	Fatality	Legendre Field, WA	Karratha spirit
MO-2008-012	13-Dec-08	Anchor fouled gas pipe	Port Phillip , Vic.	Apl sydney
MO-2008-011	24-Nov-08	Fatality	Townsville, Qld	Spirit of esperance
MO-2008-010	18-Nov-08	Serious injury	Off Newcastle, NSW	Saldanha
MO-2008-009	27-Oct-08	Flooding	Port Kembla, NSW	Great majesty
MO-2008-008	31-Jul-08	Grounding	Port Hedland, WA	Iron king
MO-2008-003	12-Feb-08	Grounding	Cocos islands	Breakthrough

Aviation investigations underway at 30 June 2009

Investigation Number	Date	Occurrence Type	Location	Aircraft
AI-2006-003	3-Jul-06	Engine power loss event and pilot decision making	N/A	N/A
AO-2007-001	15-Apr-07	Significant Event	Sydney Aerodrome, NSW	VH-OJR
AO-2007-008	24-May-07	Powerplant / Propulsion	Fitzroy Crossing Aero, WA	VH-IWO
AO-2007-017	26-Jun-07	Powerplant / Propulsion	Jundee Aerodrome, WA	VH-XUE
AO-2007-044	21-Jul-07	Aircraft Control	Melbourne Aerodrome, Vic.	VH-VQT
AO-2007-029	31-Jul-07	Collision	37 km NNE Melbourne, Vic.	VH-YJB
AO-2007-036	11-Aug-07	Fuel-Related	50 kms NW of Swan Hill, Vic.	VH-TJE
AO-2007-046	25-Sep-07	Collision	Doongan (ALA), WA	VH-HCN
AO-2007-047	17-Oct-07	Collision	Lake Yeo (VFR), 060deg M 65 Km, WA	VH-WXC
AO-2007-062	17-Nov-07	Systems	overhead Tamworth Aerodrome, NSW	VH-VBC
AO-2007-064	25-Nov-07	Significant Event	Brisbane Aerodrome, Qld	HB-IKR
AO-2007-065	1-Dec-07	Collision	Latrobe Valley Aerodrome, Vic.	VH-EUI/28-0929
AO-2007-070	29-Dec-07	Significant Event	Norfolk Island Aerodrome, NSW	VH-OBN
AO-2008-003	7-Jan-08	Systems	near Bangkok Intl Airport, Thailand	VH-OJM
AO-2008-006	7-Feb-08	Ground Operations	Tamworth, NSW	VH-TQZ
AO-2008-007	7-Feb-08	Aircraft Control	Darwin Airport, NT	VH-NXE
AO-2008-008	11-Feb-08	Powerplant / Propulsion	Jabiru Airport, NT	VH-VAZ
AO-2008-009	12-Feb-09	Aircraft Control	Thangool, Qld	VH-UZD
AO-2008-014	26-Feb-08	Collision	Wee Waa, NSW	VH-CJK/VH-ATB
AE-2008-024	8-Apr-08	Engine Power Loss	Brookhan Aerodrome, UK	G-CEFY
AO-2008-026	9-Apr-08	Collision	Sydney Airport 151 deg M/19km, NSW	VH-OZA
AO-2008-030	1-May-08	Aircraft Separation	Launceston, Tas	VH-VOQ/VH-VQS
AI-2008-038	30-May-08	Safety Issue Investigation	Qld	N/A

Aviation investigations underway at 30 June 2009

Investigation Number	Date	Occurrence Type	Location	Aircraft
AO-2008-039	19-Jun-08	Airframe	Wollongong Aerodrome, NSW	VH-UAH
AO-2008-043	18-Jun-08	Collision	False Cape, Qld	VH-RYW
AO-2008-042	20-Jun-08		Lockhart River, Qld	VH-QOA
AO-2008-052	25-Jul-08	Powerplant / Propulsion	Darwin Airport, NT	VH-ZMK
AO-2008-053	25-Jul-08	Airframe	Near Manila Philippines (Int'l Waters)	VH-OJK
AO-2008-059	27-Aug-08	Collision	Near Moorabbin Airport, Vic.	VH-UPY/ VH-CGT
AO-2008-062	14-Sep-08	Collision	Purnululu ALA NE M/5 km, WA	VH-RIO
AO-2008-063	14-Sep-08	Collision	Tamworth Airport SE M/69 km, NSW	VH-JDQ
AO-2008-064	20-Sep-08	Warning Devices	Alice Springs Airport, NT	VH-NXE
AO-2008-065	24-Sep-08	Collision	Near Hoxton Park Aerodrome, NSW	VH-CZX
AO-2008-067	25-Sep-08	Powerplant / Propulsion	Talbot Bay (ALA), 92° M/5 km, WA	VH-NSH
AO-2008-068	19-Sep-08	Powerplant / Propulsion	Hoxton Park Aerodrome SE M/6 km, NSW	VH-BUK
AO-2008-069	29-Sep-08	Collision	Clifton (ALA) 070 deg M 19 km, Qld	VH-FXE
AO-2008-070	7-Oct-08	Aircraft Control	154 km west of Learmonth, WA	VH-QPA
AO-2008-072	15-Oct-08	Collision	Elcho Island, 170 deg M 20 km, NT	VH-WRT
AO-2008-076	7-Nov-08	Collision	3 km N Bathurst Aerodrome, NSW	VH-OPC
AO-2008-077	3-Nov-08	Aircraft Control	Sydney Aerodrome 160deg M 13 km, NSW	VH-ORX
AO-2008-078	19-Nov-08	Collision	Murray Bridge, 030 deg M 8 km, SA	VH-PLJ
AO-2008-080	17-Dec-08	Failure to comply with ATC clearance/instruction	Darwin Aerodrome, NT	PK-GZJ
AO-2008-081	18-Dec-08	Collision	10 Km W of Bankstown aerodrome, NSW	VH-FMG/ VH-XLY
AO-2008-083	25-Dec-08	Collision	Scone Aerodrome, NSW	VH-EKS
AO-2008-084	29-Dec-08	Collision	Nyngan, NSW	VH-IGT

Aviation investigations underway at 30 June 2009

Investigation Number	Date	Occurrence Type	Location	Aircraft
AO-2009-001	12-Jan-09	Significant Event	Sydney Aerodrome, NSW	VH-TQL
AO-2009-002	13-Jan-09	Airframe	Ambalindum Station, NT	VH-HZB
AO-2009-003	16-Jan-09	Powerplant / Propulsion	Gayndah (NDB), Qld	VH-UYI
AO-2009-004	6-Feb-09	Warning Devices	Townsville 123 deg M 74 km, Qld	VH-ESH
AO-2009-006	6-Feb-09	Airframe	Sydney Aerodrome, NSW	VH-KDQ
AO-2009-005	7-Feb-09	Collision	Parafield Aerodrome, SA	VH-YTG
AO-2009-007	11-Feb-09	Collision	Townsville Aerodrome, Qld	VH-SBW
AI-2009-008	20-Feb-09	Partial power Loss	darwin Airport, NT	VH-TFX
AO-2009-009	24-Feb-09	Collision	Normanton Aerodrome SW 120 km, Qld	VH-DAC
AO-2009-011	6-Mar-09	Aircraft Loading	Sydney Aerodrome, NSW	VH-QPJ
AO-2009-012	20-Mar-09	Significant Event	Melbourne Airport, Vic.	AG-ERG
AO-2009-010	2-Apr-09	Collision	Proserpine, Qld	VH-YDA
AO-2009-013	7-Apr-09	Systems	Sydney Aerodrome, NSW	VH-VYL
AE-2009-014	16-Apr-09	Collision	near Wamena Airport, West Papua, Indonesia	PK-BRD
AE-2009-015	17-Apr-09	Aircraft Control	Hang Nadim Intern'l Airport, Indonesia	PK-RAR
AO-2009-017	20-Apr-09	Collision	Edenhope (ALA) 210 deg M 27 km, Vic.	VH-EZT
AO-2009-019	3-May-09	Powerplant / Propulsion	Rolleston (ALA), Qld	VH-IDU
AO-2009-018	5-May-09	Collision	Halls Creek Aerodrome N M 50 km, WA	VH-HCB/ VH-PHT
AO-2009-021	18-May-09	Airframe	South of Mackay, Qld	VH-VNC
AO-2009-022	21-May-09	Precautionary Landing	Canberra Aerodrome, 63 km	VH-WAL
AO-2009-024	29-May-09	Significant Event	Darwin Aerodrome, NT	VH-NXM
AO-2009-025	9-Jun-09	Significant Event	near Gold Coast Aerodrome, Qld	VH-VBL

Aviation investigations underway at 30 June 2009

Investigation Number	Date	Occurrence Type	Location	Aircraft
AO-2009-026	10-Jun-09	Significant Event	Dreamworld (HLS), Qld	VH-JTI
AO-2009-027	11-Jun-09	Significant Event	Guam International Airport	VH-EBF
AE-2009-028	12-Jun-08	ATSB assistance to the Civil Aviation Safety Authority - Technical examination of failed engine crankcase through-bolts	N/A	-
AO-2009-029	22-Jun-09	Weather / Environment	near Kota Kinabalu, Malaysia	VH-QPI
AO-2009-030	24-Jun-09	Wirestrike	near Albury Aerodrome, NSW	VH-CAP
AO-2009-031	25-Jun-09	Collision with Terrain	Paraburdoo Aerodrome, 120 km, WA	VH-HXD

Appendix E: Investigation priorities and classification

Investigation types

There are four main types of safety investigations that the ATSB conducts:

- occurrence investigations
- safety issue investigations
- safety research investigations
- external assistance investigations.

Occurrence investigations

Occurrence investigations are those in which the ATSB investigates the circumstances associated with a specific transport safety matter. These investigations can vary greatly in terms of their depth and scope, based on the occurrence levels 1 to 4. These investigations also involve the investigation of the safety issues associated with the occurrence. However, if a safety issue is significant, complex, and not a central feature of the occurrence, then a separate safety issue investigation may be initiated. Occurrence investigations are the most common types of investigations conducted by the ATSB and include investigations with a technical analysis focus.

Note: Only a small proportion of occurrences reported to the ATSB are investigated each year (approximately 80 aviation occurrences, 10 rail, and 10 marine occurrences).

Safety issue investigations

The ATSB becomes aware of potential safety issues in a number of different ways. Usually it is through the result of an occurrence investigation, initiated after the ATSB receives notification of an occurrence. In general, there are two main types of safety issue investigations:

- Broad investigations into complex systems based on one or more events. Broad investigations are resource intensive, and therefore they are only initiated in special circumstances. They would typically be Level 2 or Level 3 investigations.
- More focused investigations into specific safety issues identified during occurrence investigations or based on other information. In general, focused investigations are usually addressed within occurrence investigations, but in special circumstances are addressed as a separate safety investigation. They would typically be Level 3 or Level 4 investigations.

Safety research investigation

Safety research investigations can be conducted to examine a wide range of factors influencing or associated with safety, they can range from:

- reviews of occurrence statistics
- reviews of literature/research already conducted on a particular topic
- broad surveys of personnel in some area of transport safety
- the collection and analysis of data about a specific topic.

Safety research investigations can identify safety issues and produce safety recommendations, but in general they are designed to provide information to enhance safety rather than focus on identifying specific safety issues.

External assistance investigation

The ATSB also conducts a range of investigation activities to support investigations conducted by other investigation agencies. These activities may involve ATSB investigators acting as accredited representatives to an overseas investigation, or providing technical assistance in a specialised

area to support an overseas or external investigation. External assistance investigations vary greatly in terms of their scope. They can be classified as Level 1, 2, 3 or 4 based on their importance, safety enhancement benefit, and resource implications. These classifications are based primarily on the extent of the ATSB involvement rather than the nature of the occurrence itself. Consequently, it is very unlikely that there would be a Level 1 technical assistance investigation. ATSB investigators may become involved in assisting with a range of investigation activities for other organisations. The extent to which the ATSB guidelines apply to such an investigation depends on the terms of reference and the ATSB investigator's responsibilities and duties associated with the investigation. The terms of reference, responsibilities and duties should to be clearly defined prior to the investigator becoming involved.

Investigation levels

The ATSB uses five levels made up of four 'investigation' levels and one 'non investigation' level. The investigation levels are defined by the level of resources and/or the complexity and time required for completing the investigation. A description of each level is provided below under each mode.

Rail

The *Transport Safety Investigation Act 2003* and the ATSB Safety Investigation Quality System forms the basis of procedures followed by the Bureau.

Decision guidelines for accident/incident classification

The ATSB is resourced each year to undertake a finite number of rail investigations on the Defined Interstate Rail Network (DIRN). It is acknowledged, however, that an occurrence with a large number of deaths (not including an occurrence that was primarily a road accident) would represent a major accident and supplementary funding may be required.

In classifying rail transport safety matters and selecting which of those the ATSB should investigate, the decision-makers must consider:

1. The potential safety value that may be gained by conducting an investigation
2. On board fatalities and/or serious passenger injuries
3. The public profile of the occurrence
4. The extent of resources available and projected to be available; and, in the event of conflicting priorities
    - Any risks associated with not investigating
    - The requirement under s21(2) of the TSI Act for the Executive Director to publish reasons (justification) for discontinuing an investigation where an investigation has already commenced.

The following broad hierarchy should also be taken into account when making the decision to initiate and classify an investigation:

1. Passenger operations
2. Freight and other commercial operations
3. Non-commercial operations.

The decision to investigate will also have regard as to whether, in the absence of an ATSB investigation, a credible safety investigation is likely.

In view of these considerations, initiation of a formal ATSB investigation can only be made at or above Team Leader level after discussion and agreement with the Director and Executive Director. Each investigation will be classified on a scale of 1 – 5 (see below).

Following the initial assessment of a rail transport safety matter a decision will be made whether or not to conduct a field investigation. Unless otherwise agreed by the Executive Director, all occurrences will initially be classified at level 4. Subsequently, an investigation may be upgraded or downgraded. The decision to upgrade (and commit extra resources) or to downgrade must be made at Director level or above after discussion with the Executive Director. Any decision to discontinue an investigation must be endorsed by the Executive Director.

In relation to any ATSB investigation requested under state or NT legislation, the Executive Director's approval to initiate the investigation is required after consultation with the Minister. Where the ATSB reviews an investigation undertaken by another credible body (e.g. an independent investigation commissioned by a state rail regulator or the ARTC) and wishes to publish the report in the interests of future safety and permission to do so is given, such a report could be published by the Executive Director under the TSI Act with proper attribution.

The following guidance on the classification of rail transport safety matters is intended to serve as a suggested starting point based on initial information. This guidance is not intended to cover all possible scenarios but illustrates a broad range of typical events. It is expected that judgment will be required in order to classify some events which do not neatly fit these levels or where the circumstances, potential safety value and available resources suggest that they should be assigned a different category.

Level 1

- An *accident* involving one or more trains resulting in large scale fatalities and serious injuries, property damage and intense public interest.

Level 2

- An *accident* involving one or more trains with 5 or more fatalities (except where it is primarily a road accident) plus serious injuries, property damage and intense public interest.

Level 3

- An *accident* involving one or more trains with less than 5 fatalities (except where it is primarily a road accident), serious injuries and property damage.
- An *accident* involving one or more trains with serious injuries and property damage (except where it is primarily a road accident) where there was a significant risk of fatalities or serious injuries (on-train or off-train), substantial property damage and a substantial commitment of investigative resources is likely to significantly mitigate the possibility of future accidents.
- A *serious incident* involving one or more trains and/or failure of a safety management system where there was a significant risk of multiple fatalities and serious injuries and a substantial commitment of investigative resources is likely to significantly mitigate future passenger train accidents.
- An *accident* involving one or more trains at an active level crossing where an investigation is likely to significantly mitigate future accidents.
- Occurrences indicating a trend that may involve serious safety deficiencies.

Level 4

- An *accident* involving one or more trains without fatalities or serious injuries and without substantial property damage where investigation is likely to contribute to mitigating future accidents.
- A *serious incident* involving one or more trains and/or failure of a safety management system where a limited commitment of investigative resources could contribute to mitigating future accidents.
- An *accident* involving one or more trains at a passive level crossing where a limited commitment of investigative resources could mitigate future accidents.
- Any other significant safety occurrence not included in the preceding categories.

Level 5

- An *accident* or serious incident where another competent body will be conducting an investigation and available resources do not allow for an ATSB investigation.
- An *accident* involving one or more trains without fatalities where the potential safety lessons do not, after initial review, justify the commitment of investigative resources within available funds. Data will be filed for statistical purposes.
- An *accident* involving one or more trains with off-train fatalities at a passive level crossing which is primarily a road accident.

- An *accident* or *serious incident* involving one or more trains and/or failure of a safety management system where the potential safety lessons do not, after initial review, justify the commitment of investigative resources. Data will be filed for statistical purposes.

Note: Fatalities do not include suicides or train surfers.

Marine

The Transport Safety Investigation Act 2003 and the ATSB Safety Investigation Quality System forms the basis of procedures followed by the Bureau. These are supplemented by administrative guidelines and procedures recommended by International Maritime Organisation (IMO).

Decision guidelines for accident/incident classification

The ATSB is resourced each year to undertake a finite number of marine investigations. It is acknowledged, however, that an occurrence with a large number of passenger fatalities or which results in major pollution of the Great Barrier Reef or other sensitive area would represent a major accident that may require supplementary funding.

In classifying marine transport safety matters and selecting which of those the ATSB should investigate, the decision-makers must consider:

1. The potential safety value that may be gained by conducting an investigation
2. Obligations under international conventions
3. Recommendations stemming from IMO Assembly resolutions and Committee circulars
4. The public profile of the occurrence
5. Whether the occurrence is part of an identifiable trend
6. The extent of resources available and projected to be available and, in the event of conflicting priorities and the extent of any investigation backlog
    - Any risks associated with not investigating
    - The requirement under s21(2) of the TSI Act for the Executive Director to publish reasons (justification) for discontinuing an investigation where an investigation has already commenced.

The following broad hierarchy should also be taken into account when making the decision to initiate and classify an investigation:

1. On-board fatalities and/or serious passenger injuries
2. The pollution of environmentally sensitive areas
3. Ships subject to significant structural damage
4. Occurrences which disrupt, or have the potential to disrupt, major port operations
5. Occurrences that do not involve any of the above, but where the requirements of the International Safety Management Code may reasonably be anticipated to have been breached.

The decision to investigate will also have regard as to whether, in the absence of an ATSB investigation, a credible safety investigation by another organisation is likely.

In view of these considerations, initiation of a formal ATSB investigation can only be made at or above Team Leader level after discussion and agreement with the Director and Executive Director. Each investigation will be classified on a scale of 1 to 5 (see below).

Following the initial assessment of a marine transport safety matter a decision will be made whether or not to conduct a field investigation. Unless otherwise agreed by the Executive Director, all occurrences will initially be classified at level 4. Subsequently, an investigation may be upgraded or downgraded. The decision to upgrade (and commit extra resources) or to downgrade must be made at Director level or above after discussion with the Executive Director. Any decision to discontinue an investigation must be endorsed by the Executive Director.

In assessing initial and developing action on any marine investigation due regard shall be had to the IMO requirements relating to reports on marine casualties and incidents, MSC Circ.953/MEPC Circ 372. This circular outlines the IMO reporting requirements, based on very serious, serious and less serious casualties and incidents.

For the purpose of reporting information to the Organisation, ship casualties are classified as 'very serious casualties', 'serious casualties', 'less serious casualties' and 'marine incidents'. Administrations are requested to submit data for all very serious casualties and serious casualties1.

Where there are important lessons to be learned from serious casualties, less serious casualties and marine incidents, full investigation reports should be submitted along with IMO-specified additional information.

Level 1

- An *accident* involving one or more ships resulting in large scale fatalities.

Level 2

- An *accident* involving major pollution of an area of recognised environmental sensitivity such as the Great Barrier Reef.
- The total loss of an Australian ship with loss of life.
- An *accident* involving multiple fatalities.

Level 3

- An *accident* involving one or more vessels involving a fatality or serious injury.
- An *accident* involving one or more vessels that resulted in pollution of the marine environment or potential pollution of an area of particular environmental sensitivity.
- A failure of a structural member of a ship so as to render the ship unseaworthy.
- The loss, presumed loss, or abandonment of a ship.
- A *collision* between two ships so that the watertight integrity of one or both vessels is compromised.
- Fire aboard a ship that compromises the seaworthiness of a ship.
- The failure of the main engine, steering gear, or electrical generating system that renders the ship disabled, requiring external assistance to bring the ship to a place of safety.

Level 4

- Collision of a ship with another ship or fishing vessel where the damage to either vessel is significant. An accident involving one or more vessels without fatalities or serious injuries and without substantial property damage where investigation is likely to contribute to mitigating future accidents.
- A ship stranding or grounding.
- Fire aboard ship where the seaworthiness of the ship is not affected
- Contact damage with a navigation aid or port infrastructure.
- Loss of stability such that the ship and its crew are imperilled.
- A ship or other vessel involved in a near collision, near stranding.
- A serious breach of the ISM Code.

Level 5

- An *accident* or *serious incident* where another competent body will be conducting an investigation and available resources do not warrant an ATSB investigation.
- An *accident* involving one or more vessels without fatalities or significant pollution, where the potential safety lessons do not, after initial review, justify the commitment of investigative resources within available funds. Data will be filed for statistical purposes.
- An *accident* involving contact with navigational or port infrastructure, where the seaworthiness of the ship is not compromised.
- An *accident* or *serious incident* involving a minor breach of the ISM Code.

Notes:

1. Very serious casualties are casualties to ships which involve total loss of the ship, loss of life, or severe pollution, the definition of which, as agreed by the Marine Environment Protection Committee at its thirty seventh session (MEPC 37/22, paragraph 5.8), is as follows:

   Severe pollution is a case of pollution which, as evaluated by the coastal State(s) affected or the flag State, as appropriate, produces a major deleterious effect upon the environment, or which would have produced such an effect without preventive action.

   Serious casualties are casualties to ships which do not qualify as very serious casualties and which involve a fire, explosion, collision, grounding, contact, heavy weather damage, ice damage, hull cracking, or suspected hull defect, etc., resulting in:

   - immobilization of main engines, extensive accommodation damage, severe structural damage, such as penetration of the hull under water, etc., rendering the ship unfit to proceed, or
   - pollution (regardless of quantity); and/or
   - a breakdown necessitating towage or shore assistance.

   Less serious casualties are casualties to ships which do not qualify as very serious casualties or serious casualties and for the purpose of recording useful information also include marine incidents which themselves include hazardous incidents and near misses.

2. *The ship is in a condition, which does not correspond substantially with the applicable conventions, presenting a danger to the ship and the persons on board or an unreasonable threat of harm to the marine environment.*

Aviation

Procedures

The *Transport Safety Investigation Act 2003* and the ATSB Safety Investigation Quality System forms the basis of procedures followed by the Bureau. The ATSB uses the classifications below when prioritising its aviation investigations to meet international obligations and achieve the most important safety outcomes within its given budget.

Decision guidelines for accident/incident classification

The ATSB is resourced each year to undertake a finite number of aviation investigations. It is acknowledged, however, that an occurrence with a large number of deaths would represent a major accident and supplementary funding may be required.

In classifying aviation transport safety matters and selecting which of those the ATSB should investigate, the decision-makers must consider:

1. The potential safety value that may be gained by conducting an investigation
2. On board fatalities and/or serious passenger injuries, and provision of support to state coroners
3. The public profile of the occurrence
4. The extent of resources available and projected to be available and, in the event of conflicting priorities
    - Any risks associated with not investigating
    - The requirement under s21(2) of the TSI Act for the Executive Director to publish reasons (justification) for discontinuing an investigation where an investigation has already commenced.

The priorities applied when considering the initiation of an aviation investigation reflect the ATSB's primary focus on enhancing safety with respect to fare paying passengers. Subject to the considerations detailed above, the ATSB will allocate its resources in line with the following priorities:

1. Passenger transport – large aircraft
2. Passenger transport – small aircraft:
    - RPT and charter on small aircraft
    - Humanitarian aerial work (for example, RFDS, SAR flights)
3. Commercial (that is, fare paying) recreation (for example, joy flights)
4. Flying training
5. Aerial work with participating passengers (for example, news reporters, geological surveys)
6. Other aerial work:
    - Non-passenger carrying aerial work (for example, agriculture, cargo)
    - Private transport/personal business
7. High risk personal recreation/sports aviation/experimental aircraft operations.

The decision to investigate will also have regard as to whether, in the absence of an ATSB investigation, a credible safety investigation is likely.

In view of these considerations, initiation of a formal ATSB investigation can only be made at or above Team Leader level after discussion and agreement with the Director and Executive Director. Each investigation will be classified on a scale of 1 to 5 (see below).

Following the initial assessment of an occurrence, and the allocation of an investigation level, a decision will be made whether or not to conduct an on-scene investigation. Subsequently, an investigation may be upgraded or downgraded. The decision to upgrade (and commit extra resources) or to downgrade must be made at Director level after discussion with the Executive Director. Any decision to discontinue an investigation must be endorsed by the Executive Director.

The following guidance on the classification of aviation transport safety matters is intended to serve as a suggested starting point based on initial information. This guidance is not intended to cover all possible scenarios but illustrates a broad range of typical events. It is expected that judgment will be required in order to classify some events which do not neatly fit these levels or where the circumstances, potential safety value and available resources suggest that they should be assigned a different level.

Level 1

- An *accident* involving one or more High Capacity Air Transport (scheduled and non-scheduled) passenger aircraft with fatalities.
- An *accident* involving one or more High Capacity Air Transport (scheduled and non-scheduled) passenger aircraft without fatalities
  - *where there was a significant risk of fatalities or serious injuries and a substantial commitment of investigative resources is likely to significantly mitigate future High Capacity Air Transport accidents.*
- A *serious incident* (as defined by ICAO see Attachments A & B) involving one or more High Capacity Air Transport (scheduled and non-scheduled) passenger aircraft
  - *where there was a significant risk of fatalities or serious injuries and a substantial commitment of investigative resources is likely to significantly mitigate future High Capacity Air Transport (scheduled and non-scheduled) accidents.*

Level 2

- An *accident* involving one or more High Capacity Air Transport cargo aircraft with fatalities and serious injuries.
- An *accident* involving one or more High Capacity Air Transport cargo aircraft without fatalities and serious injuries
  - *where there was a significant risk of fatalities or serious injuries and a substantial commitment of investigative resources is likely to significantly mitigate future High Capacity Air Transport cargo aircraft accidents.*
- An *accident* involving one or more Low Capacity Air Transport (scheduled) passenger aircraft with a significant number of fatalities (for example, it may involve more than five fatalities) and serious injuries.

- An *accident* involving one or more Low Capacity Air Transport (scheduled) passenger aircraft without fatalities or with a relatively low level of fatalities (eg less than five) and serious injuries
  - *where there was a significant risk of more fatalities or serious injuries and a substantial commitment of investigative resources is likely to significantly mitigate future Low Capacity Air Transport (scheduled) accidents.*
- A *serious incident* (as defined by ICAO see Attachments A & B) involving one or more Low Capacity Air Transport (scheduled) passenger aircraft
  - *where there was a significant risk of multiple fatalities (eg more than five) and serious injuries and a substantial commitment of investigative resources is likely to significantly mitigate future Low Capacity Air Transport (scheduled) accidents.*
- An *accident* involving one or more Low Capacity charter (non-scheduled) aircraft with fare-paying passengers and multiple fatalities and serious injuries (for example it may involve more than five fatalities)
  - *where a substantial commitment of investigative resources is likely to significantly mitigate future Low Capacity Air Transport (scheduled) and charter (non-scheduled) accidents.*

Level 3

- An *accident* involving one or more Low Capacity Air Transport passenger (scheduled) or charter (non-scheduled) aircraft with fatalities and/or serious injuries not classified as a level 2 investigation.
- An *accident* involving Air Transport cargo operations with fatalities.
- An *accident* involving one or more training aircraft with fatalities.
- An *accident* (as defined by ICAO, see Attachment A) without fatalities involving one or more High or Low Capacity Air Transport aircraft not classified as a level 1 or 2 investigation and where investigation is likely to significantly mitigate future accidents.
- An *accident* involving one or more general aviation aircraft (other than sport aviation) with fatalities.
- An *accident* involving one or more charter or other general aviation aircraft
  - *where there was a significant risk of fatalities or serious injuries and a substantial commitment of investigative resources would significantly mitigate accidents.*
- A *serious incident* (as defined by ICAO see Attachments A & B) involving one or more High or Low Capacity Air Transport passenger aircraft not classified as a level 1 or 2 investigation and where investigation is likely to significantly mitigate future accidents.
- A *serious incident* (as defined by ICAO see Attachments A & B) involving one or more Air Transport cargo, charter or training aircraft where investigation is likely to significantly mitigate future accidents.
- An *incident* involving one or more High or Low Capacity Air Transport aircraft where investigation is likely to significantly mitigate future accidents.

Level 4

- An *accident* involving a foreign aircraft covered by *Article 26* of the Chicago Convention that is not being investigated as level 1, 2, or 3.

- An *accident* (as defined by ICAO, see Attachment A) involving one or more charter or general aviation aircraft (other than sport aviation) without fatalities
  - *where a limited commitment of investigative resources could significantly mitigate future aviation accidents.*
- An *accident* or *serious incident* (as defined by ICAO, see Attachments A & B) involving Australian designed and manufactured aircraft types on the Australian Register with international safety implications not being investigated as level 1, 2, or 3.
- An *accident* or *serious incident* (as defined by ICAO, see Attachments A & B) involving one or more High or Low Capacity Air Transport aircraft not being investigated as level 1, 2, or 3.
- A *serious incident* (as defined by ICAO, see Attachments A & B) involving one or more non Air Transport aircraft
  - *where a limited commitment of investigative resources could significantly mitigate future accidents.*

Level 5

- An *accident* (including with *fatalities*) or serious incident involving a sport aviation aircraft unless foreign and required to be investigated under *Article 26* of the Chicago Convention.
- An *accident* involving aircraft *without fatalities*
  - *where the potential safety lessons do not, after initial review, justify the commitment of investigative resources. Basic incident data will be filed for statistical purposes.*
- A *serious incident* or *incident* involving aircraft
  - *where the potential safety lessons do not, after initial review, justify the commitment of investigative resources. Basic incident data will be filed for statistical purposes.*

Appendix F: Investigations commenced by occurrence type and mode

Marine investigations commenced by Occurrence Type and Financial Year

Occurrence Type	FinancialYear (# Investigations)						
	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	Total
Capsizing/listing	1					1	2
Close quarters			1	1			2
Collision	3	3	1	2	2	1	12
Damage to ship or equipment						1	1
Fatality	2	5	3	1	2	3	16
Fire/explosion		2	2	4	3	1	12
Flooding	1					1	2
Grounding/stranding	1	2	3	4	4	3	17
Lifeboat accident	1						1
Machinery failure				1			1
Other						1	1
Pollution			1				1
Serious injury			1	1		1	3
Total	**9**	**12**	**12**	**14**	**11**	**11**	**69**

Rail investigations commenced by Occurrence Type and Financial Year

Occurrence Type Level 1	Occurrence Type Level 2	FinancialYear (# Investigations)						
		2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	Total
Collision	Running Line Collision				1			1
	Yard Collision		1					1
Derailment	Running Line Derailment	1	3	1	3	4	6	18
Level Crossing Occurrence	Collision with Road Vehicle			3	7	4	3	17
Load Irregularity	Load Shift			1				1
Rollingstock Irregularity	Defective Bearing	1				1		2
	Other rolling stock irregularity					1		1
	Train Parting				1			1
	Wheel/Axle Failure			1				1
Safeworking Rule or Procedure Breach	Other safeworking rule or procedure breach	1	1	1				3
	Safeworking Rules or Procedures Deficiency				1		1	2
Signal Passed at Danger	Driver Misjudged	1	1					2
	Other signal passed at danger					1		1
	Starting Against Signal			1				1
Track and Civil Infrastructure Irregularity	Broken Rail					1		1
	Buckled Track	1	1	1				3
	Spread Track		1					1
Total		**5**	**8**	**9**	**13**	**10**	**10**	**55**

Aviation investigations commenced by Occurrence Type and Financial Year

Occurrence Type Level 1	Occurrence Type Level 2	FinancialYear (# Investigations)						
		2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	Total
Aerodrome and airways facility	Aerodrome related		1				1	2
Airspace	Aircraft separation	9	19	12	10	5	1	56
	Airspace incursion		1		1			2
	Breakdown of co-ordination		4	2	1			7
	Information error		1					1
	Operational non-compliance	1	6	7	2	7	2	25
	Procedural error	3	11	6	2	1		23
Mechanical	Airframe	10	8	6	6	4	6	40
	Powerplant / propulsion	13	17	7	19	10	5	71
	Systems	9	15	12	9	10	3	58
Operational	Aircraft control	10	17	13	10	8	4	62
	Aircraft loading	4	2		1	1	1	9
	Cabin Safety		1	2	2	2		7
	Collision	15	20	17	9	22	22	105
	Communications	2	2		2		1	7
	Fuel related	8	4	4	5	6	4	31
	Ground operations	4	4	4	4	5	3	24
	Miscellaneous	9	4	2	1			16
	Navigation / flight planning	1	3	1	2	2		9
	Regulations and SOPs	2	4	5	2	4	1	18
	Significant event	33	42	30	33	32	23	193

Aviation investigations commenced by Occurrence Type and Financial Year

Occurrence Type Level 1	Occurrence Type Level 2	FinancialYear (# Investigations)						
		2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	2008/2009	Total
	Warning device	6	7	7	4	3	5	32
	Weather / environment	2	1	6	8	6	3	26
Total		**73**	**107**	**73**	**67**	**68**	**54**	**442**