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## Australian Government

Australian Transport Safety Bureau

## **Annual Review**

safe transport



Australian Government Australian Transport Safety Bureau

# 2008 **Annual Review**

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## Executive Director's message

Financial year 2007-08 was in many respects a watershed year. In road safety, the November election of the Rudd Government led to the move of road safety from the ATSB to the Department proper from the end of March 2008 to better align with the new Government's priorities. While I was proud to chair the National Road Safety Strategy Panel from 1999 to 2008, the establishment of a higher level Commonwealth/State body holds the promise of making further gains in reducing the nation's unacceptably high road toll. However, I was personally sad to lose the road safety branch led by Joe Motha and John Goldsworthy and their dedication and professionalism from the ATSB and am grateful for all they did while in the Bureau.

In surface safety investigation, we exceeded our output targets and are well positioned to improve future timeliness of reports. I was particularly pleased with the final *Pasha Bulker* marine investigation report and the rail investigation report at Ban Ban Springs and associated work on the safety of very large trucks at level crossings. I thank Peter Foley in particular for his leadership in surface safety.

Internationally, we were instrumental in gaining International Maritime Organization approval of a new marine investigation code and the role of Patrick Hornby deserves special commendation. Our contribution to the Government 'ITSAP' assistance program to Indonesia included substantial input led by Alan Stray in the finalisation of the Indonesian National Transportation Safety Committee investigation reports on fatal 737 accidents involving Garuda and Adam Air. Alan and Kerryn Macaulay also ensured that the ATSB's part of the 2008 ICAO state audit was very positive. A wide range of other ATSB outputs, including aviation research, technical analysis, occurrence notifications, and IT, benefited from Kerryn's leadership.

The greatest organisational pressure during 2007–08 was faced by the aviation investigation branch led by Julian Walsh. It is very difficult to select up to 80 investigations from the more than 8,000 accidents and incidents reported annually and inevitably parties associated with occurrences on the margins may not agree with the selection. There are also competing priorities between investigating fatal general aviation accidents to a level sought by state and territory coroners (and the further resources needed in any ensuing inquests), and doing more investigation of fare-paying passenger regular public transport incidents where there may be more future safety value. There is often a further trade-off between numbers of new investigations and timeliness. I am extremely grateful for Julian's leadership in managing, with his team leaders, in this environment. The 'Miller Review' was a further pressure that required substantial ATSB input. The new Government's announcement, through portfolio Minister the Hon Anthony Albanese, of an aviation Green and White Paper process was seen as a significant opportunity and warmly welcomed by the ATSB.

I also wish to publicly thank the ATSB training manager, Colin McNamara, for volunteering to coordinate the ATSB's central office move from 15 Mort Street to 62 Northbourne Avenue. His planning during 2007–08 led to a smooth move in September 2008.

Kym Bills

## 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



## Executive profile

## Mr Kym Bills



Kym Bills was appointed foundation Executive Director of the newly formed Australian Transport Safety Bureau on 1 July 1999. 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 Organization, 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 policing led by the Rt Hon Sir John Wheeler.

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's 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 Joe Motha



Joe Motha was General Manager, Road Safety until March 2008, when the ATSB's road safety functions were transferred to the Department's Infrastructure and Surface Transport Policy Division. He started with the ATSB as the then Director of Safety Research and Education in September 2002. This Director role was renamed General Manager in March 2005. From July 1999 to September 2002, he was Deputy Executive Director, Sea, Air and Safety at the Bureau of Transport and Regional Economics (BTRE).

During his 13 years with the BTRE (and former BTCE), Mr Motha researched various transport issues including transport safety, accident costing, valuation of life in transport accidents, and transport-related environmental issues. His individual and team-based work produced numerous research papers and

reports. He has received a number of awards for individual and team-based work, including Australia Day medallions in 1996 and 2002 and awards from the Australasian Evaluation Society and the Australasian College of Road Safety.

Before joining the then Bureau of Transport and Communications Economics in 1989, Mr Motha worked in the Maritime Policy Division of the former Department of Transport and Communications and has held positions with the Australian Taxation Office, the former Inter-State Commission and the former Department of Primary Industry. He also has overseas experience in industry, shipping and commerce.

Mr Motha has tertiary qualifications in science, economics, international affairs and business administration.

### Mr Alan Stray



Alan Stray is Director International, with responsibility for international engagement/liaison with government and industry, including the International Civil Aviation Organization. He also provides executive assistance to the Executive Director. He has previously been an aviation safety investigator with the ATSB and its predecessor, the Bureau of Air Safety Investigation, since January 1987.

Between 1992 and 1994, Alan was an investigation exchange officer with the Transportation Safety Board of Canada. While serving there he developed *Reflexions*, a multimodal safety magazine modelled on the successful *BASI Journal*, which he had produced in Australia for several years.

Between July 1997 and March 2006, as Deputy Director Aviation Safety Investigation, Alan was responsible for aviation safety investigations in Australia. Between March 2006 and March 2008 he had the role of Deputy Director Information and Investigations.

Alan has been the Accredited Representative on a number of overseas major airline accidents, the most recent being the Garuda and AdamAir Boeing 737 tragedies in Indonesia. He has the lead incountry role in the ATSB's cooperation with the Indonesian National Transportation Safety Committee, as part of the Australian Government's Indonesia Transport Safety Assistance Program.

He has been 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.

As a licensed aircraft maintenance engineer and pilot with an Airline Transport Pilot Licence, Alan has flown in Papua New Guinea, Canada, the USA and Australia in a variety of piston-engine and turbo-prop aircraft types. He 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 Investigation Team. Kerryn completed a 3 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 completed an Executive Masters in Public Administration degree with the Australian and New Zealand School of Government.

## 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 Road safety

In March 2008, as part of a restructure of the Department, the Road Safety Branch was moved from the ATSB to the Infrastructure and Surface Transport Policy Division of the Department. As this move occurred late in 2007–08, the activities of the Road Safety Branch are reported in this Review.

## Role

The Department aims to help improve national road safety by:

- undertaking research projects
- collecting and analysing statistics
- coordinating the National Road Safety Strategy and Action Plans
- providing safety, education and information material.

## Key road safety activities and results

During 2007–08, the ATSB continued to monitor and report on road safety progress under the National Road Safety Strategy framework approved by Ministers of the Australian Transport Council (ATC). Chairing and working with the National Road Safety Strategy Panel, the ATSB maintained close ties with state and territory transport agencies and other major stakeholders.

Since the end of 2004, there has been a small improvement in Australia's per capita rate of road deaths. In the 12 months to 30 June 2008, the national road fatality rate stood at 7.2 deaths per 100,000 population. This compares with a rate of 6.4 that would have represented exact pro-rata progress toward the National Road Safety Strategy target of no more than 5.6 deaths per 100,000 people by the end of 2010.

The Road Safety Branch began a comprehensive review of national road safety progress and priorities, and commenced work on the development of the *National Road Safety Action Plan 2009 and 2010*. This fifth action plan under the *National Road Safety Strategy 2001–10* is being developed jointly with state and territory governments, with input from a broad range of organisations and stakeholders through the National Road Safety Strategy Panel. It will be submitted to the Australian Transport Council in late 2008, with a view to implementation from 1 January 2009.

The Road Safety Branch also coordinated scoping work for the development of the next National Road Safety Strategy. The current Strategy will finish in 2010.

In 2007–08, the ATSB jointly released three new reports with the Australian Institute of Health and Welfare (AIHW) on serious injury arising from transport accidents. The partnership arrangement with the AIHW addresses the long-standing need for greater understanding of the dimensions of serious injury in road crashes.

During the year, the Road Safety Branch published 23 road safety research and statistical reports, including a series of bulletins on fatal heavy vehicle crashes, and an analysis of fatal and serious road crashes involving motorcycles.

## National Road Safety Strategy and Action Plans

In November 2000, the ATC approved the *National Road Safety Strategy 2001–2010* and an associated Action Plan for 2001 and 2002. The National Strategy provides a framework that complements the strategic road safety plans of state, territory and local governments and other stakeholders. It aims to reduce annual road fatalities per 100,000 population by 40 per cent— from 9.3 in 1999 (the benchmark year) to no more than 5.6 by December 2010.

The fourth Action Plan covered calendar years 2007 and 2008. During 2008, the Road Safety Branch commenced a review of national road safety progress and priorities, and commenced work on the development of the *National Road Safety Action Plan 2009 and 2010*.

The Road Safety Branch also coordinated early scoping work for the development of the next National Road Safety Strategy to commence in 2011.

Analytical work to underpin the next Strategy is to be commissioned early in 2008–09. The Strategy will be developed jointly with state and territory governments, with input from a broad range of stakeholders. It will be submitted to the Australian Transport Council in late 2010, for implementation from 2011.

## Novice driver education

In 2007–08, work continued on a major cooperative effort - involving the Australian Government, the New South Wales and Victorian governments, the Federal Chamber of Automotive Industries, Insurance Australia Group and the Royal Automobile Club of Victoria - to develop and trial an innovative driver education program. The project is focused on reducing the casualty crash involvement of newly licensed (P-plate) drivers.

During the year, a detailed curriculum comprising four learning modules was developed for the program. The third module, an on-road coaching session, was successfully tested in a preliminary trial during December 2007. The results of that trial were subsequently used to refine the curriculum.

The project partners will finalise the curriculum by the end of 2008 and expect to commence the full trial during 2009. This will require the delivery of the program to about 7,000 P-platers in each state, with a similar number participating in control groups. All participants will be monitored for at least a year after the completion of the trial, and independent experts will be commissioned to undertake a comprehensive evaluation of the effectiveness of the program.

#### Keys2drive program

In 2007–08, the ATSB assisted in the development of a new policy proposal for the Australian Government to deliver the *keys2drive* program. The Government is providing \$17 million over five years for the development and implementation of the Australian Automobile Association's *keys2drive* program, which recognises the critical role that parents can play in the development of new drivers.

## National road safety statistics

The ATSB published national statistics and reports on persons killed and seriously injured in road crashes. Important publications include monthly bulletins containing the latest national road death data, a comprehensive annual summary of Australian road death statistics, and an annual publication comparing Australia's road safety outcomes with those in other Organisation for Economic Co-operation and Development (OECD) countries. The ATSB also provided public access to an interactive online database of fatal road crash statistics, which is updated monthly.

## Road safety statistical reports for 2007-08

In 2007–08, the ATSB released and published on its website 16 road safety statistics publications. These reports are listed in Appendix A.

## Road safety research and analysis

Input from the road safety research program helps the Australian Government to formulate and review its road safety policies in consultation with jurisdictions and partner organisations. It also contributes to work on vehicle safety standards undertaken within the Vehicle Safety Standards Branch of the Department.

Some research is conducted by staff and other research projects are contracted out to private sector consultants or academics. When research is contracted out, road safety officers identify the directions, manage the projects, exercise quality control, use the material in advice, and incorporate it in key safety messages.

The Road Safety Branch published the results of commissioned and in-house research on the ATSB website. During 2007–08, the ATSB released seven road safety research reports (details are shown in Appendix A), including three road safety research reports funded through the road safety research grants program (details are shown in Appendix B).

## Road safety research grants program

On an annual basis, the Road Safety Branch makes available several small competitive road safety research grants. The program invites researchers and community groups to submit innovative research ideas. Three grant reports were published in 2007–08, on psychological and social factors influencing motorcycle rider interventions and behaviour, development of an implicit association test to measure attitudes toward speeding, and psychosocial factors influencing mobile phone use while driving. More details on these grants and the reports published are provided at Appendix B.

The Branch also contributes funding and/or management resources to significant road safety research projects conducted by major stakeholder organisations such as the National Transport Commission (NTC), Austroads, and state government transport agencies.

## Participation in road safety forums

#### Austroads

Austroads is the association of Australian and New Zealand road transport and traffic authorities. As the road modal group of the Australian Transport Council, it advances Australia's broader transport agenda. There is a small national office, but the majority of the work is undertaken or managed by the staff of member organisations. The General Manager of Road Safety is a member of the Austroads Road Safety Task Force.

#### Research Coordination Advisory Group (RCAG)

The Research Coordination Advisory Group (RCAG) assists in arranging the annual Road Safety Research, Policing and Education Conference and considers issues relating to the funding and prioritisation of road safety research. The RCAG includes representatives of the road transport authorities and major research organisations, and the Road Safety Branch convenes a meeting of the RCAG once a year. At the meeting held in Melbourne in November 2007, the delegates agreed that the next conferences would be held in Adelaide in 2008 and in Sydney in 2009.

#### National Road Safety Strategy Panel

The ATSB convened, chaired and provided secretariat services to the National Road Safety Strategy Panel. The Panel meets twice a year and brings together key stakeholders in road safety, including representatives of transport agencies, police, road user groups and industry (See Appendix H for details). It reports to the Australian Transport Council (ATC) through the Standing Committee on Transport (SCOT) and in consultation with Austroads. The role of the Panel is to:

- assist in identifying emerging national road safety priorities and in developing national road safety strategies and action plans
- monitor implementation of the current National Road Safety Strategy and Action Plan and related national strategies and action plans for specific areas of road safety
- identify and recommend areas of research to assist in reducing the incidence and severity of road trauma, including input to the Austroads research programme
- provide a forum for the exchange of data and information among stakeholders on road safety matters
- promote the developing and implementing of road safety countermeasures based on research and best practice.

#### Motorcycle Safety Consultative Committee

The Road Safety Branch chairs the Motorcycle Safety Consultative Committee (MSCC), which usually meets once a year in Canberra. The Committee provides a forum where the Department, major rider associations and the motorcycle industry can comment on national motorcycle safety issues. During 2007–08, the Committee met seven times in teleconference, principally to discuss arrangements for the Motorcycle and Scooter Safety Summit which was held in Canberra on 10–11 April 2008.

#### Marketing and Public Education Forum

The Marketing and Public Education Forum includes representatives from organisations involved in road safety marketing and public education in all jurisdictions and the Department, and meets once a year in conjunction with the annual Australasian Road Safety Research, Policing and Education Conference. Forum members seek to cooperate in sharing public education and communication resources, experiences and market research results, and to promote best practice in the development and conduct of public education activities.

#### Indigenous Road Safety Working Group and Forum

The ATSB chaired the Indigenous Road Safety Working Group which advises the National Road Safety Strategy Panel on measures to improve road safety outcomes for Indigenous people. Members include representatives from federal, state and territory government and community organisations. In 2007–08, the Working Group met to discuss plans for the next Indigenous road safety forum to be held in Cairns in October 2008.

## Public information on road safety

The Road Safety Branch provides a wide range of stakeholders with road safety research findings and road crash statistics, ensuring that authoritative information is accessible to governments, industry organisations, community groups and the general public.

The Road Safety Branch also produces and distributes various road safety communication materials for use by government agencies, educational institutions, training organisations and individual members of the community. Topics include first aid, child safety, drink driving, learner drivers, motorcycle safety, speed, fatigue and vehicle safety.

Most of these reports and information materials are available free of charge, and can be ordered online, and in many cases can also be downloaded from the Department's web site.

## Other road safety contributions

The Road Safety Branch provides occasional discretionary grants and sponsorships for worthwhile road safety activities that support the Australian Government's road safety policy objectives. During 2007–08, the ATSB contributed to:

- the creation of a documentary by Schools Broadcasting Australia featuring high school students exploring driver safety issues which is to be shown on SBS Television and distributed to high schools through Australia;
- the development of guidelines on protective clothing for motorcycle riders.

## **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, and 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 to address the safety issues identified are made. The 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 rail safety activities and results

In 2007–08, the ATSB initiated 10 rail safety investigations on the DIRN under the TSI Act from a total of 57 rail accident and incident notifications recorded. The Bureau also continued to assist Victoria's Office of the Chief Investigator, Transport and Marine Safety, with the investigation of the multiple-fatality rail level crossing collision at Kerang, Victoria, on 5 June 2007.

The Bureau completed 12 investigations (see Appendix C) and issued one supplementary rail investigation report and a Railway Level Crossing Safety Bulletin. The median completion time for the twelve rail investigations was 456.5 days, higher than the target of 365 days.

The completed investigations related to five level crossing collisions, four derailments, one Signal Passed at Danger (SPAD), one rolling stock irregularity, and a collision between a train and maintenance equipment.

The completed investigation reports noted 35 safety actions that had been taken by rail stakeholders. The reports also contained a total of 42 safety recommendations and seven safety advisory notices.

At 30 June 2008, the ATSB was continuing 10 rail safety investigations (see Appendix E).

## Key rail investigations completed in 2007–08

The Ghan level crossing collision



At approximately 1356 on 12 December 2006, a double trailer road-train truck drove into the path of *The Ghan* passenger train (1AD8) at the Fountain Head Road level crossing, Ban Ban Springs, Northern Territory. As a consequence, two locomotives, a wagon used for carrying passengers' private vehicles and nine passenger carriages derailed. There were no fatalities, however, many of the 64 passengers and 17 staff on board sustained minor injuries, with the driver of the road-train and one passenger hospitalised for several days following the accident.

The ATSB investigation of the collision found that the accident occurred when the road-train was driven through a 'Stop' sign at a level crossing at an estimated speed of 50 km/h. The factors which contributed to the accident were linked to local truck driving practice and potentially the truck driver's medical issues.

The investigation found that *The Ghan* was travelling at a speed of 101 km/h when it collided with the road-train, just behind its prime mover. The road-train driver had been carrying road-base material across the Fountain Head Road level crossing about 30 times each day for the previous month and had apparently only seen about four trains in that time. It was the driver's practice, and that of other drivers engaged in the same work, to slow rather than stop at the level crossing.

The train driver had appropriately sounded the locomotive horn three times before the collision and the locomotive headlight was illuminated and set on high beam. The investigation found that the road-train driver had severe bilateral hearing loss, to the extent that he would not have been eligible to hold his unrestricted heavy vehicle licence, and that this hearing loss would have compromised his ability to hear the locomotive horn in the time leading to the collision. The report also noted concerns regarding the adequacy of sighting distances at level crossings for very long vehicles (road-trains up to 53.5 metres long) which use passively controlled level crossings in many rural areas across Australia.

The report acknowledged the initial emergency response measures taken by GBS Gold Pty Ltd and the work being undertaken by the Australian Transport Council, the Northern Territory Government and the Australasian Railway Association in regard to initiatives intended to raise public awareness of the safety risks associated with level crossings.

The ATSB recommended that relevant authorities consider the issues identified by the investigation in relation to the medical examination of heavy vehicle drivers, sighting distance requirements at level crossings used by high combined gross mass vehicles, driver compliance at railway level crossings, and accident response in light of the remoteness of much of the Northern Territory rail corridor. The NT Government has significantly increased the penalties associated with road user non-compliance at level crossings and Standards Australia has undertaken a review of the relevant sighting distance standard.



#### Derailment near Roopena

At approximately 0428 on 22 May 2007, ballast train 3MR2 derailed near Roopena, SA (between Whyalla and Port Augusta). The derailment occurred about 28 track kilometres north of Whyalla. Twenty seven ballast wagons were derailed but there were no injuries.

The ATSB used dynamic rollingstock/track modelling to analyse the derailment mechanism and concluded that a number of factors combined to cause the derailment. A cross-level track geometry defect combined with a horizontal and vertical alignment defect and with various factors associated with the uneven loading and suspension system of the first wagon to derail, caused wheel unloading and flange contact which resulted in a flange-climb derailment.

The investigation revealed a number of safety issues associated with the maintenance of the track, the application of speed restrictions in response to track defects, and the design and loading of the ballast wagons. A range of safety actions were taken by the rail operator in relation to the design and loading of the ballast wagons. However, seeking to prevent similar incidents in the future, the ATSB identified further opportunities for improvement relating to the assessment of track geometry defects and the application of speed restrictions suitable for safe rail operations.

#### Railway level crossing safety bulletin

Since 1970, fatalities resulting from accidents between road vehicles and trains at level crossings have reduced by about 70 per cent. However, recently there have been an increasing number of accidents involving heavy road vehicles.

Between April 2006 and December 2007, the ATSB investigated 12 level crossing accidents. Of those 12 accidents, nine have involved heavy road vehicles, four of which have been collisions with longdistance passenger trains. In addition, during the same period, state authorities have investigated a further three significant accidents between heavy vehicles and passenger trains.

Those accidents have cost the lives of 19 people, 13 on board the trains and six occupants of the road vehicles. In addition, over 60 people have been injured and the damage bill is estimated at well over \$100 million.

Although fatalities and injuries resulting from accidents at railway level crossings are only a small proportion of the total fatalities and injuries that occur on Australian roads each year, railway level crossing accidents, particularly when they involve heavy road vehicles, have the potential to be catastrophic.

Heavy road vehicles such as road-trains and larger freight trains have become the norm in Australia for the good reason that they are an efficient way to transport goods over long distances between metropolitan and regional centres. However, with the increased size comes an increased consequence in the event of a level crossing collision. It used to be somewhat rare to hear of a train derailing or of significant casualties on board the train as a result of a collision with a road vehicle. This is not the case today.

Some recent accidents have involved significant loss of life, the worst case being the tragic accident at Kerang when a semi-trailer collided with a Melbourne-bound passenger train on 5 June 2007. Eleven people were killed and 20 injured in this accident. Another major collision between a B-double truck and a freight train occurred at Lismore, Victoria on 25 May 2006. This accident resulted in the death of the truck driver and an estimated damage bill in excess of \$30 million.

The ATSB compiled the *Railway level crossing safety bulletin* to highlight key lessons learnt during the investigations. Foremost are the operational limitations of trains and the resultant onus on motorists to avoid collisions. Copies of the bulletin were sent to state and territory rail regulators, and the Australasian Railway Association and the Australian Trucking Association distributed the bulletin through their membership networks.

## Key rail safety actions and recommendations 2007–08

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 2007–08, ATSB reports noted 35 rail safety actions that had been taken by rail stakeholders and issued 42 rail safety recommendations and seven safety advisory notices. The recommendations and safety advisory notices broadly related to:

- level crossing safety and risk, particularly in relation to heavy vehicles, and interface agreements between rail track managers and road owners/authorities
- medical requirements for drivers of heavy road vehicles
- · recorded data in general and, in particular, locomotive data recorders
- · railway communications systems and practices
- management of SPADs
- the effect of train speed on dynamic forces and track stability, particularly over track with defects
- maintenance of rolling stock coupling assemblies
- safe working arrangements related to maintenance work on infrastructure
- maintenance work planning and consideration of the effects of fatigue
- train passenger evacuation.

Details of all rail 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.

During the period 2006 through 2008, 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 2007–08, 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 Goa, India in October 2007
- the AusRAILPLUS 2007 Conference in Sydney in December 2007
- the Rail Safety 2008 conference in Melbourne in February 2008
- NT Rail Safety Committee meetings in Darwin in November 2007 & April 2008
- SA Police Road Traffic Seminar in Adelaide in May 2008
- The Railway Technical Society of Australasia, selected branch meetings in SA, WA and Qld.

## Marine investigations

### Role

The ATSB's Marine Investigation Team investigates accidents and incidents involving Australianregistered ships anywhere in the world and foreign ships in Australian waters or en route to Australian ports.

Since 1 July 2003, the Marine Investigation Team has investigated marine accidents under the provisions of the *Transport Safety Investigation Act 2003* (TSI Act) and associated regulations. Under the TSI Act, accidents and incidents must be reported to the ATSB. Depending on the type and severity of an occurrence, the Executive Director of the ATSB may decide that an investigation will be conducted. Other action taken may be to:

- seek more information from an owner, operator, crew or appropriate bodies
- enter details of the occurrence details into the ATSB's marine occurrence database.

The purpose of marine investigations is to enhance safety at sea 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 Australian Maritime Safety Authority (AMSA) and ship managers 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 incident, and 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 to address the safety issues identified are made. The 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.

The ATSB distributes its marine investigation reports and safety and educational material nationally and internationally and promotes marine safety in Australia and overseas. The Bureau distributes copies of every report to Australia's maritime community and educational institutions, to marine administrations in Australia and overseas including the International Maritime Organisation (IMO), and to overseas maritime colleges and universities. All reports are also available on the ATSB's website.

### Key marine safety activities and results

In 2007–08, the ATSB initiated 11 new investigations from a total of 68 marine accident and incident notifications recorded. The Bureau completed 12 marine investigations (see Appendix C). The median completion time for investigations was 319 days - below the 365 day target.

The completed investigations related to three fires, two groundings, two collisions (one with fatalities), one dangerous goods leakage, one main engine failure, one fatality, one serious injury and one explosion.

The completed investigation reports recorded 30 safety actions that had been taken by marine stakeholders. The reports included a total of 32 safety recommendations and 39 safety advisory notices to marine stakeholders.

At 30 June 2008, the ATSB was continuing 10 marine safety investigations (see Appendix E).

## Key marine investigations completed in 2007–08

#### Pasha Bulker grounding



On 23 May 2007, the Panamanian-registered bulk carrier *Pasha Bulker* anchored 2.4 miles off the coast near Newcastle, New South Wales. The ship had sufficient water ballast on board for the good weather at the time, and was not expected to load its coal cargo for about three weeks.

At midday on 7 June, *Pasha Bulker*'s master veered more anchor cable after a gale warning was issued. The weather deteriorated and shortly after midnight, the wind had reached gale force.

At 0500 on 8 June, the wind had increased to strong gale force and the weather was severe. At 0625, *Pasha Bulker* started to drag its anchor. The master decided to put to sea and, at 0748, the anchor was aweigh. The ship was now 1.2 miles from the shore and, with the southeast wind fine on the

starboard bow, it made good a north-easterly course. At 0906, the master altered the ship's course to starboard to put the wind on the port bow in an attempt to make good a southerly course on a south-southeasterly heading. Its heading, however, became south-westerly and, with the wind on the port beam, the ship started to rapidly approach the coast.

At 0931, with Nobbys Beach 0.8 of a mile away, the master attempted a starboard turn. The manoeuvre did not succeed and at 0946, with grounding imminent, he requested assistance from authorities ashore. At 0951, *Pasha Bulker* grounded on Nobbys Beach and the ship's momentum carried it further onto the beach. The crew were evacuated by helicopter during the afternoon.

On 2 July, *Pasha Bulker* was successfully refloated. The ship was temporarily repaired in Newcastle and, on 26 July, taken in tow to Vietnam to undergo permanent repairs.

In response to the incident and the findings in the ATSB draft report, Newcastle Port Corporation took a number of safety actions with other action to be considered to address the recommendations in the final report. Similarly, Port Waratah Coal Services, the operator of the Newcastle's coal terminals, took a number of safety actions to improve the understanding of ballast related issues.

The final report included a number of recommendations and safety advisory notices to address safety issues that have not already been addressed with the aim of preventing such incidents.



#### Creciente breakaway and grounding

At 1730 on 10 September 2006, the Hong Kong-registered bulk carrier *Creciente* berthed in Port Hedland, Western Australia, to load a cargo of iron ore.

At about 0245 on 12 September, the almost fully laden ship broke away from the wharf under the influence of a strong ebb tide.

Despite the use of several tugs and the ship's engine, it was not possible to manoeuvre the ship back alongside the wharf. The harbour master decided to hold the ship in the deepest part of the port's entrance channel until the next high tide.

By about 0615 on 12 September, the ship was firmly aground in the channel and, at about 0950, it was successfully refloated.

The ATSB investigation found that the effective holding capacity of the ship's mooring winches was reduced by the number of layers of mooring line on their drums and the poor condition of their brakes. The investigation also found that it was highly likely that the brakes had not been sufficiently tightened and that the mooring winches were not effectively monitored in the time leading up to the incident.

The ATSB found that neither the port authority nor the ship's master had identified the possibility of the ship breaking away from its berth and had not appropriately assessed the risks associated with this potential hazard.

The Port Hedland Port Authority took safety action in the form of a marine notice to address mooring related issues in order to reduce the risk posed by such incidents which could result in the blockage of the port's main shipping channel. The final report also included two recommendations and five safety advisory notices to address the identified safety issues.

## Key marine safety actions and recommendations 2007–08

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 2007–08, the ATSB recorded 30 safety actions taken by marine stakeholders, and issued 32 safety recommendations and 39 safety advisory notices.

The recommendations and safety advisory notices broadly related to:

- the design and maintenance of ships' engine room equipment
- the safe anchoring of an unmanned barge in WA
- the inadequate risk assessment undertaken prior to the mooring a large bulk carrier
- the inadequate maintenance of moor equipment and associated safety management system for its use
- numerous recommendations and safety advisory notices arising from the Pasha Bulker grounding, including those dealing with anchoring off Newcastle and the vessel traffic system in the port
- · the inadequate risk assessment of a hazardous cargo shipments
- the inadequate packaging of hazardous goods
- the lack of bridge resource management principles being implemented on board ships' bridges.
- the lack of a proper and effective lookout being maintained on the bridges of ships and fishing vessels
- the use of personal protective equipment.

Details of all marine 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.

## Marine safety promotion

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

- 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 marine publications and journals
- maintaining the marine confidential reporting scheme.

These activities help to improve future marine 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 marine safety forums

During 2007–08, the ATSB participated in several marine 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:

- various Advanced Marine Pilots Training (AMPT) courses throughout the year
- Marine Accident Investigators International Forum (MAIIF) in Beijing in October 2007
- Association of Australian Ports & Marine Authorities Inc. (AAPMA) conference in Launceston in November 2007
- the National Shipping Conference (Natship 2007) in Brisbane in December 2007
- the Pacific 2008 maritime conference in Sydney in January 2008
- the National Marine Safety Committee's biannual conference in Adelaide in May 2008
- the sixteenth meeting of the International Maritime Organization's Flag State Implementation (FSI) Sub-Committee in London in June 2008.

Members of the Marine Investigation Team also made presentations at or participated in other forums throughout the year including:

- workshops for maritime law, marine pilotage related issues and Nautical Institute presentations on various marine safety and other issues
- Advanced Marine Pilot Training courses.
# Coronial inquests

The ATSB continued to assist the Queensland State Coroner with the inquest into the disappearance of *Malu Sara* with five people on board in the Torres Strait in October 2005. The inquest hearings were conducted on Thursday Island over 5 weeks, 2 weeks in April and 3 weeks in August and September in 2007. The ATSB published its investigation report into the tragedy in May 2006 and the investigator in charge gave evidence at the initial inquest hearings. The Coroner is expected to deliver his findings in late 2008.

# Aviation investigations

## Role

The ATSB's Aviation 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 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 incident, and 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 to address the safety issues identified are made. The 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 also available on the ATSB's website.

## Key aviation safety activities and results

In 2007-08, the ATSB initiated 77 new aviation investigations from approximately 15,218 notifications received (8,299 were recorded as aviation occurrences).

During 2007–08, the ATSB completed 73 aviation investigations (see Appendix C), down from 80 in 2006–07. The median time for investigations was 443 days, an increase from 379 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. The drop in reports released from 80 to 73 was the result of the diversion of resources to provide input to coronial inquests, including into the Lockhart River 15-fatality accident; three long-term staff illnesses, resignations and the associated recruitment and training overhead for new

investigators; and ongoing training and familiarity in the use of SIIMS and its associated investigation and analysis tools.

There were 131 separately-identified safety actions taken by aviation safety stakeholders in response to 43 different aviation investigations. The completed investigation reports included a total of 23 safety recommendations and two safety advisory notices to aviation stakeholders.

At 30 June 2008, the ATSB was continuing 91 aviation safety investigations (see Appendix E), up from 87 in 2006-07.

## Key aviation investigations completed in 2007–08



Boeing 737-476 in-flight engine malfunction 6 km SSE Sydney, NSW

On 25 August 2005, during a scheduled passenger flight from Brisbane, Qld, to Sydney, NSW, the left engine of a Boeing 737-476 aircraft, registered VH-TJX, malfunctioned approximately 6 km SSE of Sydney Airport. While on approach to runway 34R with the landing gear extended, the flight crew heard unusual 'popping' noises from the left side of the aircraft. The crew initially suspected a defect with the landing gear and commenced a missed approach.

When both engine power levers were advanced, the left engine did not respond. The pilot-in-command then reduced the left engine power to idle, retracted the landing gear and climbed the aircraft to approximately 2,000 ft. The crew advised air traffic control of a possible engine problem. The aircraft Captain advised the First Officer to leave the left engine at idle and that a single engine landing would be conducted. The appropriate single engine inoperative checklists were referenced and the aircraft was prepared for landing.

A single-engine approach and landing on Sydney runway 34R was completed. An inspection of the left engine by the operator's engineering personnel revealed damage within the high pressure compressor (HPC). The left engine, a General Electric CFM56-3C1, was subsequently removed and disassembled at the operator's maintenance facility. The teardown revealed that a single dowel pin had come loose from its installed position within stage three of the HPC and was ingested by the downstream rotating hardware, resulting in damage to the HPC rotor and stator components.

The HPC stator components were subject to detailed examination at the ATSB's technical facilities in Canberra. That examination revealed that directly contributing to the dowel pin release was the excessive clearance between the stage three stator shroud anti-rotation pins and the attached interstage honeycomb air seals. Both the 3 o'clock and 9 o'clock anti-rotation pins at the HPC split line had been pressed slightly too deep into their shroud sockets. This allowed the honeycomb seal segments to shift and circumferentially bunch during engine operation. Once the straight D-head dowel pin became exposed between the seal segments, it was very likely that the dowel pin liberated out through the gap between seal segments. The dowel pin then impacted the downstream HPC rotor hardware resulting in the severe engine damage.

With no requirement from the engine manufacturer to dimensionally inspect the stator shroud antirotation pins, it was possible that the anti-rotation pins had been pressed too deep into their shroud sockets from when first assembled. Alternatively, each of the anti-rotation pins may have been forced downward into their socket through contact with the honeycomb seals during engine operation. The investigation was not able to choose either of these two possibilities.

As a result of this occurrence, the engine manufacturer, General Electric, initiated a number of safety actions that included a redesign of the HPC anti-rotation pin. The manufacturer also released an alert (Service Bulletin CFM56-3 S/B 72-1091) to all operators and maintainers of CFM56-3 engines that recommended the introduction of the new pin design into existing engines. Other safety actions taken included amendments made to the CFM56-3 maintenance manual for HPC stator shroud component inspections.



VH-SEF Fairchild Metro III fuel exhaustion 18 km SW Bundaberg, Qld

At 1917 Eastern Standard Time on 23 September 2005, a Fairchild Industries Inc.2 SA227-AC (Metro III) aircraft, registered VH-SEF, departed Thangool, Qld, on a scheduled passenger flight to Brisbane, Qld. There were two pilots and 16 passengers on board. The copilot was the flying pilot.

The flight crew reported that as the aircraft approached overhead Gayndah (180 km north-west of Brisbane) at flight level (FL) 170, the L XFER PUMP (left fuel transfer pump) amber caution light illuminated on the annunciator panel in the cockpit. The crew consulted the quick reference checklist, which stated that the warning light indicated that, with the boost pumps operating, there was less than

70 pounds (lbs) (39 L) of fuel remaining in the left tank. They initially thought that the warning may have been false, as the fuel quantity indicator showed that there was substantial fuel in the left tank. In accordance with the checklist, they selected the alternate boost pump, but the caution light remained on. The crew continued on the basis that the warning was genuine and diverted the flight to Bundaberg (102 km north-east of Gayndah3), which they assessed as the nearest suitable aerodrome. When air traffic control queried the status of the flight, the crew advised that operations were normal.

The copilot continued to fly the aircraft and initiated a descent shortly after turning towards Bundaberg, initially levelling the aircraft at 4,000 ft. At approximately 18 km from Bundaberg, the left engine surged a few times and then ceased operating. The pilot in command secured the engine, while the copilot continued to fly the aircraft. The crew did not report the engine failure to air traffic control and did not declare an emergency. The copilot initiated a descent to 1,500 ft and entered the left circuit pattern for runway 32. The pilot in command took control of the aircraft during the base turn and completed an uneventful single-engine landing. The R XFER PUMP (right transfer pump) caution light did not illuminate at any stage. The crew did not record the fuel quantity indicator readings on arrival at Bundaberg.

When the aircraft was examined the following day, the cockpit fuel quantity indicator showed 250 lbs of fuel in the right tank and 400 lbs of fuel in the left tank. The aircraft tanks were drained. The left tank contained 4 lbs (2 L) of fuel and the right tank contained 49 lbs (28 L). According to the aircraft flight manual, approximately 8 L of fuel in each tank was unusable. The fuel filters contained only minor debris.

The investigation determined that problems with the aircraft's fuel quantity-indicating system and limitations in the company's flight crew practices relating to fuel quantity resulted in the aircraft departing Brisbane with only 65 per cent of the amount of fuel the crew believed was on board. When the aircraft landed at Bundaberg, the fuel remaining was sufficient for about 10 minutes of single-engine flight, even though the fuel quantity-indicating system was showing that substantial fuel remained in the tanks.

The investigation found a number of safety factors that contributed to the fuel quantity system over-reading and leading to the usable fuel in the left tank being exhausted causing the left engine to stop. Those factors included both maintenance procedures and operational practices that allowed a discrepancy between the indicated and actual fuel on board the aircraft to remain undetected. The maintenance procedures related to the calibration of the fuel quantity indicating system and the condition of some components of that system. The operational practices involved the measurement and recording of the quantity of fuel on board the aircraft by both flight crew and maintenance personnel.

Following the occurrence, the operator developed new procedures for fuel quantity management and CASA made rule changes regarding fuel quantity measurement and verification for transport category aircraft.

VH-UYB Cessna U206 collision with terrain near Willowbank, Qld



At about 1040 Eastern Standard Time on 2 January 2006, a Cessna Aircraft Company U206 aircraft, registered VH-UYB, was being operated from the Aeroplane Landing Area (ALA) at Willowbank, Qld on the second of a series of parachuting flights. On board the aircraft were the pilot, three Tandem Master parachutists (Tandem Masters) and three Tandem Student parachutists.

The aircraft's engine was not shut down following the first flight, and was running at low RPM on the ground for a period of about 10 minutes. A number of witnesses in the area of the ALA buildings at that time reported that the aircraft's engine RPM appeared to be erratic when at low power settings, and one witness observed smoke coming from the engine area.

Witnesses reported that the pilot backtracked down the runway before turning the aircraft around and immediately taking off to the north. Several witnesses reported black smoke and/or vapour coming from the aircraft soon after takeoff.

One of the Tandem Masters on board, who was also the owner/operator of the parachute school and a private pilot, and who survived the accident, stated that the takeoff appeared 'normal' until the aircraft overflew the end of the runway at about 100 ft above ground level (AGL). Following that, he reported that the aircraft performed as if the power had been 'pulled back'. The owner/operator recalled asking the pilot whether the auxiliary fuel pump was selected ON, to which the pilot reportedly replied 'yes'. The surviving Tandem Student on board, who had not previously flown in a light aircraft, described the takeoff as being as expected, and was unconcerned until hearing the owner/operator tell the pilot to 'keep it up'.

Witnesses on the ground further reported that the aircraft climbed to no more than about 100 ft AGL, and then banked right somewhere between five and 10 degrees, before descending from view.

The owner/operator reported that he told the pilot 'don't stall the thing' and 'look out for the tree', and that the pilot was looking back towards him when the aircraft impacted a tree. The owner/operator also advised of hearing the aircraft's stall warning horn activate shortly before the impact with the tree. He described the aircraft then doing what he considered to be a right roll before entering a dam that was located about 1,250 m from the end of the runway and slightly right of runway centreline.

The Tandem Student recalled the aircraft striking 'something of a wooden nature', but had no memory of the moments between the plane hitting the tree and its subsequent landing in the dam. Another of the owner/operator's pilots conducted an aerial search in the other company aircraft, in an attempt to locate the missing aircraft. Shortly after, the crew of a search and rescue helicopter located the missing aircraft submerged in the dam. Rescuers found one of the Tandem Students walking near the dam and the owner/operator clinging to a section of the submerged aircraft. Five of the seven persons on board received fatal injuries or were drowned. Both survivors were severely injured.

Technical examination and testing of the aircraft's engine and its associated components did not reveal any anomalies with the potential to have individually contributed to the partial engine power loss. However, the investigation could not discount the potential that:

- a number of less significant anomalies that were identified during the engine and components examination may have coincided to reduce the available engine power, or that
- there may have been an anomaly of the engine or its components present during the accident flight that was not apparent during the subsequent disassembly, examination and testing of the engine and its components.

As a result of the investigation, the Australian Parachute Federation (APF) has addressed a number of safety concerns. CASA initiated safety action to clarify Airworthiness Directive AD/ENG/4 and the intent of Airworthiness Bulletin AWB 02-003 Issue 2. In addition, CASA undertook to review elements of the various training syllabi and supporting documentation affecting the management of engine and partial engine power loss after takeoff.

In addition, as a result of the investigation, the ATSB issued seven safety recommendations related to airworthiness bulletins, regulations, parachutists' safety and survivability, aircraft maintenance documentation and pilot training in emergency procedures.





At about 1215 Eastern Standard Time on 5 October 2006, the pilot of a British Aircraft Corporation 167 Strikemaster aircraft, registered VH-AKY, took off from Bathurst, NSW, for a 25-minute adventure flight with one passenger. The flight was intended to include high-level aerobatics followed by a low-level simulated strike mission. When the aircraft failed to return, a search was initiated and the aircraft wreckage was located in the Turon State Forest about 20 km to the north-east of Bathurst. The ground impact started a fuel-fed fire that resulted in a large bushfire, which took several days to contain. The pilot and passenger were fatally injured.

The engine was producing significant power at the time of impact and the wing flaps and landing gear were retracted. The right wing and tail had separated from the aircraft. Despite the fire damage, ATSB investigators were able to recover the majority of the heavier sections of the aircraft's wing connection structure, including the upper and lower spar boom interconnections and the inboard central section of the right wing. The left wing spar boom connections had been entirely destroyed during the post-impact fire. The recovered wing and fuselage structures were transported to the ATSB's Canberra laboratories for detailed technical analysis.

That analysis revealed that separation of the right wing was precipitated by pre-existing fatigue cracking in the right wing upper main spar attachment lug. Examination of the recovered items of the tail section and assessment of the distribution of the items indicated that the rudder mass balance was torn off over the top of the rudder at an early stage in the breakup sequence.

The majority of the available evidence was consistent with a breakup initiated by separation of the tail surfaces leading to the separation of the weakened right wing.

As a result of this accident, the ATSB briefed CASA and the UK Civil Aviation Authority (CAA) on findings relating to the separation of the wing and tail. CASA released a number of Airworthiness Bulletins to

alert Australian operators of issues relating to Strikemaster and Jet Provost aircraft. In addition, the CAA issued a Mandatory Permit Directive, which applied to all BAC 167 Strikemaster and Jet Provost aircraft. CASA also approved the Australian Warbirds Association Limited to administer aircraft operating under the Limited Category.

## Key safety actions and recommendations 2007-08

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 2007–08, 43 different aviation occurrence investigations resulted in 131 separately-identified safety actions by aviation stakeholders. Also, the ATSB issued 23 aviation safety recommendations and two safety advisory notices to aviation stakeholders.

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.

#### Safety actions 2007-08

In 2007–08, the ATSB's aviation stakeholders undertook 131 separately-identified safety actions linked to 43 ATSB aviation investigations. These stakeholder safety actions identified by occurrence report number included:

- (200701625) in relation to Robinson Helicopter Company (RHC) R22 and R44 helicopters and susceptibility to main rotor blade skin disbanding if the bond line becomes exposed due to abrasion of the leading edge paint coatings:
  - RHC issued service letters SL-56 and SL-32 for the R22 and R44 helicopters respectively, providing instructions for the refinishing/restoration of the leading edge paint coating, and guidance as to when that is recommended. The company also revised the safety alert addressing the skin disbond issue (first published on 4 January 2007) including references to SL-56 and SL-32
  - The US Federal Aviation Administration issued Airworthiness Directive 2007-26-12, effective from 18 January 2008 and requiring the inspection of any exposed (bare metal) blade skin aft of the skin to spar bond line on the lower surface of each blade
  - The Civil Aviation Safety Authority (CASA) released issue 2 of its earlier Airworthiness Bulletin (AWB 62-004) discussing the issue of bond line erosion and referencing the RHC safety alerts. Subsequently, airworthiness directives AD/R22/54 and AD/R44/22 were introduced and became effective on 18 January 2008, reiterating the requirements of FAA AD 2007-26-12.

- (200605999) as a result an in-flight engine malfunction, the engine manufacturer, General Electric, initiated a number of safety actions that included a redesign of the high-pressure compressor (HPC) anti-rotation pin. The manufacturer also released an alert Service Bulletin CFM56-3 S/B 72-1091 to all operators and maintainers of CFM56-3 engines that recommended the introduction of the new pin design into existing engines. Other safety actions taken included amendments to the CFM56-3 maintenance manual for HPC stator shroud component inspections
- as a result of a fire in an auxiliary power unit (APU) caused by a cloth rag that had been left in the APU compartment the operator:
  - amended the maintenance documentation for clearance closure inspections
  - took action to reinforce the responsibility and importance of the clearance closure inspections and to remind maintenance staff of the company's 'Safety over Schedule' principles
  - reviewed the suitability of equipment to gain access to all areas of the APU compartment
  - reviewed the relevant licensed aircraft maintenance engineer training
  - In addition, the Aviation Rescue Fire Fighting (ARFF) service changed its procedures to include that, until an ARFF response was called to a 'STOP', either an aircraft engineer or ARFF member was required to inspect the relevant aircraft compartment or area, where a fire had occurred, an aircraft's fire warning system had activated, or an onboard fire extinguisher had been activated.

#### Recommendations and safety advisory notices 2007-08

The 23 recommendations and two safety advisory notices (SANs) issued during 2007–08 covered important issues including:

- for Hawker Beechcraft to consider the implications of a safety issue relating to insufficient
  instruction or guidance in the aircraft manufacturer's maintenance manual, for operators and
  maintainers of Super King Air 200 aircraft for the lubrication of the landing gear torque tube
  support bearings, and to take action where considered appropriate (SAN20080002)
- review by Airservices Australia of the requirements for the dissemination of SIGMET information with a view to minimising differences between air traffic control procedures contained in the Aeronautical Information publication and those contained in ICAO Doc. 444 and ICAO Doc 7030 (R20070026)
- review by Transport Canada of the continued airworthiness of PT6A series engines, with regard to
  its susceptibility to failure of the number-1 bearing as a result of electrical discharge damage (EDD)
  sustained from a starter generator malfunction (R20070020).

## Aviation safety promotion

A part of the ATSB's mission is to improve transport safety by raising safety awareness and knowledge. Along with CASA 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 2007–08)
- 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 2007–08, the ATSB participated in several aviation safety forums. Participation helps the Bureau communicate various safety messages, maintain its industry contacts, and stay informed on relevant policy and technical issues. The ATSB attended and/or presented, or provided training, at the following industry forums:

- aero clubs and flying training schools
- airport fire fighters
- emergency services
- Australian Defence Force Academy
- police squads
- flight safety and other industry forums
- helicopter operators
- Royal Federation of Aero Clubs of Australia
- Royal Australian Navy
- tertiary institutions
- Australian Federation of Airline Pilots
- Airservices Australia Major Industry Consultation forum
- Bureau d'Enquêtes et d'Analyses (BEA), Paris, France
- Singapore Aviation Academy
- Indonesian National Transportation Safety Committee Accident Fundamentals Course, Jakarta, Indonesia
- ATSB Human Factors Course, Jakarta, Indonesia.

Professional conferences address engineering, human factors, flight operations, air traffic control, cabin safety and flight recording issues. In 2007–08, ATSB executive, aviation and technical staff attended and/or presented at the following conferences:

- Asia Pacific Coroners Society Conference, Hobart, Tasmania, October 2007
- ICAO Regional Investigator's Workshop, Hong Kong, October 2007
- Australian Federation of Airline Pilots (AFAP) Conference, Melbourne, November 2007
- Accident investigator recorders meeting (EUROCAE), Cologne, June 2008
- International Transportation Safety Association meeting, Russia, June 2008
- Flight Safety Foundation Conference, Seoul, October 2007
- International Society of Air Safety Investigators Conference (ISASI), Singapore, August 2007
- Safety in Action Conference 2008, Melbourne, April 2008
- Aviation Law Association of Australia & New Zealand (ALAANZ) 27th Annual Conference, Sydney, May 2008
- Safeskies Conference, Canberra, November 2007
- Embraer Operators Conference, Perth, November 2007
- Australian and New Zealand Society of Air Safety Investigators (ANZSASI) Conference, Adelaide, May 2008
- International Confidential Aviation Safety Systems (ICASS) meeting, San Francisco, October 2007.

## **Coronial inquests**

Coronial inquest attendance involved considerable ATSB resources for both preparation and attendance. In 2007–08, ATSB aviation investigators provided ongoing evidence at the Lockhart River coronial inquest in Brisbane during July, and attended the inquest into the March 2006 VH-ZIP Cessna 188B fatal accident. The Queensland State Coroner brought down his findings on the Lockhart River inquest on 17 August 2007. Investigators also attended the December 2007 coronial inquest into an April 2006 fatal Lancair accident at Bankstown and the June coronial inquest into the fatal accident involving Cessna U206, VH-UYB which occurred on 2 January 2006. The findings of those inquests were, in the main, consistent with the ATSB investigation findings. In addition, two team members of the ATSB gave evidence by phone to a coronial inquest held in Mareeba, Qld, in the week of 18 February 2008 into a fatal ultralight accident that the ATSB did not investigate.

The Aviation Safety Investigation Branch continued to provide briefings to State Coroners and next of kin, on the outcome of Bureau investigations involving fatalities so that in most instances the accident was not subject to an inquest.

# Strategy and Capability

## Role

The Technical and Projects Branch of the ATSB became the Strategy and Capability Branch in March 2008 and 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 Department's Annual Report.

## Media

Community interest in the ATSB's transport investigation activities and findings require a wellplanned process for coordinated media response. The ATSB can be reached through its media contact officer or rostered duty officer 24 hours a day, 7 days a week. It maintains a 24-hour contact number for inquiries at 1800 020 616.

In 2007–08, the team organised seven 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 2007–08, 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, road safety public education and ATSB corporate materials.

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

As a result of a restructure of the Department to make it more responsive to and better align with the new Government's priorities, the team updated the ATSB website and a number of corporate materials including the popular 'Safe Transport DVD'.

### Freedom of Information and legal matters

The ATSB began 2007–08 with one Freedom of Information request (FOI) on hand and received nine FOIs during the financial year. The Bureau completed seven FOIs within 30 days and one between 30 and 60 days. One FOI was withdrawn. At 30 June 2008, one FOI was on hand. In addition, four subpoenas were attended to within specified timeframes. No ATSB FOI decisions were subject to Internal Reviews in 2007–08.

During 2007–08, the ATSB was involved in one court proceeding which was a challenge to Justice Dowsett's decision of 5 July 2007 in *Elbe Shipping v Giant Marine Shipping SA* [2007] FCA 1000 that a subpoena to the proper officer of the ATSB be set aside and that section 60 of the *Transport Safety Investigation Act 2003* is constitutionally valid. The appeal was discontinued in February 2008 and Justice Dowsett's decision stands. 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 with respect to FOI applications.

### Departmental and Ministerial coordination

#### Ministerial correspondence

During 2007-08, the ATSB helped draft 92 responses to letters for Ministers.

#### Briefing Minutes for Ministers

During 2007-08, the ATSB submitted six meeting briefs to Ministers.

#### Questions on Notice

During 2007–08, 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 2007–08, the ATSB appeared at two Senate Estimates Hearings of the Rural and Regional Affairs and Transport Legislation Committee:

- Additional Estimates in February 2008, after which the ATSB drafted answers to three questions on notice
- Budget Estimates in May 2008, 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 including the Safe Transport DVD by telephoning (02) 6274 7687 or 1800 020 616.

The site's online notification forms for accidents and incidents, the aviation confidential reporting scheme (REPCON), the aviation self reporting scheme (ASRS), and the confidential marine reporting scheme (CMRS) 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 2007–08, the site attracted approximately 1,000,000 visitor sessions and by 30 June 2008, was averaging over 110,000 hits per day. The number of hits increases markedly following the release of high-profile information or reports, particularly in the aviation mode.

## **Technical Analysis**

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 of materials and systems failure and the analysis of recorded data collaborate with ATSB investigation team members and external parties to provide in-depth insight into the technical issues surrounding transport safety occurrences.

The ATSB Technical Analysis Team's 2007–08 output of 63 technical reports and projects included 14 stand-alone investigations, specialist support studies, and technical support to international agencies. The 2007–08 work included:

- examination and analysis of skin disbonding of main rotor blades from Robinson R22 helicopters
- examination of fractured rail sections resulting from a derailment on the defined interstate rail network at Bates, SA

- examination of Pratt & Whitney PT6 gas-turbine engine compressor turbine blade failures
- assistance to the Indonesian National Transportation Safety Committee (NTSC) with their investigations in the form of flight recorder download and analysis of six incidents/accidents involving regular passenger transport aircraft
- assistance to the New Zealand Transport Accident Investigation Commission (TAIC) with their investigations in the form of flight recorder download and analysis of two incidents/accidents involving regular passenger transport aircraft.

During 2007–08, the team attempted to recruit two materials failure analysts. Demand for this skill is high in Australia because of the continuing mining boom and the ATSB faces stiff competition from mining industry organisations. As of July 2008, the section had recruited one replacement materials failure analyst and is continuing its efforts to recruit a second. The team's active industry involvement included the presentation of working papers to the EUROCAE Working Group 77 meeting in Cologne, Germany in June 2008 and the 2008 ANZSASI annual conference and seminar in Adelaide in May 2008.

At the commencement of the 2008–09 financial year, 71 technical investigations (including 19 standalone investigations) were underway across the team, including:

- assistance to the Indonesian NTSC with the recovery and analysis of data and audio from a
   number of Indonesian aircraft that were involved in accidents and incidents
- examination of components from a mid-air collision between a Piper Cub and a Robinson R44 helicopter, WNW Gascoyne Junction, WA on 13 February 2008
- examination and analysis of fractured rail from a derailment near Pura Pura, Vic, on 30 March 2008
- examination of flight recorder data from a pressurisation system event involving a Boeing 737 at Coolangatta Airport, Qld on 17 November 2007
- examination of flight recorder data from a leading edge device failure involving a Boeing 737 at Norfolk Is, NSW on 29 December 2007.

In addition, the team continues to assist international parties and to provide input to technical development forums and other bodies.

# 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 manning 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 2007–08, the ATSB received a total of 15,218 aviation notifications of which 8,299 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 Marine Reporting Scheme (CMRS), the confidential aviation reporting scheme (REPCON) and the voluntary reporting aspects of the Aviation Self Reporting Scheme (ASRS). The marine and aviation schemes enable 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 2007–08, six reports were processed through CMRS and 104 reports were 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 three 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 11 aviation safety research reports in 2007-08:

- An analysis of Australian birdstrike occurrences 2002 to 2006
- Staying safe against in-flight turbulence
- Analysis, causality and proof in safety investigations
- Australian aviation safety in review: 2002 to 2006 (2<sup>nd</sup> edition)
- Passenger health the risk posed by infectious disease in the aircraft cabin
- Fibre composite aircraft capability and safety
- Trends in immediately-reportable matters involving regular public transport operations
- CFIT: Australia in context 1996 to 2005
- An overview of spatial disorientation as a factor in aviation accidents and incidents

- · Aircraft reciprocating-engine failure: An analysis of failure in a complex engineered system
- Robinson R22 helicopter aerial mustering usage investigation.

A short description of each ATSB aviation research report is provided in Appendix A.

Two higher profile studies released during the year were:

### Analysis, causality and proof in safety investigations

The quality of a safety investigation's analysis activities plays a critical role in determining whether the investigation is successful in enhancing safety. However, safety investigations require analysis of complex sets of data and situations where the available data can be vague, incomplete and misleading. Traditionally, analysis has been a neglected area in terms of standards, guidance and training of investigators in most organisations that conduct safety investigations. This is despite its importance, complexity, and reliance on the judgements of investigators.

To address this situation, the ATSB developed a comprehensive investigation analysis framework, consisting of standardised terminology and definitions; an accident development model; a defined process or workflow for conducting analysis activities; a set of tools to guide and document analysis activities; and policies, guidelines and training for investigators.

The report, released as a discussion paper in March 2008, and then as a final report in June 2008, presented some of the key aspects of the ATSB investigation analysis framework and concepts, and outlined some of the concerns that have been expressed regarding the framework and similar approaches.

The ATSB believes that its investigation analysis framework is well suited to the Bureau's role as an independent, no-blame safety investigation body. It is hoped and expected that ongoing development and provision of information about the framework can help the safety investigation field as a whole to consider some important issues and help develop the best means of conducting safety investigations to enhance future safety.

## Passenger health - the risk posed by infectious disease in the aircraft cabin

Every year, an increasing number of people undertake air travel. Whether for business or pleasure, these journeys should be safe and enjoyable. However, there is continuing public concern about whether, or to what extent, aircraft cabins represent an increased risk of transmission of infectious disease. This report reviews the current literature on the potential risk of disease transmission within an aircraft cabin.

The evidence suggests that passengers' health is not greatly at risk through air travel, and that widespread infections are unlikely. Although there have been cases of infectious disease transmission in aircraft cabins, there is evidence that such transmission was primarily due to the crowding together of a large variety of people in a confined space, not specifically as a result aircraft cabin conditions. This suggests that the risk of transmission within an aircraft cabin is no greater than in other crowded and confined spaces, provided that circulation and filtration systems are working properly. Perhaps of greater concern is the opportunity for infection to spread in airport terminals, where passengers who are travelling to or from many destinations, are gathered together.

Although the overall risk of transmission of infection in an aircraft cabin is low, passengers need to give sufficient thought to their fitness to fly – not only for their own health, but also for that of the other passengers who will be travelling with them. Furthermore, while an increase in international air travel

could facilitate the spread of a future influenza pandemic, the aviation industry will also play a critical role in mitigating the consequences of such an event. Australia will prevent or minimise the spread of an emerging pandemic through border control measures and also possibly through travel restrictions.

# 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*. Supporting memoranda of understanding with ATSB stakeholders and input into development of international instruments are also coordinated.

## Transport Safety Investigation Act 2003

The *Transport Safety Investigation Act 2003* (TSI Act) and related Regulations have continued to be effective in facilitating the ATSB's independent, no-blame, systemic transport safety investigations. In July 2007, the Federal Court's decision in *Elbe Shipping v Giant Marine Shipping SA* [2007] FCA 2007 confirmed the validity of powers in the TSI Act for the protection of sensitive safety information (see *Freedom of Information and legal matters section*).

Some of the recommendations made in the ATSB/CASA Review 2007 (the Miller Review) would require amendment to the TSI Act if implemented. A number of the Miller recommendations are contentious.

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.

## Maritime Casualty Investigation Code

On 16 May 2008, the International Maritime Organisation (IMO) adopted the 'Code of the International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident' (the Code). Amendments to the International Convention on the Safety of Life at Sea (SOLAS) were also adopted to make parts of the Code mandatory. They are expected to come into effect on 1 January 2010. Australia, through the ATSB, played a primary role in developing and negotiating the Code in the IMO. Significantly, it will ensure that investigations are mandatory for deaths, loss of a ship, or severe damage to the environment, that involve ships on international voyages.

## Confidential Marine Reporting Scheme

Amendments were progressed to legislation giving effect to the 'Confidential Marine Reporting Scheme'. The legislation is being updated to make the marine scheme consistent with the aviation confidential reporting scheme (REPCON) introduced in 2007, which has been successful in delivering legislative guarantees of confidentiality for reporting of safety concerns. Industry consultation on the amendments to the marine scheme is being finalised.

## Memorandums of Understanding

Adding to the existing Memorandums of Understanding (MoUs) with industry and Government agencies, in 2007–08, the ATSB signed an updated MoU with Airservices Australia. The ATSB also

agreed to a Letter of Cooperation with the Safety Institute of Australia. Work continues on updating and revising existing MoUs, while consideration is being given to developing new MoUs with other agencies. In particular, MoUs are being sought with other countries to effect the implementation of the new Maritime Casualty Investigation Code. Copies of MoUs that the ATSB has signed are available on the ATSB website.

# Training and Development

As a Registered Training Organisation (RTO), the ATSB awarded an additional six Transport Safety Investigation (TSI) Diplomas to staff in 2007–08, with a further 14 in progress.

Diploma of Transport Safety Investigation core training courses for 2007–08 included:

- Accident/incident investigation fundamentals
- Investigation analysis
- Basic and advanced OH&S (including blood-borne pathogens)
- TSI Act 2003
- Coronial witness
- Media awareness and media release
- 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 2007–08 included:

- A380-800 Flight deck and systems briefing
- threat and error management training
- Pratt & Whitney ECTM training
- Continental Motors factory overview
- Cirrus Systems safety presentation
- various aircraft general familiarisations (including the completion of Air Transport Pilot Aeroplane License subjects)
- maritime revalidations (Master Mariner)
- helicopter underwater escape training
- Parliamentary processes
- preparation for senate estimates and other parliamentary inquiries
- internal leadership program

• coaching and mentoring.

ATSB support of relevant tertiary education opportunities for 2007-08 included:

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

As a continuous learning organisation, the ATSB has recently reviewed several of its internallyproduced training courses, including Accident Investigation Fundamentals, Human Factors and Basic and Advanced OH&S. These courses now present the very latest subject matter and are more closely aligned to supporting transport safety investigator learning objectives.

## Safety Investigation Information Management System (SIIMS)

The Safety Investigation Information Management System (SIIMS) is the ATSB's system for tracking, managing and reporting on notifications, occurrences and investigations. The ATSB's SIIMS project to replace the old aviation occurrence database (OASIS) received Government funding in 2004–05 of \$6.1m (including capital and expenses but excluding depreciation components) spanning four financial years between 2004-05 and 2007–08.

Following the successful commissioning of SIIMS for aviation in April 2007, Strategy and Capability has continued to manage the final phase of the project in 2007–08. This phase involved expanding and customising the core functionality developed for aviation to cater for rail and marine occurrences and investigations. Both rail and marine capabilities went live as scheduled in the second quarter of 2007–08, with all investigations commenced in the 2008 calendar year now being completed in SIIMS. Migrating data from legacy systems for all three modes was also completed, and reporting models to facilitate easier ad-hoc reporting were introduced. SIIMS is now being maintained as a live application, and there are plans for additional functionality in future, including integration with the ATSB's website, a digital asset management system and additional direct electronic notification functionality from major transport operators.

# International

The Convention on International Civil Aviation (Chicago Convention), and the International Maritime Organisation (IMO) 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, the International Civil Aviation Organization (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 aviation safety.

In an era of massive expansion of air services globally, cooperation with regional neighbour States is fundamentally important.

## Indonesia Transport Safety Assistance Package

The Indonesia Transport Safety Assistance Package (ITSAP), for which funding was announced in the May 2007 federal budget, followed the crash of a Garuda B737 passenger aircraft at Yogyakarta on 7 March 2007. Intended to develop local capacity and underpin the development of a genuine safety culture in the Indonesian transport sector, ITSAP is administered as a single whole-ofgovernment program with the Department of Infrastructure, Transport, Regional Development and Local Government as the lead agency and other portfolio agencies delivering the assistance through technical transfer of skills from aviation and maritime safety specialists.

In May 2008, an Indonesian investigator completed the Bureau's Canberra-based 12-month diplomalevel training as an aviation safety investigator. The project was jointly funded by the ATSB and an AusAID Fellowship. Through ITSAP, the ATSB has expanded its program of capacity-building assistance to Indonesia through 2007–08, providing new opportunities for international aviation and marine investigators. This will include an expanded diploma program for Indonesian marine, rail and aviation investigators in 2008–09.

The ATSB provided cooperation and assistance in the investigation of the Boeing 737 fatal accidents at Yogyakarta Airport in March 2007 and into the Makassar Strait in January 2007. This involvement was undertaken at the invitation of the Government of Indonesia, to assist the Bureau's Indonesian counterpart, the NTSC. The cooperation was conducted in accordance with international standards and included on-site investigation, flight data and cockpit voice recorder replay and analysis and report writing. Working cooperatively led to the timely release of both final accident investigation reports and many safety actions being taken by the Indonesian regulator, air traffic service provider, and the airlines. Assistance for other high-profile aviation investigations in Indonesia was also provided, in addition to marine investigation analysis assistance.

Under the ITSAP program, the ATSB also conducted training courses in Indonesia, including courses on human factors and basic investigation. These courses are designed to provide the knowledge base for conducting and reporting on investigations according to ICAO and IMO Standards.

## International Civil Aviation Organization

The International Civil Aviation Organization (ICAO) is a specialized 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 of the audit is yet to be received, although the results are expected to recognise the ATSB as a best-practice agency in a range of investigation activities.

# 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 Code of the International Standards and Recommended Practices for a Marine Safety Investigation into a Marine Casualty or Marine Incident (the Code) was adopted by the International Maritime Organisation on 16 May 2008. It is expected to come into effect on 1 January 2010. The ATSB played a major role in both initiating the development of the Code and drafting its provisions. When it comes into effect as a part of the International Convention of the Safety of Life at Sea (SOLAS), the Code will represent a major advance in international maritime safety investigation. Australia, as a signatory to the SOLAS Convention, will be required to conduct safety investigations into very serious marine casualties (deaths, loss of ship and severe damage to the environment) involving any of our ships. In addition, the Code provides for the investigation of marine casualties in our waters. The ATSB has been investigating such casualties for many years and is already fully compliant with the Code's mandatory provisions and recommended practices.

# International Transportation Safety Association

The ATSB is a member of the International Transportation Safety Association (ITSA), which consists of 13 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 ATSB participated in the annual meeting of the International Transportation Safety Association (ITSA), held in May 2008 in St Petersburg, Russia. Of particular note was a presentation on the investigation conducted by the UK Marine Accident Investigation Branch into the breakup of the MSC *Napoli* in rough weather. The techniques used to establish the breakup mechanism and sequence using advanced simulation software set a benchmark for other investigation authorities to follow.

# 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 meeting was held in August 2007 in Singapore. Of particular interest to ATSB investigators were presentations on cultural challenges when conducting joint-investigations with foreign agencies and the difficulties experienced in collating information in a foreign language, as well as cultural differences in the approach to accident investigation. Another presentation by the US FAA focussed on the rapid introduction of relatively low-cost, very light jets (VLJs) that are entering service in private operations in the US and are expected to arrive in Australia in the coming years. 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 MAIIF meeting was held in October in Beijing, China. The ATSB's representative provided a presentation on the investigation into the grounding of the *Pasha Bulker* near Newcastle on 8 June 2007. The presentation included details of the data collection techniques employed to identify the safety risks present and the survey of the practices by the crews of other ships that were in the area at the time of the *Pasha Bulker*'s grounding. Separately, a correspondence group was established, led by Vanuatu, to collect further data on issues surrounding 'enclosed spaces' incidents with a view to providing a paper on the findings to the International Maritime Organisation. The ATSB participated in this correspondence group.

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. The purpose of the exercise is 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.

The benchmarking exercise is expected to be finalised in 2008–09.

# Transport safety performance statistics

## Multimodal trends (fatalities)

Table 1 shows the number of fatalities in each of the major transport modes from 1998 to 2007. This table shows that road trauma is by far the largest contributor to total transport deaths. Between 2003 and 2007, it accounted for 93 per cent of the total, aviation accounted for 2 per cent, and rail and marine each accounted for 3 per cent respectively (see Figure 1).

Year	Road	Rail	Marine	Aviation*
1998	1755	59	46	48
1999	1764	47	51	42
2000	1817	46	42	38
2001	1737	56	59	40
2002	1715	58	48	24
2003	1621	47	41	35
2004	1583	44	43	24
2005	1627	37	25	39
2006	1598	41	29	37
2007	1611	37	na	23

#### Table 1: Australian transport fatalities by mode, 1998 to 2007

na not available.

\* Explanatory notes

• Fatalities resulting from parachute operations where aircraft safety was not a factor have not been included in this data.

• The data excludes fatalities involving non-VH registered recreational aircraft.

Source: ATSB (road, rail and aviation), ABS (marine)



#### Figure 1: Australian transport fatalities by mode, 2003 to 2007

Source: ATSB (road and aviation), ABS (rail and marine).

Figure 2 shows the overall transport accident death rate across road, rail, marine and aviation modes per 100,000 population. The overall death rate decreased from 10.14 deaths per 100,000 population in 1998 to 7.89 in 2007.



Figure 2: Australian transport fatalities (all modes) per 100,000 population, 1998 to 2007

Source: ATSB, ABS

## Road safety trends

The aim of the *National Road Safety Strategy 2001–2010*, which was endorsed by Ministers of the Australian Transport Council, is to reduce the annual road death rate to no more than 5.6 road deaths per 100,000 population by the end of 2010.



Figure 3: Road crash death rates per 100,000 population, December 1999 to June 2008

Sources: Department of Infrastructure, Transport, Regional Development and Local Government, ABS

The Strategy came into effect on 1 January 2001, at which time the annual road death rate for the preceding 12 months was 9.5 deaths per 100,000 population—slightly higher than the 9.3 rate used as a base for the Strategy.

Figure 3 shows that at mid-2008 the 12-month road crash death rate per 100,000 population stood at 7.2, a fall of 23.3 per cent from the base NRSS rate. Using a projected constant annual reduction between the rate at 1 January 2001 and the target rate of 5.6 at the end of 2010, the projected rate for mid-2008 was 6.4 deaths per 100,000 population, a projected fall of 31.8 per cent. There remains a substantial challenge to meet the 2010 target.

During the first 7 years of operation of the Strategy:

- vehicle occupant deaths declined by 13 per cent (173 fewer deaths)
- pedestrian deaths declined by 25 per cent (112 fewer deaths)
- motorcyclist deaths increased by 25 per cent (47 more deaths)
- bicyclist deaths increased by 32 per cent (10 more deaths).

#### Average annual change

Each year, numbers of deaths fluctuate around a trend. This section assumes that the trend function is exponential with a constant growth (or decay) rate.

Over the last 5 years, *total* road crash deaths have declined by an average of 1.4 per cent per year. Figure 4 gives the 5-year average change for each road user group. A positive rate means that numbers of deaths each year are tending to increase.

Numbers of deaths of motorcyclists have grown by approximately 3.9 per cent per year for each of the past 5 years. By comparison, numbers of deaths of motor vehicle passengers has fallen by approximately 5.2 per cent per year. A small annual change of -0.5 per cent was observed in driver deaths.





#### Persons seriously injured

The number of persons seriously injured in road crashes each year is being monitored in collaboration with the Australian Institute of Health and Welfare. Figures for 1999–00 to 2005–06 are now available (Table 2).

	Case numbers						
Road user group	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Males							
Pedestrian	1,769	1,731	1,777	1,633	1,568	1,522	1,563
Car driver	4,874	5,122	5,588	5,085	5,490	5,523	5,576
Car passenger	2,150	2,255	2,306	2,132	2,251	2,190	2,273
Motorcyclist	4,151	4,252	4,683	4,630	4,891	5,344	5,901
Pedal cyclist	2,719	2,455	2,672	2,905	2,951	3,277	3,527
Total	15,663	15,815	17,026	16,385	17,151	17,856	18,840
Females							
Pedestrian	1,161	1,185	1,124	1,037	1,010	1,072	1,081
Car driver	3,596	3,691	3,944	3,992	4,248	4,285	4,410
Car passenger	2,804	2,772	2,966	2,683	2,656	2,750	2,840
Motorcyclist	363	390	413	410	494	517	577
Pedal cyclist	705	601	619	686	725	761	843
Total	8,629	8,639	9,066	8,808	9,133	9,385	9,751
Persons							
Pedestrian	2,930	2,916	2,901	2,670	2,578	2,594	2,644
Car driver	8,470	8,813	9,532	9,077	9,738	9,809 <sup>(a)</sup>	9,986
Car passenger	4,954	5,027	5,272	4,815	4,908 <sup>(a)</sup>	4,941 <sup>(a)</sup>	5,113
Motorcyclist	4,514	4,642	5,096	5,040	5,385	5,861	6,479 <sup>(a)</sup>
Pedal cyclist	3,424	3,056	3,291	3,591	3,676	4,038	4,370
Total	24,292	24,454	26,092	25,193	26,285	27,243	28,592

# Table 2: Road vehicle traffic crashes—serious injury cases by sex and road user group, Australia, 1999-00 to 2005-06

(a) Includes cases where sex is missing or indeterminate.

Source: Serious injury due to land transport, Australia, 2005-06 available at <www.nisu.flinders.edu.au>

#### Road death rates by state/territory

As shown in table 3 below, road crash death rates per 100,000 population by the end of 2007 were lower than those at the end of 2000 in all jurisdictions except the Northern Territory. Over this same 7-year period, the national road death rate declined by 24.6 per cent.

Year	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
1999	9.0	8.2	9.0	10.1	11.8	11.2	25.4	6.1	9.3
2000	9.3	8.6	8.9	11.0	11.3	9.1	26.1	5.7	9.5
2001	8.0	9.2	8.9	10.1	8.7	12.9	25.3	5.0	8.9
2002	8.5	8.2	8.7	10.1	9.3	7.8	27.6	3.1	8.7
2003	8.1	6.7	8.1	10.3	9.2	8.6	26.5	3.4	8.1
2004	7.6	6.9	8.0	9.0	9.0	12.0	17.3	2.7	7.9
2005	7.5	6.9	8.3	9.5	8.1	10.5	26.6	7.9	8.0
2006	7.3	6.6	8.2	7.5	9.9	11.2	19.9	3.9	7.7
2007	6.4	6.4	8.6	7.8	11.2	9.1	26.0	4.1	7.7

#### Table 3: Road crash deaths per 100,000 population by state/territory, 1999 to 2007

Source: Department of Infrastructure, Transport, Regional Development and Local Government, ABS

Note: At the end of June 2008, the national fatality rate stood at 7.2 deaths per 100,000 population, compared with a rate of 6.4 that would have represented pro-rata progress towards the 2010 target. NSW (5.7), Victoria (6.3) and the ACT (4.4) achieved fatality rates below the pro-rata rate. South Australia achieved a rate of 6.8, but the other jurisdictions were substantially higher.

## Truck safety trends

Table 4 shows the number of deaths in road crashes involving articulated trucks in each jurisdiction between 2000 and 2007.

Collection has begun on road death crashes involving heavy rigid trucks; however, the available data are not yet sufficient for worthwhile analysis. On the basis of a less up-to-date data source, road deaths involving heavy rigid trucks are estimated to be of the order of two-thirds of the road deaths involving articulated trucks.

	2000 ((										
	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia		
2000	84	40	40	19	13	6	6	0	208		
2001	60	45	33	18	14	5	0	3	178		
2002	86	49	28	13	14	3	7	0	200		
2003	63	41	35	13	17	1	1	0	171		
2004	64	37	13	13	17	4	2	0	150		
2005	52	30	25	17	12	5	1	0	155		
2003	52	32	27	10	10	0	1	0	100		
2006	69	31	37	10	11	8	2	0	168		
2007	60	48	41	6	15	5	2	0	177		

# Table 4:Australian road deaths in crashes involving articulated trucks, by state/territory,<br/>2000 to 2007

Source: ATSB, Department of Infrastructure, Transport, Regional Development and Local Government

Road deaths and fatal crashes involving articulated trucks have declined by 12 per cent and 15 per cent respectively since the 2003 introduction of the *National Heavy Vehicle Safety Strategy* 2003–2010 (NHVSS). Over the same period, kilometres travelled, tonne-kilometres, and articulated truck numbers all increased—by 12 per cent, 21 per cent (to 2006 only), and 16 per cent respectively (see figure 5).

Overall, between 1998 and 2006, (the latest period for which activity data are available across all variables):

- road death rate per kilometre travelled declined by 22 per cent
- road death rate per tonne-kilometre declined by 34 per cent
- kilometres travelled by articulated trucks increased by 24 per cent
- articulated truck tonne-kilometres increased by 45 per cent
- articulated truck numbers increased by 20 per cent.





Source: ATSB, Department of Infrastructure, Transport, Regional Development and Local Government, ABS, BITRE

### International road safety comparisons

To compare measures of road trauma across international jurisdictions, some standardisation should occur in order to remove the effects caused by diversity of population and/or levels of motorization. The rate of road crash fatalities per 100,000 population is used here for this purpose.

While Australia's rate has historically been below the OECD median rate, the OECD median has been falling at a faster rate over time. In 2006 (the latest year with available international data) Australia's rate placed it 13<sup>th</sup> best out of 30 nations.

Figure 6 presents historical data for Australia against the OECD median.



#### Figure 6: Road crash deaths per 100,000 population, OECD median and Australia, 1985 to 2006

Sources: ATSB, Department of Infrastructure, Transport, Regional Development and Local Government, IRTAD
### **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 Standard No. ON – S1: Occurrence Categories and Definitions. These definitions have been developed by rail safety regulators in collaboration with industry operators. Rail regulators provide the data to the Australian Transport Safety Bureau (ATSB) for national publication.

The data is published at <www.atsb.gov.au/rail/statistics.aspx> and also features in Table 5.

Occurrence type	2003	2004	2005	2006	2007
Deaths (non-suicide)	47	44	37	41	37
Serious injuries (exc. NSW)	50	74	70	132	177
Derailments <sup>+</sup>	162	192	111	110	146
Collisions <sup>+</sup> with	102	102	144	110	140
- infrastructure	72	87	103	106	101
- persons	52	54	49	45	41
- road vehicles	20	31	16	14	11
- rollingstock	3	12	13	14	6
- other trains	18	6	19	21	16
Level Crossing collisions with		-			
- road vehicles	84	73	71	81	57
- persons	13	8	6	9	7
Signals passed at danger	324	468	439	418	501
Loading irregularities	376	450	499	511	479
Track/infrastructure irregularities	1502	1626	1094	1068	1096

### Table 5: National Rail Safety Occurrence Data 2001 to 2007

### + Running line

Source: Rail Safety Regulators Panel (RSRP), ATSB

The information contained in Table 6 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 5. The table shows that over the last 5 years, collisions with road vehicles at level crossings were the most frequent occurrence reported to the ATSB, followed by running line derailments and running line collisions.

		Occurre	nce Year	(# Rail Oc	currence	s)	
Occurrence Type Level 1	Occurrence Type Level 2	2003	2004	2005	2006	2007	Total
						1	1
Collision	Running Line Collision	3	6	7	6	5	27
	Yard Collision		1	1		1	3
Derailment	Running Line Derailment	2	11	6	5	12	36
	Yard Derailment	2	2	4	3	2	13
Fire	Lineside Fires				1		1
	On Train		1			2	3
Level Crossing Occurrence	Collision with Person		1	3		1	5
	Collision with Road Vehicle	7	8	10	14	13	52
Load Irregularity	Door Open					1	1
	Load Shift			1	1	1	3
	Loose Load Fastening			1			1
Proceed Authority Exceeded	Completely Missed While Running		1	1			2
	Driver Misjudged		1				1
Rollingstock Irregularity	Braking System		1				1
	Defective Bearing	1	2	3	2	2	10
	Other		1		5	1	7
	Train Parting		3		1		4
	Wheel/Axle Failure		3		3		6
Safeworking Rule or Procedure Breach/							
Deficiency	Other		4	5		1	10
	Safeworking Rules or Procedures Deficiency				1		1
Signal Passed at Danger	Completely Missed While Running		1				1
	Driver Misjudged		2	1			3
	Other			1			1
	Starting Against Signal				1		1
Slip, Trip or Fall	To/From Train		1				1
Suspected Suicide or Attempted Suicide	Suspected Suicide		1	1		2	4
Track and Civil Infrastructure Irregularity	Buckled Track	1	2	2	1		6
	Other					1	1
	Other Natural Events					1	1
	Spread Track	1	1				2

### Table 6 : Rail Occurrences Reported to the ATSB by Occurrence Type

### Marine Safety Trends

The information contained in Table 7 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 5 years, serious injuries sustained by crew members is the most frequent occurrence reported to the ATSB followed by machinery and equipment failures and groundings/strandings.

Occurrence Type	2003	2004	2005	2006	2007	Total
Capsizing/listing		1		1		2
Close quarters		4	3	2	2	11
Collision	2	6	7	8	7	30
Contact		1	6	3	4	14
Damage to ship or equipment		2	6	6	4	18
Equipment failure	1	4	13	11	14	43
Fatality	3	5	6	8	6	28
Fire/explosion	2	3	10	10	10	35
Flooding		1		2	2	5
Foundered			1			1
Grounding/stranding	5	10	11	11	6	43
Hull failure/failure of watertight openings					2	2
Lifeboat accident	1	1	4	4	1	11
Machinery failure	3	16	4	17	5	45
Missing assumed lost				1		1
Other		2	6	10	11	29
Pollution				1	2	3
Serious injury	2	1	17	17	16	53
Total	19	57	94	112	92	374

### Table 7: Marine Occurrences Reported to the ATSB by Occurrence Type, 2003 to 2007

### 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 is usually presented in terms of Australia's aviation sectors:

- 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)
- General Aviation (aircraft used for aerial work, training, private, business and recreational operations).

The information contained in Table 8 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.

Occurrence Type Level 1	Occurrence Type Level 2	2003	2004	2005	2006	2007	Total
Aerodrome and airways facility	Aerodrome related	42	30	30	31	33	166
	Airways facility	109	68	66	144	50	437
Airspace	Aircraft separation	180	177	196	187	190	930
	Airspace incursion	520	83	633	1301	1315	3852
	Breakdown of co-ordination	254	338	345	308	323	1568
	Information error	77	56	117	111	88	449
	Operational non-compliance	643	653	1017	1185	1430	4928
	Other	75	17	29	33	5	159
	Procedural error	82	79	120	119	106	506
Mechanical	Airframe	167	158	193	197	293	1008
	Powerplant / propulsion	302	287	292	252	381	1514
	Systems	282	425	468	395	422	1992
Operational	Aircraft control	24	38	47	54	93	256
	Aircraft loading	12	35	40	75	112	274
	Bird / animal strike	909	1154	1341	1292	1345	6041
	Cabin Safety	22	22	26	35	46	151
	Collision	114	114	125	90	135	578
	Communications	90	161	130	182	114	677
	Fuel related	43	40	36	40	56	215
	Ground operations	227	265	320	313	302	1427
	Miscellaneous	17	16	15	10	26	84
	Navigation / flight planning	94	112	153	144	137	640
	Regulations and SOPs	8	8	5	9	25	55
	Significant event	280	357	380	495	412	1924
	Warning device	320	443	562	396	295	2016
	Weather / environment	116	162	168	169	186	801

### Table 8: Aviation Occurrences reported to the ATSB by Occurrence Type, 2003 to 2007

### Table 9: Aviation occurrences by occurrence category, 1998 to 2007

Occurrence category	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Accident	230	196	224	203	164	158	167	133	104	152	1,731
Serious incident	1	7	9	9	8	6	20	28	20	28	136
Incident	4,991	5,377	5,764	5,491	5,841	4,855	5,129	6,712	7,486	7,769	59,415
Total	5,222	5,580	5,997	5,703	6,013	5,019	5,316	6,873	7,610	7,949	61,282

Note:

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

### Aviation accident numbers by operation type

High-capacity aircraft operations continue to be the safest in the country, with extremely low accident numbers (Table 10). To date, Australia has recorded no hull losses or fatal accidents involving high-capacity aircraft operations. As table 10 shows, both high-capacity and low-capacity operations are very safe in terms of the number of accidents each year. The two fatal accidents recorded against low-capacity operations relate to an 8-fatality accident involving a Piper PA-31-250 near Whyalla in 2000 and a 15-fatality accident involving a Fairchild Metro 23 aircraft near Lockhart River on 7 May 2005.

Air transport	Injury level	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
High canacity	Fatal	0	0	0	0	0	0	0	0	0	0	0
Then oupdoity	Non-fatal	1	8	3	3	3	1	1	1	2	2	25
Low capacity	Fatal	0	0	1	0	0	0	0	1	0	0	2
Low capacity	Non-fatal	2	3	2	3	4	3	0	1	0	1	19
Charter	Fatal	2	3	3	4	4	2	0	1	1	2	22
ondition	Non-fatal	39	18	24	28	16	25	15	8	9	14	196
Total	Fatal	2	3	4	4	4	2	0	2	1	2	24
	Non-fatal	42	29	29	34	23	29	16	10	11	17	240

### Table 10: Aviation accident numbers - Air Transport, 1998 to 2007

Table 11 shows that of the General Aviation categories, private operations continue to dominate, with 555 accidents between 1998 and 2007 but there has been an overall decrease in annual accident numbers since 1998.

General aviation	Injury level	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Aerial work	Fatal	4	1	5	5	1	3	3	2	4	3	31
Achar work	Non-fatal	47	40	43	37	22	31	41	27	18	26	332
Rusiness	Fatal	3	2	0	0	0	0	1	0	0	1	7
Dusiness	Non-fatal	9	4	3	4	1	0	1	0	0	3	25
Flving training	Fatal	1	2	0	2	1	5	1	1	0	0	13
i lying training	Non-fatal	25	30	37	17	24	14	13	22	11	16	209
Private	Fatal	13	14	9	10	4	4	6	9	13	7	89
Timate	Non-fatal	68	53	69	67	67	49	65	42	34	41	555
Total	Fatal	17	18	9	12	5	9	8	10	13	8	140
10101	Non-fatal	102	87	109	88	92	63	79	64	45	60	1,121

### Table 11: Aviation accident numbers – General Aviation

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Recreational	Injury level	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Ballooning	Non-fatal	-	0	2	m	Ч	ς	Ť	0	1	2	14
0	Fatal	0	0	0	0	0	0	0	0	0	0	0
Gliding	Fatal	2	1	0	0	0	0	Ţ	ო	с	1	11
0	Non-fatal	ß	9	10	ß	00	9	00	9	с	4	61
Snort aviation	Fatal	0	0	0	1	0	1	0	1	0	0	с
	Non-fatal	0	2	2	0	Ţ	0	0	Т	1	m	10
Total	Fatal	e	Ŧ	7	4	۲	4	7	4	4	e	28
	Non-fatal	2	00	12	5	6	9	80	7	4	7	71

Note: Recreational accident numbers exclude non-VH registered aircraft.

# Table 13: Aviation accident numbers – Total all operations

All categories		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
	Fatal	22	22	15	20	10	15	10	16	18	13	192
Grand total	Non-Fatal	149	124	150	127	124	86	103	81	60	84	1,432
Note: During the 10	Mear reporting period there	More 73 ac	idente arroc	e all catador	lovul teht jovul	alnitinina hav	aircraft					

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# Aviation accident rates by operation type

Accident numbers alone cannot provide a complete picture of safety trends. It is also important to consider the amount of flying each category of operation has undertaken. However, a degree of caution should be used when interpreting the results because of the low number of accidents, fatal accidents and fatalities recorded each year.

Table 14: Air transport rates per 100,000 hours flown, 1997 to 2006

Air transport		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
High capacity	Accidents	0.00	0.14	0.99	0.39	0.38	0.14	0.13	0.11	0.11	0.00
	Fatal accidents	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Fatalities	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Low capacity	Accidents	0.00	0.70	1.05	1.05	1.20	1.92	1.52	0.00	1.00	0.00
	Fatal accidents	0.00	0.00	0.00	0.35	0.00	0.00	0.00	0.00	0.50	0.00
	Fatalities	0.00	0.00	0.00	2.80	0.00	0.00	0.00	0.00	7.53	0.00
Charter	Accidents	10.35	8.29	4.17	5.47	6.92	4.53	5.63	3.13	1.87	2.10
	Fatal accidents	0.83	0.40	0.60	0.63	0.86	0.91	0.47	0.00	0.21	0.21
	Fatalities	1.66	1.42	1.98	2.31	2.16	2.72	1.88	0.00	0.62	0.42
Total	Accidents	3.38	2.96	2.07	2.08	2.52	1.82	2.03	1.03	0.75	0.62
	Fatal accidents	0.27	0.13	0.20	0.26	0.26	0.29	0.14	0.00	0.12	0.06
	Fatalities	0.54	0.47	0.67	1.24	0.66	0.88	0.58	0.00	1.12	0.12

The accident, fatal accident and fatality rates for high and low-capacity operations continue to remain low, reinforcing the results of previous ATSB studies that found Australia among world leaders in aviation safety (see Figure 10 Fatal Accidents – Scheduled Operations by Regions).



Figure 7: Air transport rates per 100,000 hours flown, 1997 to 2006

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General aviation		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	Accidents	15.15	11.15	9.35	11.47	10.33	5.71	8.56	10.88	6.92	5.43
Aerial work	Fatal accidents	1.36	0.87	0.23	1.19	1.23	0.25	0.76	0.74	0.48	0.99
	Fatalities	1.81	1.09	0.46	2.15	2.21	0.25	1.76	0.99	0.48	2.22
	Accidents	2.80	7.23	3.86	2.16	2.73	0.69	0.00	1.38	0.00	00.0
Business	Fatal accidents	0.56	1.81	1.29	0.00	0.00	0.00	0.00	0.69	0.00	00.0
	Fatalities	0.56	3.62	1.29	0.00	0.00	0.00	0.00	4.14	0.00	00.0
	Accidents	8.77	5.15	7.03	8.09	4.62	5.53	4.46	3.92	5.22	2.56
Hying training	Fatal accidents	0.00	0.21	0.44	0.00	0.49	0.24	1.17	0.28	0.24	00.0
	Fatalities	0.00	0.21	0.44	0.00	0.49	0.24	1.64	0.56	0.24	00.0
	Accidents	25.28	30.18	22.65	30.35	29.23	25.04	21.58	27.29	21.13	20.11
Private	Fatal accidents	1.86	4.90	4.31	3.19	3.80	1.47	1.66	2.01	3.73	5.68
	Fatalities	3.35	10.19	7.91	3.59	7.21	3.68	4.98	3.61	5.80	9.62
	Accidents	13.37	12.23	10.70	13.11	11.56	9.32	8.68	11.08	8.27	6.54
lotal	Fatal accidents	0.89	1.53	1.28	1.06	1.38	0.49	0.99	0.87	0.97	1.41
	Fatalities	1.34	2.84	2.11	1.47	2.44	0.97	2.15	1.82	1.38	2.57

Of interest in Figure 8 is the overall decrease in accident rates for General Aviation operations compared to the small overall increase in the fatal accident and fatality rate.



Figure 8: General aviation rates per 100,000 hours flown, 1997 to 2006





### International aviation comparison

Compared with the rest of the world, Australia has the lowest accident rate for high-capacity aircraft (see figure 10). International comparisons of high-capacity operations are often based on hull losses per million departures.

# International comparison of fatal accidents per million departures, calendar years 2003 to 2007



### Figure 10: Fatal accidents - scheduled operations by regions

### Accidents per million departures

Source: International Civil Aviation Organization

Figure 10 provides data for the period 2003 to 2007 for the different regions of the world compared with the world average of 0.5 accidents per million departures. Australia is the lowest for the world at 0.0 accidents per million departures. Australia has never had either a hull loss or a fatal accident involving a high-capacity jet aircraft. It is less economic to repair older aircraft and hull loss data are in some measure biased by the age of aircraft involved in serious accidents.

# Internal management and processes

### Financial overview

In 2007–08, the ATSB utilised \$16.396m of operating expenditure (including \$0.125m sourced from own revenue), and \$0.272m of capital expenditure to deliver its outputs (Table 16).

A number of 2007–08 aviation investigations were conducted into accidents at remote and difficult locations and incurred above average logistical and retrieval costs. These expenses, together with additional depreciation following the commissioning of the ATSB's Safety Investigation Information Management System (SIIMS), resulted in higher investigation expenditure over 2006–07. The Government's 3-year Indonesia Transport Safety Assistance Package (ITSAP) commenced in 2007–08 with the ATSB funded to provide \$1.724m of assistance on approved projects.

The ATSB operating budget allocation for 2008–09 is \$16.856m, including attributed depreciation expense of \$1.467m and an increase in the ITSAP allocation to \$1.925m. The ATSB, like all Department of Infrastructure divisions, is required to absorb the 4 per cent staff pay rise effective 1 July 2008 under the Collective Agreement 2006–2009, and also incurred a budget reduction of \$0.162m resulting from the Government's efficiency dividend requirement.

				0000 00
2004-05	2005-06	2006-07	2007-08	2008-09
ACTUAL	ACTUAL	ACTUAL	ACTUAL	BUDGET
\$m	\$m	\$m	\$m	\$m
10.020	11.733	11.460	11.089	11.904
4.758	4.343	3.451	3.794	3.485
0.467	0.583	0.587	1.420	1.467 <sup>2</sup>
2.165	0.814	0.675	0.094	0.000
17.410	17.473	16.172	16.396	16.856
0.398	0.203	0.111	0.125	0.000
17.013	17.269	16.061	16.271	16.856
0.487	0.110	0.043	0.109	0.000
	0.289	0.671	0.163	0.000
98	109	113	97	93
	2004-05 ACTUAL \$m 10.020 4.758 0.467 2.165 17.410 0.398 17.013 0.487 0.487	2004-05         2005-06           ACTUAL         ACTUAL           \$m         \$m           10.020         11.733           4.758         4.343           0.467         0.583           2.165         0.814           17.410         17.473           0.398         0.203           17.013         17.269           0.487         0.110           0.289         98	2004-05         2005-06         2006-07           ACTUAL         ACTUAL         ACTUAL           \$m         \$m         \$m           \$m         \$m         \$m           10.020         11.733         11.460           4.758         4.343         3.451           0.467         0.583         0.587           2.165         0.814         0.675           17.410         17.473         16.172           0.398         0.203         0.111           17.013         17.269         16.061           0.487         0.110         0.043           0.289         0.671         98           109         113         113	2004-05         2005-06         2006-07         2007-08           ACTUAL         ACTUAL         ACTUAL         ACTUAL         ACTUAL           \$m         \$m         \$m         \$m           10.020         11.733         11.460         11.089           4.758         4.343         3.451         3.794           0.467         0.583         0.587         1.420           2.165         0.814         0.675         0.094           17.410         17.473         16.172         16.396           0.398         0.203         0.111         0.125           17.013         17.269         16.061         16.271           0.487         0.110         0.043         0.109           0.289         0.671         0.163           98         109         113         97

### Table 16: Budget Comparisons

### Notes

- 1. Under a 2007–08 departmental restructure, the ATSB's former Road Safety functions were transferred to another division of the Department. Consequently Road Safety expenditure is not included above from 2008–09, and only a small residual component of \$0.294m is included in 2007–08. Road Safety budget resources transferred from the ATSB were \$2.063m in 2007–08 and \$2.319m in 2008–09.
- 2. From 2008–09 depreciation expense is held centrally and not allocated to divisional budgets, however attributed depreciation is included above for comparison purposes.
- 3. Expenditure under the Indonesia Transport Safety Assistance Package is included comprising \$1.082m actual in 2007-08 and \$1.925m budget in 2008-09.
- 4. Capital amounts are recognised when either spent, approved for expenditure, or contained in a budget measure.
- 5. This represents the value of ATSB staff contributions to SIIMS which was commissioned in April 2007 for aviation and completed in 2007–08 for all modes.
- Average staffing FTE across the year. Includes 5.0 FTE budget allocation to ITSAP in 2008–09. The transfer of the Road Safety function in 2007–08 included a full year budget transfer of 14.0 FTE.

The 2008–09 Portfolio Budget Statements include the ATSB's departmental expenses under Outcome 2 'Fostering an efficient, sustainable, competitive, safe and secure transport system'. From 2008–09, the ATSB contributes to a single departmental output viz Output 2.1.1 Transport Safety Investigations. Table 17 below shows ATSB resourcing by output, including attributed departmental corporate overhead.

### Table 17: ATSB Price of Outputs 7

	2007-08	2007-08	2008-09	2008-09
	ESTIMATE	ACTUAL	ESTIMATE	BUDGET
	PBS		PBS	Post PBS
Output 2.1.1				
Iransport Safety Investigations	Şm	Şm	Şm	Şm
ATSB <sup>8</sup>	16.779	16.102	17.226	16.856 <sup>9</sup>
Corporate	7.622	7.690	7.472	6.981
Total	24.401	23.792	24.699	23.837
Output 2.3.2 Road safety and vehicle policy, programs and regulation				
ATSB	0.294	0.29410		
Corporate	0.156	0.154		
Total	0.450	0.448		
Summary				
ATSB	17.073	16.396	17.226	16.856
Corporate	7.778	7.844	7.472	6.981
Total	24.851	24.240	24.699	23.837

Notes

- 7. 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 Annual Report 2007–08 for mapping between the present and former output structures).
- 8. Includes Indonesia Transport Safety Assistance Package (\$1.082m actual 2007-08, \$1.925m budget 2008-09).
- 9. Includes depreciation expense of \$1.467m held centrally.
- 10. Most expenditure relating to the ATSB's former Road Safety functions was transferred effective 1 July 2007. However a small component was transferred effective 1April 2008. Expenditure of \$0.294m incurred on this component prior to this date remained included in the ATSB's 2007–08 result.

### Table 18: Comparison of staffing levels (year end FTE)

	2007-08	2008-09
	Actual	Budget
Classification level	30 June 08	30 June 09
Executive Director	1.0	1.0
Director Transport Safety Investigation	4.0	4.0
Team Leader Transport Safety Investigation	6.0	6.0
Senior Transport Safety Investigator	52.0	57.0
Transport Safety Investigator	1.0	0.0
Executive Level 2	6.0	5.0
Executive Level 1	5.0	5.0
Australian Public Service Level 6	5.5	5.5
Australian Public Service Level 5	7.0	8.5
Australian Public Service Level 4	3.4	2.0
Australian Public Service GAPS	0.0	1.0
TOTAL (year end FTE)	90.9	95.0

### People profile

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*. Further responsibilities are outlined in the *Financial Management and Accountability Act* and other legislation.

The ATSB ensures there are clear linkages between individual work plans (Plans on a Page), unit business plans and the Department's Portfolio Budget Statements. Six-monthly performance exchanges 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 12: ATSB statistical and research publications initiated/completed

Initiated Released

### Major accident preparedness

The 2007–08 review and testing of the response capabilities of ATSB staff complemented previous testing of ATSB operational readiness.

The ATSB's 2007–08 major accident response program included a desktop discussion exercise that considered recovery aspects of a major aviation accident, conducted in association with primary response agencies at Sydney Airport in May 2008.

In December 2007, ATSB staff travelled to Port Macquarie, New South Wales, to participate in Exercise: Rock My Baby—a large desktop exercise that contemplated interagency responses to an aviation accident at Lord Howe Island, which has fewer resources than ports in mainland Australia.

The ATSB also participated in on-site and central office response and recovery exercises for a major aviation accident simulation, held at Lord Howe Island in May 2008 and at Gold Coast Airport in June 2008. This program is ongoing, with simulations to be conducted at the Perth and Sydney airports in 2008–09.

These collaborative exercises have led to an internal review of the ATSB's Major Accident Response Guidelines aimed at simplifying and streamlining the ATSB's response to a major accident. The review is expected to be completed in early 2009.

### 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 \$5.450m at 30 June 2008 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

In November 2000, the Australian Transport Council adopted the *National Road Safety Strategy* 2001–10. Noting that not all road users enjoy the same level of safety, the Strategy commits governments to improving equity among road users. Targeted groups include:

- youth and older people
- Indigenous Australians
- non-English speaking background Australians
- residents in rural and remote areas
- pedestrians, cyclists and motorcyclists.

In 2007–08, the Department supported continued collaboration among jurisdictions on Indigenous road safety issues by:

- convening and chairing meetings of the Indigenous Road Safety Working Group
- on behalf of the Indigenous Road Safety Working Group the Department is planning the fourth Indigenous Road Safety Forum in Cairns
- continuing to employ a university student during semester breaks under the National Indigenous Cadetship Project of the Department of Employment and Workplace Relations
- participating as a steering committee member to support Western Australia's ongoing improvement of the HealthInfoNet Indigenous Road Safety Website
- distributing, on request, copies of the Aboriginal road safety video Corrugations to Highways.

### Aboriginal Reconciliation

The Departmental Reconciliation Action Plan outlines how the Department contributes to the wellbeing and quality of life of Indigenous Australians. A program initiative in the Plan includes preparation for the  $4^{\text{th}}$  Indigenous Road Safety Forum in Cairns later in 2008.

The employment initiative in the Plan notes the employment of a university student during semester breaks under the National Indigenous Cadetship Project conducted by the Department of Employment and Workplace Relations.

### Disability strategy

The Department 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.

Until the structural changes in the department led to the departure of the Road Safety section, the ATSB website contained a large body of road safety research and statistical publications. It also provided a broad range of safety information products.

### 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 innovative CD-ROM based-system, designed in-house, to maintain continued awareness and competency concerning vaccinations. 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.

2007–08 saw the ATSB Occupational Health and Safety Panel become established as an effective forum. By maintaining the organisation's focus on both routine and unique health and safety issues as they arise, it ensured the continued health and safety of employees, contractors and members of the general public. The panel, comprising 10 staff drawn from across the Bureau (including one member from each regional office and a management representative at the Team Leader level), meets monthly and has provided the impetus behind a number of new initiatives implemented by the ATSB during 2007–08. These include:

- the compilation and provision of a ready-reference guide relating to the risk of envenomation from bites and stings in the field
- the provision of high-visibility vests and strobe-lights to teams working in restricted visibility sites
- the continued evaluation of techniques and equipment for the mitigation of heat stress on staff working in exposed, hot locations, including broad-brimmed hats and water-retaining cooling vests, weather monitoring equipment, dehydration assessment charts and rehydration packs
- an assessment of the impact of recent changes to the Safety, Rehabilitation and Compensation Act 1988 to ATSB staff involved in investigatory activities
- an ongoing focus on the risks presented by fragmented/burnt composite fibre materials, including discussions with international experts and the evaluation of new products for dust/ fibre suppression.

A periodic e-mail newsletter, ATSB OH&S Matters keeps staff informed of the panel's agenda and the outcome of discussions.

During 2007–08, many ATSB staff members travelled to and worked in remote and hazardous investigation sites. Accordingly, the continued attention to OH&S and the assimilation of sound safety practices into the Bureau's *modus operandi* has served the organisation well in maintaining the highest standards of health and safety in the workplace. The Executive Director and other senior staff attend a debriefing soon after an on-site phase is completed which addresses, amongst other things, any OH&S issues.

# Looking ahead

The ATSB plans to receive, assess, classify and record around 12,000 potential accident and incident notifications and around 100 confidential reports in 2008–09.

In addition, the Bureau plans to commence and conduct up to 80 aviation, and 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.

The Bureau will also complete about 10 aviation research and analysis reports in 2008–09 focussing on safety priorities, occurrence trends and human factors issues. It will release and publicise safety investigation reports, 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 Organization, International Civil Aviation Organization, International Society of Air Safety Investigators, International Transport Safety Association, and the Marine Accident Investigators International Forum.

Other activities in 2008–09 will include providing assistance and evidence as required to coronial inquests and, subject to Ministerial approval, facilitating the introduction of TSI Act amendment legislation into Parliament and relevant Regulations with associated consultation. The ATSB will be participating in an important review of the provisions of Annex 13 to the Convention on International Civil Aviation at the ICAO Accident Investigation and Prevention (AIG) Divisional Meeting in October 2008 – the first such meeting since 1999.

The ATSB will also complete endorsed projects as part of the Indonesian Transport Safety Assistance Package and provide other international assistance in transport safety investigations. This will include an expanded diploma program for Indonesian marine, aviation and rail investigators in 2008–09.

The ATSB will contribute input to the Government's announced Green and White paper process on aviation which will also pick up some of the suggestions made by the 2007 Miller Review.

Because much of the ATSB's work is necessarily reactive, many investigations will be undertaken in 2008–09 that were unknown at the beginning of the financial year.

# Appendices Appendix A: Research, statistical, and other non-investigation publications released in 2007–08

The ATSB released the following major publications during 2007-08.

### 2007–08 Road safety research and analysis reports

All the reports are available on the Department's website <www.infrastructure.gov.au/roads/safety/>

### Fatal and Serious Road Crashes Involving Motorcycles

### Research organisation: ATSB Monograph

Motorcycle usage is increasing in Australia, and the numbers of serious crashes are also rising. This report analyses recent data on fatal and serious motorcycle crashes. Time trends are shown and comparisons made across road user groups, crash type and national and international jurisdictions. Analysis of the crashes includes road-type, weather, and main contributory factors. Analysis of rider characteristics include age, and helmet use. In addition to fatal crashes, included are tabulations of non-fatal crashes where a motorcyclist was seriously injured.

# Serious Injury Due to Transport Accidents Involving a Railway Train, Australia, 1999–00 to 2003–04

### Research organisation: Australian Institute of Health and Welfare & ATSB

The purpose of this publication is to provide a national overview of serious non-fatal injury in Australia due to transport accidents involving a railway train in the period 1999–00 to 2003–04, including level crossing accidents. The definition of transport injury used in this report excludes injuries given an external cause of intentional self harm, assault or undetermined intent (terms that are defined in the report).

This report includes all injuries that were serious enough to require hospitalisation but did not result in death.

### Serious Injury Due to Land Transport Accidents, Australia, 2003-04

### Research organisation: Australian Institute of Health and Welfare & ATSB

Transport accidents are a leading cause of injury, both fatal and non-fatal. The primary purpose of this publication is to provide a broad overview of serious injury due to land transport accidents in Australia in the one-year period 2003–04, the latest year for which data are available. The main focus is on accidents involving road vehicles travelling on public roads (called travelling in traffic). Road vehicles include motor vehicles, pedal cycles and other road vehicles such as trams, animals or animal-drawn vehicles (when they travel on the road).

Serious injury is defined for this report as an injury which results in the person being admitted to hospital, and subsequently discharged alive either on the same day or after one or more nights stay in a hospital bed (i.e. deaths are excluded).

This report presents estimates of the numbers of persons seriously injured in Australia due to land transport accidents, including road traffic crashes, in the one-year period of 2003–04. Trends in injury rates in road traffic crashes are examined over a five-year period, 1999–00 to 2003–04.

### Serious injury due to transport accidents, Australia, 2003-04

### Research organisation: Australian Institute of Health and Welfare & ATSB

Transport accidents are a leading cause of injury, both fatal and non-fatal. The primary purpose of this publication is to provide a broad overview of serious injury due to transport accidents in Australia in the one-year period 2003–04, the latest year for which data are available.

Serious injury is defined for this report as an injury which results in the person being admitted to hospital, and subsequently discharged alive either on the same day or after one or more nights stay in a hospital bed (i.e. deaths are excluded). This report presents estimates of the numbers of persons seriously injured in Australia due to transport accidents in the one-year period 2003–04. All modes, air, sea, road and rail, are included.

### Road safety statistics reports

Twelve issues of Road Deaths Australia - Monthly Bulletin

• This publication presents the latest fatal road crash data as well as recent historical comparisons. It is produced using monthly data supplied by the eight states and territories.

Fatal Heavy Vehicle Crashes Australia - Quarterly Bulletin

• A regular publication which presents recent data on fatal road crashes involving heavy vehicles, as well as historical comparisons. It is produced using data supplied by the eight states and territories.

### Annual Road Crash Casualties and Rates from 1925 to 2005

• This publication contains historical series of numbers of Australian road crash deaths and serious injuries. Standardised rates by vehicle registration and vehicle use are also provided.

### 2007–08 Rail statistics reports

### Australian Rail Safety Occurrence Data, January 2001 to December 2007

This report tables rail safety occurrence data by state and territory between January 2001 and December 2007. Data is adjusted annually to reflect new information that comes to light during the reporting period. There is a lag period of approximately 3 to 4 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 conforms to Standard No. ON-S1: Occurrence Categories and Definitions. This report excludes tram and light rail or monorail operations.

On 2 June 2008, the ATSB was notified by the South Australian Department for Transport, Energy and Infrastructure that the data originally published in May 2008 for South Australian *running line collision with road vehicle incidents* prior to 2005 included collisions with trams while running on roadways. These incidents have been removed from Table 13 in this amended version of the report.

### 2007–08 Aviation safety research and analysis reports

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

### An analysis of Australian birdstrike occurrences 2002 to 2006

In 2003, the ATSB, the Civil Aviation Safety Authority, and the Australian Aviation Ground Safety Council met and agreed that an industry consultative forum on bird and animal hazards to aircraft would meet an important need in aviation. This led to the formation of a forum, now known as the Australian Animal Wildlife Hazard Group (AAWHG). Part of the AAWHG mandate is to examine birdstrike research. The AAWHG requested that the ATSB prepare a report on bird hazards to assist in examining trends, developing risk assessment models, and priorities. This report was prepared in response to that request and analyses birdstrikes reported to the ATSB between 2002 and 2006. Specifically, the data is examined by year, month, phase of flight, type of operation, record source, effect on flight, time, aircraft damage, injuries, the nature of occurrence reports, flight disruption, aircraft movements, aircraft size, ingestion, bird size, species, and location.

### Staying safe against in-flight turbulence

High in the sky, as you are cruising to your destination, the seat belt sign goes on. As you look out the window, there are no clouds for kilometres. What could you possibly run into at this height? Turbulence - a frequently invisible problem for aircraft. Turbulence is a weather phenomenon responsible for the abrupt sideways and vertical jolts that passengers often experience during flights, and is the leading cause of in-flight injuries to passengers and cabin crew. For air travellers, turbulence can be an unpleasant and unpredictable experience with passengers often mystified as to why it occurs and its effect on safety. The purpose of this aviation safety bulletin is to provide passengers with an informative overview of why turbulence occurs, the seriousness of turbulence, the common types of turbulence, and what passengers can do to reduce turbulence-related injuries.

### Analysis, causality and proof in safety investigations

Analysis activities ultimately rely on the judgement of investigators, but analysis has been a neglected area in terms of standards, guidance and training of investigators in most safety investigation organisations. The ATSB analysis framework has been designed to guide and support the difficult judgements required of its investigators. By providing standardised terminology, a generic accident development model, a defined process, tools, policies, guidelines and training, the ATSB believes that its framework will improve the rigour, consistency and defensibility of its investigation analysis activities, and improve the ability of its investigators to detect safety issues in the transportation system. This report provides an overview of the ATSB investigation analysis framework and concepts such as the determination of contribution and standard of proof. The report concludes by examining the nature of concerns that have been raised regarding the ATSB analysis framework and the ATSB's consideration of these concerns.

### Australian aviation safety in review: 2002 to 2006

In 2007, the ATSB produced the inaugural edition of *Australian Aviation Safety in Review* as part of the ATSB's role to enhance public awareness of aviation safety. The Review was developed to provide a readily accessible analysis of the Australian aviation sector and offer insights and information about key trends and emerging issues. This edition of the Review looks at the five calendar years 2002 to 2006, covering all major categories of aircraft operations, from regular public transport (RPT) to general aviation (GA), and some sports aviation information. The report also presents demographic and activity data in order to provide a context within which to examine accident trends.

### Passenger health - the risk posed by infectious disease in the aircraft cabin

The environment in aircraft cabins is receiving increasing attention as a possible problem environment with regard to air quality for both passengers and crew. Issues regarding cabin air quality and the transmission of infectious disease in an aircraft cabin have been discussed extensively in the past, but the emergence of severe acute respiratory syndrome (SARS) in 2002-03, and recent outbreaks of avian influenza in Asia, have increased the importance of these issues. This report summarises what is known about the risk of infectious disease transmission in aircraft cabins. Considering the large number of flights that occur each day, reported cases of transmission of infection in an aircraft cabin have occurred relatively infrequently. The evidence suggests that passengers' health is not greatly at risk through air travel and widespread infections are unlikely.

### Fibre composite aircraft - capability and safety

For many decades, fibre composites have been replacing traditional aluminium structures in a wide variety of aircraft types. However, there is a lot of conflicting or incorrect information in the aviation community about the safety and capability of fibre composite materials. Composite structures behave very differently under normal loads than equivalent metal structures. Fatigue and corrosion have been proven through trials of composite repair patches to be much less prevalent in composites compared with metals. Subsurface damage such as delamination however can go undetected for long periods and result in sudden catastrophic failure. This study provides an overview of fibre composite use in aircraft and the issues associated with its use, with a focus on aircraft operating in Australia that contain these materials.

# Trends in immediately reportable matters involving regular public transport operations

The reporting of aviation safety occurrences enables the ATSB to investigate accidents and serious incidents and monitor safety through the analysis of trends. On 1 July 2003 the *Transport Safety Investigation Act 2003* came into effect, introducing the terms immediately reportable and routine reportable matters (IRMs and RRMs, respectively). This report examined trends in IRMs involving regular public transport (RPT) operations. The aim 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. The results indicated that despite an increase in RPT activity, the number of IRM occurrences remained stable or declined. When measured in relation to airline activity, the trend rate was generally downwards. The study further highlighted the value of a strong reporting culture and provided encouraging data concerning safety trends in Australian airline operations.

### CFIT: Australia in context 1996 to 2005

Controlled flight into terrain (CFIT) has been identified as one of 'aviation's historic killers', claiming the lives of more than 35,000 people since the emergence of civil aviation in the 1920s. Given the catastrophic nature of CFIT, the international aviation community has invested a considerable amount of time and resources to prevent CFIT, particularly in the commercial sector of the industry. The purpose of this report was to provide an overview of CFIT from an international perspective, explore the initiatives introduced in an effort to reduce CFIT, and examine CFIT in the Australian context. The results determined that when compared with the total number of accidents recorded in the ATSB's database for the 10-year period, CFIT in Australia is a rare event. However, should a CFIT occur, there is a high risk that it will result in fatal injuries to the aircraft occupants. A continued focus on developing preventative strategies is therefore warranted in an effort to reduce the risk of CFIT further.

## An overview of spatial disorientation as a factor in aviation accidents and incidents

Spatial disorientation (SD) is among the most common factors contributing to aviation accidents and incidents, but its true prevalence is difficult to establish. This is because many accidents where SD is cited as a likely factor are fatal, and therefore its role cannot be known with any certainty, but also because in the many instances of SD where an accident doesn't result, it goes unreported. This study provides a comprehensive explanation of the various types of SD in the aviation environment, and suggests strategies for managing the risk associated with SD events. The report also encourages pilots who have experienced SD episodes to share their experiences with their aviation colleagues, either informally, or through magazines, journals and web-based forums. This will serve to encourage a greater awareness of the incidence of SD, and help reduce the stigma that some pilots might associate with these events.

# Aircraft reciprocating-engine failure: An analysis of failure in a complex engineered system

The safe operation of an aircraft depends on the reliable performance of systems that provide thrust, lift, stability, control, collision avoidance, navigation, and cabin environment. The wellbeing of crew, passengers, and bystanders may be threatened by the failure of any one these systems to perform their designed function – they are safety-critical systems. The focus of this safety study was the reliability of propeller-based propulsion systems that provide thrust for the operation of aircraft commonly used in low-capacity public-transport operations during the period 2000 to 2005. In particular, the study critically examined the issues arising from the in-flight failure of propeller propulsion systems powered by reciprocating engines.

### Robinson R22 helicopter aerial mustering usage investigation

The Robinson R22 helicopter is the most common model of rotary-wing aircraft on the Australian register and has been a popular choice for private operations, flying training and various types of aerial work activity. The R22 is also the favoured type for aerial stock mustering operations – a uniquely Australian application. Despite its popularity in this type of work, little was known about the helicopter's suitability for the task. Like other helicopters on the Australian register, the R22 received its initial airworthiness certification in its country of manufacture (United States). The spectrum of manoeuvres conducted in aerial stock mustering did not form part of the flight profile used when the helicopter type received its certification. In 2004, the ATSB commissioned AeroStructures, an Australian engineering company, to undertake a study of forces acting on an R22 engaged in aerial mustering operations. Testing showed that mustering operations can involve large and sudden power changes that apply very high loads on the helicopter's drive system, and these may exceed the limits set during the certification process. The report highlights the importance of handling technique, and especially good engine management.

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

Beginning in January of 2008, the ATSB's supplement to CASA's *Flight Safety Australia* included a new section covering REPCON, the voluntary confidential reporting scheme. The new section describes the scheme, and provides examples of reports that have been made.

### July-August 2007

- Executive Director's message Implementation of the ATSB Safety Investigation Information Management System (SIIMS)
- Fatal accident involving the VH-FIN Cessna 310R aircraft near Tamworth, NSW
- Research Report: Accident and fatal accident rates for fixed-wing and rotary-wing aircraft engaged in private operations between 2001 and 2005.
- Safety Briefs (SA Engine Surge, Hawaii Ditching, Separation Standards, Turbulence Event Adelaide Airport, Birdstrike, IFR conditions for VFR pilot).

### September–October 2007

- Executive Director's message Lockhart River Coroner's Report, ATSB Aviation Safety Research
   Programme
- Training for Safer Australian Skies
- Amateur-built (Experimental) Aircraft Survey
- Safety Briefs (Auxilliary Power Unit fire warning activation, Dash 8-315 Icing incident, Airbus AA340 tyre deflation, Fatal wirestrike accident involving Bell 206B helicopter, Breakdown of coordination on runway between a Boeing 737 and tow vehicle, Weather conditions below applicable landing minima).

### November-December 2007

- Executive Director's message Reflecting on the ATSB's aviation outputs for 2006-07
- Robinson R22 helicopter aerial mustering usage investigation
- REPCON Status Australia's aviation voluntary confidential reporting scheme
- Safety Briefs (Engine failure, Collision with terrain, Loss of control, Fatal helicopter accident, Erratic airspeed displays, Fuel Exhaustion).

### January-February 2008

- Executive Director's message 25 years of transport safety and investigation
- Final ATSB investigation report on Condobolin in-flight breakup 4-fatality accident
- CFIT: Australia in context 1996 to 2005
- Safety Briefs (Oxygen Mask Complications, Willy-Willy, Pilot Collapse, Power Loss, Fire-bombing, Excessive Take-off Weight)
- REPCON Briefs (Back tracking, Wing skin corrosion, ETOPS operations).

### March-April 2008

- Executive Director's message REPCON, Elbe Shipping v Giant Marine Shipping SA
- Final ATSB investigation report on Boeing 737-476 in-flight engine malfunction
- What's next for aviation safety research?
- Safety Briefs (Oxygen Mask Complications, Smoke Event, Engine Power Loss, Loss of Control, Crew Incapacitation, Wirestrike)
- *REPCON Briefs* (Photographic flight, Expired maintenance release, Close call, Fuel-related event, UK confidential reporting scheme, Fixation).

### May–June 2008

- Executive Director's Message ATSB and the NTSC
- Indonesian NTSC releases Adam Air final report
- Analysis, Causality and Proof in Safety Investigations
- Safety Briefs (Rejected Takeoff, Powerplant/propulsion event, Hydraulic System Event, Runway Intersection Collision, Depressurisation, Landing Gear Collapse)
- *REPCON Briefs* (Use of non standard procedures, Incorrect frequency selection, Engineering concerns, Serious incident involving the transfer of a technician).

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

Since April 2008, the ATSB has been providing articles to the Safety Institute of Australia's magazine *Australian Safety & Health Matters*. The articles describe safety investigations from all modes of transport, illustrating both the role of the ATSB and the issues surrounding transport safety.

### April-May 2008

• The Ghan

### June–July 2008

- Oceanic Angel
- Silky Ocean/ Peter Crombie

# Appendix B: ATSB safety research grants reports 2007–08

# Psychological and social factors influencing motorcycle rider intentions and behaviour

### Authors: B Watson, D Tunnidiff, KWhite, C Schonfeld, D Wishart Centre for Accident Research and Road Safety (CARRS-Q), Queensland University of Technology

This report documents two studies undertaken to identify and assess the psychological and social factors influencing motorcycle rider behaviour. The primary aim of the research was to develop a Rider Risk Assessment Measure (RRAM), which would act as a tool for identifying high-risk riders by assessing rider intentions and self-reported behaviour. The first study (n = 47) involved a qualitative exploration of rider perceptions utilising a focus-group methodology. This study identified six key aspects of rider behaviour considered to influence safety: motorcycle handling skills: rider awareness: riding while impaired or not; and the tendency to bend road rules, push limits, and ride at extreme speeds or perform stunts. Study 2 (n = 229) was survey-based and examined the psychological and social factors influencing these behaviours, utilising the theory of planned behaviour (TPB) and other relevant psychological constructs, such as sensation seeking and aggression. This study indicated that risky rider intentions were primarily influenced by attitudes and sensation seeking, while safer intentions were influenced by perceived behavioural control. While intentions significantly predicted all six types of behaviour, sensation seeking and a propensity for aggression emerged as significant predictors, particularly for the volitional risk-taking behaviours. The measures of intention and behaviour comprising the RRAM were not found to be significantly correlated with self-reported crash involvement, possibly indicating shortcomings in the measurement of crashes. However, significant correlations were found between the components of the RRAM and self-reported traffic offence involvement. While further work is required to refine and validate the RRAM, it represents a potential tool for informing and evaluating motorcycle rider safety countermeasures.

### Psychosocial factors influencing mobile phone use while driving

### Authors: SP Walsh, KM White, B Watson, MK Hyde, Centre for Accident Research and Road Safety, Queensland University of Technology

This study aims to improve our understanding of why drivers use their mobile phones while driving and to inform campaigns designed to address this behaviour. The theory of planned behaviour was used to investigate factors relating to mobile phone use while driving. Study 1 (N = 47) elicited behavioural, normative, and control beliefs towards mobile phone use while driving and assessed situational factors

affecting this behaviour. Study 2 (N = 801) examined how attitudes, normative pressures, and control factors influenced intention to use a mobile phone while driving in general, and in four scenarios manipulating driving condition (moving versus stationary) and driver motivation (in a hurry versus not in a hurry). In addition, the research explored the effects of age, gender, driving purpose, perceived risk of apprehension, perceived risk of crashing, and addictive tendencies towards mobile phone use.

Differences in the underlying beliefs held by participants with strong and weak intentions to use a mobile phone while driving were also assessed. Participants attitudes towards mobile phone use while driving were the only consistent predictors of the intention to engage in this behaviour in the future. Drivers with strong intentions to use a mobile phone while driving perceived that this behaviour had more advantages and greater approval from others, and were less affected by factors deterring them from using a mobile phone while driving, than drivers with weak intentions. The perceived risk of apprehension or crashing did not have much impact on participants intention to engage in this behaviour. People with addictive tendencies towards mobile phone use were more likely to use their mobile phone while driving. Drivers were more likely to use their phone when waiting at traffic lights than when driving at 100 km/h. Results of the study improve our understanding of why drivers use their mobile phones while driving by highlighting factors which influence drivers decisions to engage in this behaviour. The findings from this study can inform campaigns designed to reduce this unsafe driving practice.

# Development of an Implicit Association Test to measure attitudes toward speeding

### Authors: J Hatfield, R Fernandes, G Faunce, RFS Job, University of NSW

Speeding is a major contributor to road trauma and attitudes toward speeding are hypothesised to be a key determinant of the behaviour. Attitudinal research is limited by reliance on self-report measures and the attendant possibility of reporting biases. The Implicit Association Test (IAT; Greenwald, McGhee & Schwartz, 1998) aims to measure attitudes without reliance on self-report, by assessing the association between a target-concept and an evaluation, in terms of reaction time for compatible versus non-compatible pairings. The present research aimed to develop and evaluate an IAT to measure attitudes to speeding.

In Study 1, 45 licensed drivers completed a questionnaire that assessed self-reported attitudes to speeding, and several variables theoretically related to attitudes, including speeding behaviour. Participants also drove a driving simulator, and completed the speed-related IAT. Observed IAT results suggested that attitudes toward speeding are negative, and were generally consistent with results derived from the self-report and speeding on the driving simulator.

In Study 2, a further 45 licensed drivers underwent the Study 1 procedures, before being exposed to an intervention that was designed to increase negative attitudes to speeding (treatment group) or not (control group). Participants returned after 1–2 weeks for a second session, during which the Study 1 procedures were repeated. The intervention appeared to have a significant effect only on perceived crash risk for speeding. Thus, we could not adequately test the responsivity of the speed-related IAT to changed attitudes to speeding. In the control group, the IAT effect at Session 1 demonstrated a significant correlation with IAT effect at Session 2. Thus, the speed-related IAT appeared to be a valid and stable measure of attitudes to speeding, which might be used to measure attitudes in road safety research, without reliance on self-report.

# Appendix C: Investigations completed in 2007-08 by mode

# Rail investigations completed in 2007-08

Investigation Number*	Occurrence Number	Date	Description	Location	Registration	Report Release Date
R0-2006-014	ra200600038	15-Nov-06	Collision	near Wingeel, Vic.	Train 4AM8	24-0ct-07
R0-2007-002	ra200600016	14-May-07	Level Crossing Accident	Kalgoorlie, WA	AWR Train 2478	14-Nov-07
R0-2006-003	ra200600012	28-Mar-06	Signal 161 Passed at Danger	Adelaide, SA	H307	20-Dec-07
R0-2006-001	ra200600001	4-Jan-06	Derailment	Yerong Creek, NSW	3AB6	29-Jan-08
R0-2006-015	ra200600042	12-Dec-06	Level Crossing Collision	Ban Ban Springs, NT	The Ghan (1AD8)	13-Feb-08
R0-2006-007	ra200600026	12-Sep-06	Derailment	Seymour, Vic.	2CM3	21-Feb-08
R0-2007-004	ra200700019	10-Jun-07	Derailment	Bates, SA	6MP9	22-Feb-08
R0-2006-012	ra200600034	1-Nov-06	Derailment	Tarcoola, SA	3DA2K	29-Feb-08
R0-2006-013	ra200600036	2-Nov-06	Collision	Illabo, NSW	9351	6-Mar-08
R0-2006-011	ra200600033	26-0ct-06	Collision	North Geelong, Vic.	4AM3	8-May-08
R0-2007-008	ra200700036	13-Dec-07	Collision	Virginia, SA,	4SA8	27-Jun-08
R0-2007-003	ra200700017	22-May-07	Derailment	Roopena, SA	3MR2	30-Jun-08
* While the concept of investigation the SIIMS data migration strategy	n numbers was introduced at t	he time SIIMS was	rolled out in May 2007, pre-SIIMS	rail investigations have bee	en assigned an investig	ation number as part of
### Marine investigations completed in 2007-08

Investigation Number*	Occurrence Number	Date	Description	Location	Registration	Report Release Date
M0-2007-239 (report 239)	ma2007 00039	10-Apr-07	Crew member seriously burned by steam	Melbourne, Vic.	MSC Sonia	27-Sep-07
M0-2007-238 (report 238)	ma2007 00026	2-Apr-07	Boiler explosions	Newcastle, NSW	Shirane	16-Nov-07
M0-2006-228 (report 228)	ma2006 00039	16-Jun-06	Leakage of dangerous goods	En route Singapore to Torres S	Kota Pahlawan	20-Nov-07
MO-2006-229 (report 229)	ma2006 00042	10-Jul-06	Main engine failure	Eastern Bass Strait	Enterprise	20-Nov-07
M0-2007-240 (report 240)	ma2007 00027	23-Apr-07	Collision	Off Cape Martin, SA	Silky Ocean/ Peter Crombie	20-Dec-07
M0-2007-244 (report 244)	ma2007 00059	8-Aug-07	Crew member fatality	En route India to Dampier, WA	Oceanic Angel	31-Jan-08
M0-2007-243 (report 243)	ma2007 00041	8-Jun-07	Grounding	Nobbys Beach, Newcastle, NSW	Pasha Bulker	23-May-08
M0-2007-245 (report 245)	ma2007 00060	14-Aug-07	Fire	Off Dampier, WA	BBC Islander	28-May-08
M0-2006-232 (report 232)	ma2006 00069	12-Sep-06	Breakaway and grounding	Port Hedland, WA	Creciente	5-Jun-08
M0-2007-237 (report 237)	ma2007 00018	18-Mar-07	Collision	Off Carnarvon, WA	Norma Jean / Seatow 61	6-Jun-08
M0-2007-236 (report 236)	ma2007 00008	9-Feb-07	Engine room fire	Off Newcastle, NSW	Baltimar Boreas	25-Jun-08
M0-2008-002 (report 250)	ma2008 00004	25-Jan-08	Cargo hold fire	En route Indonesia to Geelong, Vic.	Jin Hui	26-Jun-08
*While the concept of investigatior of the SIIMS data migration strateg	າ numbers was introduced at t ຮູ້v.	he time SIIMS was r	olled out I May 2007, pre-SIIMS ma	arine investigations have be	en assigned an investi	gation number as part

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Investigation Number*	<b>Occurrence Number</b>	Date	Description	Location	Registration	Report Release Date
	200700368	5-Feb-07	Engine in-flight shut down	138NM northwest of Melbourne, Vic.	VH-EBY	30-Jun-08
A0-2007-042	200705528	4-Sep-07	Electrical system event	130km SE Mackay Aerodrome, Qld	VH-YJR	23-Jun-08
A0-2007-048	200705914	21-Sep-07	Breakdown of seperation	Sydney Aerodrome, NSW	ИН-ЕКХ, ИН-СКО	20-Jun-08
A0-2007-005	200702791	4-May-07	Procedures-related event	Townsville Airport, Qld	N7088S	17-Jun-08
A0-2007-051	200706490	20-0ct-07	Hydraulic system event	Los Angeles International Airport, USA	ALO-HV	16-Jun-08
	200702219	11-Apr-07	In-flight engine failure	9km NE Wagga Wagga, NSW	үн-тдү	12-Jun-08
	200701625	15-Mar-07	Main rotor blade skin seperation	Mareeba Aerodrome, Qld	ІАН-НЛ	3-Jun-08
	200601640	31-Mar-06	Loss of control	4km ENE Archerfield Airport, Qld	VH-BST	3-Jun-08
	200700510	6-Feb-07	Depressurisation	140 NM south of Alice Springs, NT	DTM-HV	26-May-08
	200700356	3-Feb-07	In-flight engine failure	30NM northeast Sydney Airport, NSW	MLO-HV	22-May-08
	200700231	5-Jan-07	Runway incursion	Port Macquarie, NSW	VH-TQZ, VH-TBB	14-May-08
	200605620	24-Sep-06	In-flight engine malfunction and air turn-back	130 NM west of Darwin, NT	ILT-HV	14-May-08
	200605843	5-0ct-06	In-flight break-up	20km northeast of Bathurst, NSW	ИН-АКҮ	9-May-08
	200700357	2-Feb-07	Engine failure	28km WSW of Warialda, NSW	VH-HRT	5-May-08

Aviation investigations completed in 2007-08

## Aviation investigations completed in 2007-08

laurotidation Numbor*	Occurrence Number	Dato	Docoulation	Location	Docietuation	Donort Dolocco Doto
		חמופ	nescription	LUCATION	Registration	עבאחוו עבובמאב חמוב
A0-2007-014	200703905	20-Jun-07	VFR into IMC	83 km NE Broome, WA	VH-NRT	1-May-08
A0-2007-019	200704080	4-Jul-07	Icing event	65nm NE Albury, NSW	VH-VEG	30-Apr-08
A0-2007-013	200703662	13-Jun-07	Engine power loss	39 NM west of White Tip Reef, Qld	MWL-HV	24-Apr-08
	200606542	1-Nov-06	Engine failure	Townsville Airport, Qld	VH-UBX	21-Apr-08
	200700358	4-Feb-07	Engine power loss	15 km SE Gold Coast Airport, Qld	VH-DIC	17-Apr-08
	200702213	30-Mar-07	Recovery of information from CVR to assist TAIC of New Zealand	93 km N Christchurch Aerodrome, NZ	ZK-VIR	15-Apr-08
	200700765	13-Feb-07	Crew incapacitation	Busselton, WA	VH-SQF	15-Apr-08
	200602839	19-Feb-06	Technical analysis assistance to the Indonesian NTSC	Balikpapan Airport, Indonesia	РК-ҮТН	15-Apr-08
	200700065	11-Jan-07	Navigation event	28 km NW of Sydney Airport, NSW	ZK-OJB	11-Apr-08
A0-2007-067	200707716	10-Dec-07	Runway incursion	Essendon Aerodrome, Vic.	VH-WDA, VH-BTD	9-Apr-08
	200601351	11-Feb-06	Technical analysis assistance to the Indonesian NTSC	near SOLOM, Java Sea Indonesia	РК-ККЕ	7-Apr-08
AI-2008-019		2-Apr-08	Safety Issue			2-Apr-08
	200605561	20-Sep-06	Powerplant/propulsion event	Sydney, NSW	VH-RXE	31-Mar-08
AE-2007-012		1-Jan-07	Investigation assistance to the Indonesian NTSC	Makassar Strait, Indonesia	РК-ККW	25-Mar-08
	200700054	6-Jan-07	Crankshaft failure analysis	16 NM, northwest of Goulburn, NSW	24-3770	14-Mar-08
	200701935	2-Apr-07	Depressurisation	343km S Darwin, NT	VH-AJP	5-Mar-08

Investigation Number*	<b>Occurrence Number</b>	Date	Description	Location	Registration	Report Release Date
AE-2007-068		25-May-07	Technical analysis assistance to the Indonesian NTSC	Polonia Airport, Medan, Indonesia	PK-AWP	4-Mar-08
	200701109	26-Feb-07	Depressurisation	East of Tamworth, NSW	VH-HPB	3-Mar-08
	200700304	1-Feb-07	Runway intersection collision	Leongatha Aerodrome, Vic.	VH-BCT, VH-WDS	26-Feb-08
	200701033	23-Feb-07	Loss of control	Clyde North, Vic.	H9Z-HV	11-Feb-08
	200702171	9-Apr-07	Landing gear collapse	Perth Airport, WA	VH-SGT	8-Feb-08
	200701910	31-Mar-07	Crew incapacitation	350 NM west NW of Sydney, NSW	NH-OGN	7-Feb-08
	200607801	24-Dec-06	Wirestrike	Nelson Aerodrome, Vic.	VH-ALO	6-Feb-08
	200606223	19-0ct-06	Hydraulic system event	Sydney Airport, NSW	үр-тдү	6-Feb-08
	200605039	29-Aug-06	Smoke event	43 NM NW Ravensthorpe, WA	AH-NJE	6-Feb-08
	200601453	19-Mar-06	Rejected takeoff	Brisbane Airport, Qld	VN-QPB	5-Feb-08
	200606874	15-Nov-06	Runway incursion	Brisbane Airport, Qld	ИЧ-ИЧК	31-Jan-08
	200604439	2-Aug-06	Stall warning device event	Alice Springs Airport, NT	VH-NXE	30-Jan-08
	200600837	15-Feb-06	Aircraft loss of control	56 km S of Lombadina, WA	VH-OTV	25-Jan-08
	200504188	25-Aug-05	In-flight engine malfunction	6 km SSE Sydney Airport, NSW	XLT-HV	24-Jan-08
	200501462	8-Apr-05	Engine-driven fuel pump bearing - material substitution	Perth, WA		23-Jan-08
	200606510	31-0ct-06	Engine power loss	28 km NE Coolah, NSW	VH-KTR	17-Jan-08
	200701982	4-Apr-07	Breakdown of seperation	12 NM southwest Sydney, NSW	VH-VON, B-HLW	18-Dec-07

Aviation investigations completed in 2007-08

## Aviation investigations completed in 2007-08

Investigation Number*	Occurrence Number	Date	Description	Location	Registration	Report Release Date
	200606570	2-Nov-06	Aircraft loss of control	Palmers Island, NSW	VH-AAL	17-Dec-07
	200605274	6-Sep-06	Engine in-flight shutdown	185 kms south of Karratha, WA	IXN-HA	17-Dec-07
	200603438	15-Jun-06	Smoke event	Maroochydore, QLD	VH-SEF	12-Dec-07
	200605133	1-Sep-06	Loss of control	Mt Vernon Station, WA	VH-RIL	11-Dec-07
AE-2007-056		2-Mar-03	FDR download assistance	Chittagong Patenga Airport, Indonesia	S2-ACR	6-Dec-07
A0-2007-022	200704236	9-Jul-07	Crew incapacitation	Arafura Sea	VH-0GP	29-Nov-07
	200604514	8-Aug-06	Engine failure	5 km W Archerfield Aerodrome, QLD	VH-WNR	21-Nov-07
A0-2006-004	200600256	19-Jan-06	Aircraft loss of control	4 km E McArthur River Mine Aerodrome, NT	INM-HV	5-Nov-07
	200607815	29-Dec-06	Engine failure	Kununurra Airport, WA	VH-FNP	2-Nov-07
	200600851	16-Feb-06	Aircraft loss of control	20 km SSW of Cootamundra, NSW	VH-FVF	31-0ct-07
	20060001	2-Jan-06	Collision with terrain	Willowbank, Qld	VH-UYB	30-0ct-07
	200504768	23-Sep-05	Fuel exhaustion	18 km SW of Bundaberg Airport, Qld	VH-SEF	29-0ct-07
AE-2007-015		7-Mar-07	Investigation assistance to the Indonesian NTSC	Adi Sucipto Airport Yogyakarta, Indonesia	PK-GZC	22-0ct-07
	200608049	29-Nov-06	Collision	International Waters off Fiji	A25-221	19-0ct-07
	200506266	2-Dec-05	In-flight break-up	28 km north of Condobolin, NSW;	NY4-HV	11-0ct-07
	200600563	5-Feb-06	Engine failure	9km E Queenstown Aerodrome, Tas.	VH-KLP	9-0ct-07

Investigation Number*	<b>Occurrence Number</b>	Date	Description	Location	Registration	Report Release Date
	200605505	18-Sep-06	Engine in-flight shutdown	74km west-north-west Brisbane Airport, Qld	9MMRM	2-0ct-07
	200600979	21-Feb-06	Collision with terrain	10 km west of Gunpowder Mine, Qld	S8H-HV	2-0ct-07
	200605307	7-Sep-06	Erratic airspeed indications	241 km NNE Perth Airport, WA	IXN-HV	19-Sep-07
	200700766	14-Feb-07	Airprox	28 km south-west Camden Aerodrome, NSW	VH-BMX, VH-DTX	22-Aug-07
	200605473	15-Sep-06	Below minima landing	Perth Airport, WA	L4O-HV	20-Aug-07
A0-2006-155	200600523	2-Feb-06	Wirestrike	15km east of Parkes Aerodrome, NSW	VH-MFI	3-Aug-07
	200505236	22-0ct-05	Aircraft loss of control	Ballidu, WA	TIN-HV	3-Aug-07
	200605999	11-0ct-06	APU event	Darwin Airport, NT	VH-ZXE	31-Jul-07
	200500654	15-Feb-05	Warning device event	Hamilton Island, Qld	VH-TNX	31-Jul-07
	200601133	9-Feb-06	Powerplant/propulsion event	ACT	N/A	10-Jul-07
* Some of the aviation investigatio	ns do not have corresponding i	investigation numb	ers. This was a concept introduced	d as part of the rollout to SII	IMS in May 2007. Pre-S	silms aviation

Aviation investigations completed in 2007-08

investigations were not assigned investigation numbers as part of the SIIMS data migration strategy.

Appendix D: Safety actions taken by stakeholders, and recommendations and safety advisory notices issued in 2007–08

	Safety Actions	Safety Advisory Notices	Recommendations
Aviation	131	2	23
Marine	30	39	32
Rail	35	7	42

Appendix E: Investigations underway by mode as at 30 June 2008

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Investigation Number	<b>Occurrence Number</b>	Date	Occurrence Type	Location	Vessels
R0-2007-001	ra200700010	10-Mar-07	Collision	Back Creek, NSW	Bulk Grain Train
R0-2007-005	ra200700028	6-Aug-07	Level Crossing	Two Wells, SA	Passenger Train
R0-2007-006	ra200700029	17-Aug-07	Derailment	near Stewart, WA	Ore Train
R0-2007-007	ra200700035	16-Nov-07	Level Crossing	Virginia, SA	Freight Train
R0-2008-001	ra200800008	5-Mar-08	Level Crossing	Birkenhead, SA	Freight Train
R0-2008-002	ra200800010	10-Mar-08	Derailment	Hines Hill, WA	Freight Train
R0-2008-003	ra200800011	11-Mar-08	SPAD (signal passed at danger)	Gloucester, NSW	Freight Train
R0-2008-004	ra200800013	30-Mar-08	Derailment	Near Pura Pura, Vic.	Freight train
R0-2008-005	ra200800016	19-Apr-08	Derailment	near Bates, SA	Freight Train
R0-2008-006	ra200800017	22-Apr-08	Derailment	near Manton Dam, NT	Ore Train

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Investigation Number	<b>Occurrence Number</b>	Date	Occurrence Type	Location	Vessels
M0-2007-241	ma2007 00037	10-May-07	Grounding	Grassy Harbour, King Island, Tas.	Enterprise
M0-2007-242	ma2007 00038	16-May-07	Close Quarters	Port Phillip Bay, Vic.	Ormiston/ Searoad Mersey
M0-2007-246	ma2007 00061	25-Aug-07	Fatality/ Serious Injury	285 miles NE of Cairns, Qld	Geosounder
M0-2007-247	ma2007 00076	30-Nov-07	Grounding	Off Mooloolaba, Qld	Namhae Gas/ Rexandra
M0-2007-248	ma2007 00077	2-Dec-07	Grounding	Gladstone, Qld	Endeavour River
M0-2008-001	ma2008 00002	21-Jan-08	Collision	Bowen, Qld	Allena/ Northern Fortune
M0-2008-003	ma2008 00005	12-Feb-08	Grounding	Cocos Islands	Breakthrough
M0-2008-005	ma2008 00006	23-Feb-08	Grounding	Devonport, Tas.	Van Gogh
M0-2008-004	ma2008 00016	21-Mar-08	Fire	SE of Esperance, WA	MSC Lugano
M0-2008-006	ma2008 00017	9-May-08	Grounding	Melbourne, Vic.	Francoise Gilot

## Aviation investigations underway at 30 June 2008

Investigation Number	<b>Occurrence Number</b>	Date	Occurrence Type	Location	Vessels
A0-2006-154	200601076	28-Feb-06	Warning Devices	120 S Paraburdoo, WA	HXN-HA
AI-2006-003		3-Jul-06	Safety Issue		
A0-2006-051	200604626	11-Aug-06	Aircraft Separation	Sydney, NSW	DQ-FJK
A0-2006-052	200604967	27-Aug-06	Aerodrome Related	Sydney, NSW	VH-PRX
A0-2006-001	200606530	31-0ct-06	Collision	9k SE Raglan, Qld	VH-ZGZ
A0-2006-007	200607202	27-Nov-06	Powerplant / Propulsion	93 N Perth, WA	VH-XDB
A0-2006-153	200607300	2-Dec-06	Aircraft Control	52 N Cairns, Qld	VH-BTD

Investigation Number	<b>Occurrence Number</b>	Date	Occurrence Type	Location	Vessels
A0-2006-002	200607478	9-Dec-06	Collision	Collymongle, NSW	VH-CJZ
A0-2006-005	200607628	16-Dec-06	Powerplant / Propulsion	Mt Isa, Qld	VH-UYA
A0-2006-006	200607687	20-Dec-06	Collision	9 NE Mt Gambier, SA	VH-LFK
A0-2007-018	200700361	5-Feb-07	Powerplant	Cecil Park, NSW	АЧ-НА
A0-2007-001	200702272	15-Apr-07	Significant Event	Sydney, NSW	VH-OJR
A0-2007-002	200702404	19-Apr-07	Aircraft Separation	157 E Darwin, NT	VH-AZJ/VH-TFF
A0-2007-004	200702559	25-Apr-07	Aircraft Separation	83 NW KIMMI, QId	VH-YJD/VH-FGW
A0-2007-003	200702893	8-May-07	Aircraft Separation	19 WSW Sydney, NSW	NH-OLL/VH-OGI
A0-2007-006	200703100	17-May-07	Aircraft Separation	Pt Macquarie, NSW	VH-TQP/VH-ILS
A0-2007-007	200703214	23-May-07	Collision	28 SW Warraber Is, Qld	DY-PVD
A0-2007-008	200703245	24-May-07	Powerplant / Propulsion	370 SW Fitzroy Crossing, WA	OMI-HA
A0-2007-009	200703266	26-May-07	Collision	Esperance, WA	VH-FTT
AI-2007-010		31-May-07	Safety Issue		
A0-2007-011	200703484	31-May-07	Systems	Ballarat, Vic.	VH-XCB
A0-2007-017	200703952	26-Jun-07	Powerplant / Propulsion	Jundee, WA	VH-XUE
A0-2007-024	200704288	13-Jul-07	Significant Event	Newman, WA	NXN-HA
A0-2007-023	200704278	14-Jul-07	Significant Event	Sydney, NSW	ZK-PBF
A0-2007-044	200705576	21-Jul-07	Aircraft Control	Melbourne, VIC	VH-VQT
A0-2007-027	200704612	22-Jul-07	Powerplant / Propulsion	KETUT, Indonesia	VH-EBE
A0-2007-028	200704617	22-Jul-07	Significant Event	Cairns, Qld	VH-ESB
A0-2007-025	200704490	23-Jul-07	Systems	13 N Adelaide, SA	VH-FKZ
A0-2007-026	200704706	24-Jul-07	Collision	Marvfield Station. NT	OHV-HV

Aviation investigations underway at 30 June 2008

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at 30
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investigations
Aviation

Investigation Number	<b>Occurrence Number</b>	Date	Occurrence Type	Location	Vessels
A0-2007-030	200704598	25-Jul-07	Powerplant / Propulsion	Ardrossan, SA	VH-OAA
A0-2007-029	200704734	31-Jul-07	Collision	Clombinane, Vic.	VH-YJB
A0-2007-031	200704876	5-Aug-07	Significant Event	Sydney, NSW	VH-RXX
A0-2007-032	200704885	7-Aug-07	Fuel Related	ROTAP, WA	TLN-HV
A0-2007-036	200705093	11-Aug-07	Fuel Related	Sydney, NSW	VH-TJE
A0-2007-034	200705014	13-Aug-07	Significant Event	Rockhampton, Qld	VH-VBR
A0-2007-035	200705034	15-Aug-07	Engine In-flight shutdown	926 WNW Sydney, NSW	PK-GBF
A0-2007-037	200705096	16-Aug-07	Collision	24 S Tully, Qld	NMX-HV
A0-2007-038	200705298	27-Aug-07	Aircraft Separation	Townsville, Qld	VH-VYC/VH-TIX
A0-2007-039	200705346	27-Aug-07	Systems	74 W Mildura, Vic.	VH-SGA
A0-2007-041	200705452	29-Aug-07	Aircraft Separation	Adelaide, SA	VH-ZLR
A0-2007-046	200705937	25-Sep-07	Collision	Doongan Station, WA	VH-HCN
A0-2007-045	200706351	13-0ct-07	Collision	Sydney, NSW	VH-EEB
A0-2007-047	200706408	17-0ct-07	Collision	138 SW Warburton, Vic	VH-WXC
A0-2007-049	200706444	18-0ct-07	Powerplant / Propulsion	102 N Adelaide, SA	VH-TMP
A0-2007-052	200706589	24-0ct-07	Powerplant / Propulsion	Darwin, NT	VH-QPE
A0-2007-054	200706621	26-0ct-07	Failure to comply with ATC clearance/instruction	15 E Essendon, Vic.	VH-EKB
A0-2007-055	200706727	4-Nov-07	Regulations & Standard Operating Procedures	11 W Melbourne, Vic.	HS-TJW
A0-2007-058	200706832	10-Nov-07	Collision	37 N Elliott, NT	ЛН-МГО
A0-2007-060	200707066	15-Nov-07	Collision	Uaroo Station, WA	VH-TCS
A0-2007-061	200707039	17-Nov-07	Collision	Cape Liptrap, Vic.	VH-CHU
A0-2007-062	200707098	17-Nov-07	Systems	Gold Coast, Qld	VH-VBC

Investigation Number	<b>Occurrence Number</b>	Date	Occurrence Type	Location	Vessels
A0-2007-063	200707207	23-Nov-07	Significant Event	19 E Melbourne, Vic	VH-06G
A0-2007-064	200707268	25-Nov-07	Significant Event	Brisbane, Qld	HB-IKR
A0-2007-065	200707452	1-Dec-07	Collision	Latrobe Valley, Vic.	28-0929/VH-EUI
A0-2007-066	200707563	7-Dec-07	Collision	Lake Liddell, NSW	NH-LIS
A0-2007-069	200707880	29-Dec-07	Collision	Docklands, Vic.	VH-MEB
A0-2007-070	200707881	29-Dec-07	Significant Event	Norfolk Island, NSW	VH-OBN
A0-2008-001	200707906	31-Dec-07	Significant Event	Pt Moresby, PNG	XZO-HV
A0-2008-002	200708026	31-Dec-07	Aircraft Loading	Melbourne, VIC	VH-VQT
A0-2008-003	200800003	7-Jan-08	Systems	Bangkok, Thailand	MLO-HV
A0-2008-004	200800017	11-Jan-08	Significant Event	Brisbane, Qld	VH-OBN
A0-2008-005	200800024	14-Jan-08	Powerplant / Propulsion	8 SSW Townsville. Qld	QS4-HV
A0-2008-006	200800588	7-Feb-08	Ground Operations	Tamworth Airport. NSW	ZQT-HV
A0-2008-007	200800641	7-Feb-08	Aircraft Control	Darwin Airport, NT	VH-NXE
A0-2008-008	200800702	11-Feb-08	Powerplant / Propulsion	Jabiru, NT	VH-VAZ
A0-2008-009	200800732	12-Feb-08	Aircraft Control	Thangool, Qld	DZD-HA
A0-2008-010	200800771	13-Feb-08	Collision	80 E Carnarvon, WA	VH-OUS/VH-ZDP
AE-2008-011		20-Feb-08	Accredited representative	Botswana	A2-HDB
A0-2008-013	200801100	25-Feb-08	Significant Event	Sydney, NSW	VH-EBY
A0-2008-014	200801099	26-Feb-08	Collision	8.5 NE Wee Waa, NSW	VH-CJK/VH-ATB
A0-2008-015	200801178	26-Feb-08	Collision	Kalumbru, WA	ZUX-HV
A0-2008-017	200801245	1-Mar-08	Collision	7km NW Hornsby, NSW	VH-NBP
A0-2008-020	200801530	12-Mar-08	Regulations & Standard Operating Procedures	Launceston Airport, Tas	YD-HV

Aviation investigations underway at 30 June 2008

## Aviation investigations underway at 30 June 2008

Investigation Number	Occurrence Number	Date	Occurrence Type	Location	Vessels
A0-2008-021	200801652	18-Mar-08	Collision	5 E Camden, NSW	VH-NUK
A0-2008-022	200802048	3-Apr-08	Collision	Brampton Is, Qld	VH-ZMP
AE-2008-024		8-Apr-08	Accredited Representative	UK	numerous
A0-2008-025	200802195	9-Apr-08	Collision	Townsville, Qld	VH-PLU
A0-2008-026	200802204	9-Apr-08	Collision	10 SE Sydney, NSW	VH-OZA
AE-2008-028	200708356	22-Apr-08	External assistance	near Bindoon ALA, WA	24-4148
AE-2008-029	200801453	28-Apr-08	External assistance	near Gold Coast, Qld	VH-ZRS
A0-2008-030	200802649	1-May-08	Aircraft Separation	Launceston, Tas.	SJV-HV/JOV-HV
A0-2008-032	200802781	8-May-08	Systems	19 W Camden, NSW	YMM-HV
A0-2008-033	200802821	9-May-08	Significant Event	Perth, WA	PK-GEF
A0-2008-035	200802973	15-May-08	Collision	20 SW Abington Downs, Qld	MdI-HV
A0-2008-037	200803363	28-May-08	Air-ground communication event	Perth, WA	PK-GGE
AI-2008-038		30-May-08	Safety issue		
A0-2008-039	200803689	18-Jun-08	Airframe vibration and autorotation	Wollongong, NSW	VH-UAH
A0-2008-043	200803809	18-Jun-08	Collision	False Cape, Qld	VH-RYW
A0-2008-042	200803860	20-Jun-08	Powerplant / Propulsion	Near Weipa, Qld	VH-QOA
AE-2008-040		23-Jun-08	Accredited representative	Indonesia	РК-VТQ
AE-2008-041		23-Jun-08	Accredited Representative	France	41-LK

Appendix F: Investigations commenced by occurrence type and mode

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		FinancialYear (#	Investigations)			
Occurrence Type Level 1	Occurrence Type Level 2	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008
Collision	Running Line Collision				1	
	Yard Collision		1			
Derailment	Running Line Derailment	1	S	1	б	4
Level Crossing Occurrence	Collision with Road Vehicle			3	7	4
Load Irregularity	Load Shift			1		
Rollingstock Irregularity	Defective Bearing	1				
	Other					1
	Train Parting				1	
	Wheel/Axle Failure			1		
Safeworking Rule or Procedure Breach/Deficiency	Other	1	1	1		
	Safeworking Rules or Procedures Deficiency				1	
Signal Passed at Danger	Driver Misjudged	1	1			
	Other					1

## Rail investigations commenced by Occurrence Type and Financial Year

		FinancialYear (#	<pre>f Investigations)</pre>			
	Starting Against Signal			1		
Track and Civil Infrastructure Irregularity	Buckled Track	2	Ļ	1		
	Spread Track		1			
Total		9	8	6	13	10

# Marine investigations commenced by Occurrence type and financial year

		Financial Year Inv	/estigations)			
Occurrence Type	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	Total
Capsizing/listing	1					1
Close quarters			1	1	1	З
Collision	3	с	1	2	7	11
Fatality	2	വ	S	1	7	13
Fire/explosion		2	2	4	m	11
Flooding	1					l
Grounding/stranding	1	2	c	4	4	14
Lifeboat accident	1					Ţ
Machinery failure				1		1
Pollution			1			Ţ
Serious injury			Ţ	1		2
Total	6	12	12	14	12	59

		Financial Year (#	Occurrences)				
Occurrence Type Level 1	Occurrence Type Level 2	2003/2004	2004/2005	2005/2006	2006/2007	2007/2008	Total
Aerodrome and airways facility	Aerodrome related		Ţ				1
Airspace	Aircraft separation	6	19	12	10	9	56
	Airspace incursion		Ţ		1		2
	Breakdown of co-ordination		4	2	1		7
	Information error		Ţ				1
	Operational non-compliance	1	9	9	1	80	22
	Procedural error	З	11	9	N	1	23
Mechanical	Airframe	10	80	9	ß	ß	34
	Powerplant / propulsion	13	17	7	17	10	64
	Systems	6	15	11	6	80	52
Operational	Aircraft control	10	17	13	7	2	49
	Aircraft loading	4	2		1		7
	Cabin Safety		Ţ	2	1		4
	Collision	15	20	17	œ	22	82
	Communications	2	2		N		9
	Fuel related	80	4	с	4	2	21
	Ground operations	4	4	4	2	S	17
	Miscellaneous	6	4	2	1		16
	Navigation / flight planning	1	33	Ţ	2	2	6
	Regulations and SOPs	2	4	ß	1	1	13

Aviation investigations commenced by Occurrence type and financial year

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		Financial Year (#	Occurrences)				
	Significant event	33	42	29	29	29	162
	Warning device	9	7	7	2	2	24
	Weather / environment	2	1	6	7	e	19
Total		73	107	72	58	69	379

In 2006-07, a further four aviation investigations were commenced that were not linked to an occurrence in the aviation occurrence database. Note 1:

In 2007-08, a further 13 investigations were commenced that were not linked to an occurrance in the aviation occurrence database. Note2:

### Appendix G: Investigation procedures 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 classification 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
- 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 to 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.

- 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 casualties<sup>1</sup>.

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.

- · 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.
- <sup>1.</sup> 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.

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.

- 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.

- 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.

- 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 G: National Road Safety Strategy Panel.

Appendix H: National Road Safety Strategy Panel, Terms of Reference and List of Member Organisations

### Terms of Reference

The National Road Safety Strategy Panel (NRSSP) comprises representatives of jurisdictions, Austroads, and other key associations and organisations with an interest in improving road safety in Australia.

The NRSSP will report to the Australian Transport Council (ATC) through the Standing Committee on Transport (SCOT) and in consultation with Austroads.

Meetings of the NRSSP will be convened and chaired by the Australian Transport Safety Bureau (ATSB). The ATSB also provides the NRSSP secretariat.

The NRSSP's role will be to:

- assist in identifying emerging national road safety priorities and in developing national road safety strategies and action plans;
- monitor implementation of the current National Road Safety Strategy and Action Plan and related national strategies and action plans for specific areas of road safety;
- coordinate a national approach on specific road safety issues, appointing working groups where necessary;
- identify and recommend areas of research to assist in reducing the incidence and severity of road trauma, including input to the Austroads research program;
- provide a forum for the exchange of data and information among stakeholders on road safety matters;
- ensure that effective linkages are in place so that road safety strategies and action plans at the jurisdictional level are consistent with overall national objectives;
- assist in the harmonisation of road safety policies and practices among jurisdictions; and
- promote the development and implementation of road safety countermeasures based on research and best practice.

### Member Organisations

- ARRB Transport Research Ltd
- Australasian College of Road Safety
- Australian Automobile Association Australian Driver Trainers Association
- Australian Federal Police ACT Policing
- Australian Local Government Association
- Australian Motorcycle Council
- Australian Road Rescue Organisation
- Australian Transport Safety Bureau
- Australian Trucking Association
- Austroads
- Bicycle Federation of Australia
- Department of Health and Ageing (Commonwealth)
- Department of Infrastructure, Energy and Resources (Tas)
- Department of Planning and Infrastructure (NT )
- Department of Premier and Cabinet (WA)
- Department of Territory and Municipal Services (ACT)
- Department of Transport and Regional Services (Commonwealth)
- Department of Transport, Energy and Infrastructure (SA)
- Engineers Australia
- Federal Chamber of Automotive Industries
- Heads of Compulsory Third Party (CTP) Insurance
- Institute of Public Works Engineering Australia
- Ministry of Transport, New Zealand
- National Transport Commission
- New South Wales Police
- Northern Territory Police
- Pedestrian Council of Australia Limited
- **Queensland Police Service**
- **Queensland Transport**
- Roads and Traffic Authority of New South Wales
- Royal Australasian College of Surgeons
- Royal Automobile Club of Victoria (RACV)
- South Australia Police
- VicRoads
- Victoria Police
- Western Australia Police Service