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Australian Transport Safety Bureau

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Contents

Executive Director's message

The ATSB has come a long way since its creation on 1 July 1999. Legislation, training and IT systems have all been upgraded. The ATSB has an increasingly national and international reputation for independent safety material. This is reflected in the almost 800,000 new visitors to the ATSB website which also had more than 30 million 'hits' in 2006–07, and in multiple articles in such publications as the prestigious US-based Flight Safety Foundation's *AeroSafety World*.

During 2006–07, the ATSB finalised its complex investigation into Australian civil aviation's worst accident since 1968, the 15-fatality aircraft accident near Lockhart River, Queensland on 7 May 2005. The 500-page final report released on 4 April 2007 identifies important safety issues to enhance future aviation safety relating to the crew, the operator, regulatory oversight and instrument approach chart design. Three ATSB factual reports, a research report and ten safety recommendations were released during the course of the almost two-year investigation. A further ten safety recommendations were issued with the final report, which also utilised an enhanced ATSB investigation and analysis methodology. Among other coronial inquests, the ATSB assisted with the inquest into the Lockhart River accident by the Queensland State Coroner which included a month of hearings on Thursday Island and in Brisbane. The Coroner reported on 17 August 2007.

During the year the Bureau released 80 final aviation investigation reports, 19 aviation safety recommendations, 10 aviation safety research reports and five research grant reports. The ATSB also cooperated with the Indonesian National Transportation Safety Committee (NTSC) in the investigation of the Garuda Airlines Boeing 737-400 accident at Yogyakarta Airport on 7 March 2007 in which 21 died, including five Australians, and 12 were seriously injured. ATSB assistance included an on-site team comprising a Deputy Director and two senior investigators, flight recorder analysis in Canberra, and the drafting of preliminary and final reports.

In April 2007 the Bureau introduced a new Safety Investigation Information Management System (SIIMS) aviation database which will be extended to rail and marine in 2007–08. SIIMS was developed using the $6.1 million committed by the Australian Government in the May 2004 Budget, and was within time and budget.

In marine, the ATSB released 14 investigation reports, issued 38 safety recommendations and continued an education campaign on commercial fishing vessel safety. International success included ATSB coordination and facilitation of recent amendments to the Code for Investigation of Marine Casualties and Incidents as a member of the IMO Flag State Implementation Subcommittee. The ATSB also assisted with the inquest into the loss of the Immigration vessel *Malu Sara* with five fatalities in the Torres Strait.

The ATSB's rail safety investigation team released nine final reports and 39 safety recommendations under the *Transport Safety Investigation Act 2003* (TSI) which included a number of level crossing accidents. In June 2007, the ATSB published jurisdiction regulators' rail safety occurrence data in eight key categories covering the period January 2001 to December 2006. Further improvements in rail safety data are being sought through a process coordinated by the National Transport Commission.

The ATSB is continuing its commitment to training its investigators through accredited Diploma of Transport Safety Investigation. In 2006–07, 12 staff completed the TSI Diploma with 13 progressing through the required coursework and mentoring.

In March 2007 I completed my term as Chairman of the International Transportation Safety Association (ITSA), which includes major independent transport safety investigation bodies from around the world. ITSA has been revitalised and has grown to include the UK, Japan and Norway. France and South Korea are potential new members.

The ATSB continued to support Ministers with road safety advice and coordinated with other jurisdictions to develop the *National Road Safety Action Plan for 2007 and 2008*, which was approved by Ministers of the Australian Transport Council. While the challenges in road safety are immense, progress is being made in jurisdictions and through other stakeholders. It has been my privilege to chair the National Road Safety Strategy Panel since 1999 and work with such dedicated officers as ATSB General Manager Joe Motha and Team Leader John Goldsworthy and senior staff including Chris Brooks.

In 2006–07 the ATSB released 25 road safety research and statistical publications including a report on transport injuries amongst Indigenous people. The Bureau also helped organise an Indigenous road safety forum in October 2006. Work continued in preparation for the major novice driver research trial in New South Wales and Victoria which the Australian Government is supporting. Partners are scheduled to finalise the curriculum and conduct pilot testing before the end of 2007.

All of the achievements made in 2006–07 and on an ongoing basis are the result of the dedication of ATSB professional officers. For this untiring service, I salute them all. Most have made major personal sacrifices to make a difference for future transport safety. I particularly recognise my direct report colleagues: Peter Foley, Kerryn Macaulay, Joe Motha, Alan Stray and Julian Walsh. The investigator-in-charge of the Lockhart River investigation, Greg Madden and his team also deserve special praise.

Kym Bills

ATSB's mission statement

Objective

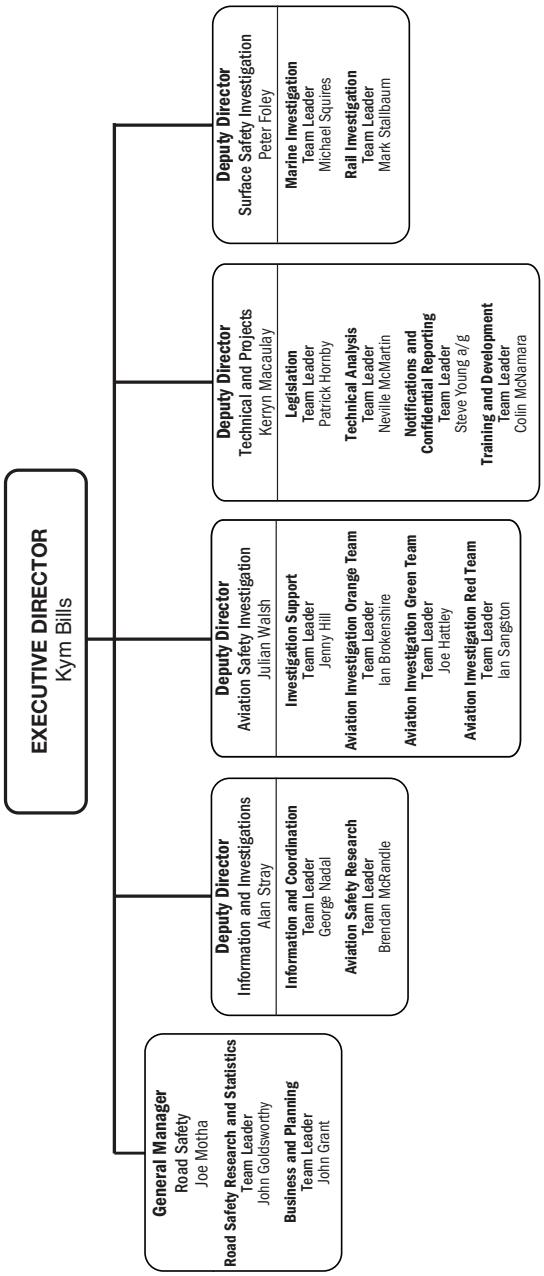
Safe transport.

Our mission

The Australian Transport Safety Bureau contributes to the well-being 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
- raising safety awareness and knowledge.

ATSB organisation chart



Executive profile

Mr Kym Bills

Kym Bills was appointed 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 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 2005–06 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 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 a number of professional bodies and immediate past Chairman of the International Transportation Safety Association.

Mr Joe Motha

Joe Motha is General Manager, Road Safety. He started 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 a number of research papers and reports. In 1997, a research team led by Mr Motha won the Australasian Evaluation Society's best public sector evaluation study award for a report on the federal government's Black Spot Road Safety Programme. He was awarded an Australia Day medallion in 1996 and again in 2002.

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 Deputy Director of Information and Investigations with responsibility for the Information and Coordination, and Aviation Safety Research sections of the Bureau. He is also responsible for international liaison with government and industry and also providing executive assistance to the Executive Director. He has been an aviation safety investigator with the ATSB and its predecessor, the Bureau of Air Safety Investigation, since January 1987.

Between 1992 and 1994, Mr Stray 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, Mr Stray was responsible for aviation safety investigations. He has been a guest speaker at conferences and lecturer at training courses for investigators in the region. Mr Stray has been the Accredited Representative on a number of overseas major airline accidents, the most recent being the Garuda and Adam Air Boeing 737 tragedies in Indonesia. He has the lead in-country role in the ATSB's cooperation with the Indonesian National Transportation Safety Committee, as part of the Australian Government's Indonesia Transport Safety Assistance Package. In January 2005 he was awarded the Department's Australia Day Achievement Medallion for his contribution to aviation safety.

As a licensed aircraft maintenance engineer and pilot with an Airline Transport Pilot Licence, Mr Stray 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 Deputy Director of Technical and Projects and is responsible for the oversight of the Technical Analysis team, notifications and confidential reporting, legislative matters affecting the ATSB, the training and development needs of Bureau staff and major projects including replacement of the OASIS aviation safety database. 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 managed the Safety Analysis Branch of BASI, which included the review and release of Safety Recommendations and safety study reports to organisations within the aviation industry including regulatory agencies, operators and manufacturers.

Since the formation of the ATSB in 1999, Kerryn has assisted in developing a capacity to investigate rail accidents and incidents and was appointed as the first Team Leader to the Rail Safety Unit. Kerryn completed a three year project to develop and implement Commonwealth multimodal 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 more adequately 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, including 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 was appointed Deputy Director of Aviation Safety Investigation in March 2006. Prior to joining the Bureau as an air safety investigator in September 1998, Julian completed nearly 21 years 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 he 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 as Team Leader Notifications and Technical Analysis, and as 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 has been Deputy Director of Surface Safety Investigations 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 Australian National Line. 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 marine engineering and transport safety investigation qualifications, degrees in both marine and mechanical engineering, and a graduate diploma in business management.

Modal overviews

Road

Role

The ATSB 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 2006–07 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 only a marginal improvement in Australia's per capita rate of road deaths. In the 12 months to 30 June 2007, the national road fatality rate stood at 7.7 deaths per 100,000 population. This compares with a rate of 6.7 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.

This recent slowing of progress provided the context for a comprehensive ATSB-led review of national road safety priorities, and the development of a new two-year National Road Safety Action Plan, which was approved by ATC in October 2006. In early 2007, the ATSB coordinated a supplementary report to Transport Ministers setting out the key initiatives needed to accelerate Australia's road safety improvement.

In May 2007, the ATSB released the first of a series of joint reports with the Australian Institute of Health and Welfare (AIHW), Injury of Aboriginal and Torres Strait Islander people due to transport, 1999–00 to 2003–04. 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 Bureau published 25 road safety research and statistical reports, and also released an update of its highly-regarded information kit for learner drivers, *Key Facts for New Drivers*.

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 third Action Plan covered calendar years 2005 and 2006. During 2006, the ATSB coordinated a comprehensive review of national road safety progress and priorities, leading to the development of the *National Road Safety Action Plan 2007 and 2008*.

The ATSB and the National Road Safety Strategy Panel chaired by the ATSB Executive Director monitor and report on progress under the National Strategy. During 2006–07 the ATSB:

- convened and chaired two Panel meetings
- coordinated the preparation of a progress report for the ATC
- coordinated the developing and publishing of the new Action Plan.

Novice driver education

The ATSB is coordinating the Australian Government contribution to a research trial education programme for young drivers in partnership with the NSW and Victorian Governments and private sector organisations. The programme will be delivered to novices who have held a provisional licence for about three months. Novices are defined as drivers who are 17–21 years old in NSW and 18–22 years old in Victoria at the time of licensing (reflecting the minimum licensing age of 17 years in NSW, and 18 years in Victoria).

The trial is expected to involve at least 7,000 course participants in NSW and a similar number in Victoria with an equivalent number of novices selected for a control group in each state. It will be one of the largest and most rigorous research projects ever undertaken on post-licence driver education, and is likely to attract considerable overseas interest.

Due to inherent complexities, the development of the Programme has progressed somewhat more slowly than originally expected. During 2006–07, the project Steering Committee engaged a specialist curriculum organisation to develop an innovative programme drawing on the latest research and experience in young novice driver education. The trial is expected to start in each state in

2007–08 after completion of a pilot phase and finalisation of the curriculum. A comprehensive evaluation of the trial will be conducted by an independent research organisation.

National road safety statistics

The ATSB disseminates 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 OECD countries. The Bureau also provides public access to an interactive online database of fatal road crash statistics, which is updated monthly.

ATSB road safety statistical reports for 2006–07

In 2006–07 the ATSB released and published on its website 15 road safety statistics publications. These reports are listed in Appendix 1.

Statistical collections updated during 2006–2007 include *Road Fatalities Australia: 2006 Statistical Summary* and *International Road Safety Comparisons: The 2005 Report*. Both of these reports are available on the ATSB website.

Road safety research and analysis

Input from the ATSB's road safety research programme 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 of Transport and Regional Services.

A number of research projects are contracted out to private sector consultants or academics. ATSB officers identify the directions, manage the projects, exercise quality control, use the material in advice, and incorporate it into key safety messages. During 2006–07 the Bureau managed a variety of commissioned research projects including community attitudes to road safety and road trauma affecting Indigenous people. The Bureau also conducted in-house research on cycling crashes, international road safety comparisons, and holiday period crashes.

The ATSB disseminates the results of commissioned and in-house research through its website. During 2007 the ATSB released five road safety research reports (details are shown in Appendix 1). Further information on two of these reports is provided below.

Community Attitudes Survey (CR 229)

The ATSB's 2006 survey of community attitudes to road safety was the nineteenth in a long-running survey programme. The main purposes of the survey are to monitor attitudes to a variety of road safety issues, evaluate specific road safety countermeasures, suggest new areas for intervention and identify any significant differences among jurisdictions.

The issues examined in the 2006 survey included: perceived causes of road crashes, exposure and attitudes to random breath testing, attitudes to speed, perceptions of police enforcement, reported usage of seat belts, involvement in road crashes, use of mobile phones while driving, and experience of fatigue while driving.

Some of the findings of this wide-ranging survey are listed below:

- 97 per cent of the community approved Random Breath Testing and 84 per cent approved mandatory carrying of licences.
- 88 per cent supported speed enforcement either being maintained at existing levels (44 per cent) or increased (44 per cent).
- Six per cent of drivers said they were very likely (2 per cent) or likely (4 per cent) to have driven when over the blood alcohol limit in the last 12 months.
- 71 per cent admitted to driving 10 km/h or more over the speed limit on at least some occasions, and 26 per cent believed 'it is okay to speed if you are driving safely'.
- 15 to 24-year-olds were much more likely to have been in a crash in the past three years.
- Of the 88 per cent of drivers who were mobile phone users, 55 per cent (an increase from 47 percent last year) reported that at least occasionally they used a mobile phone while driving.

Injury of Aboriginal and Torres Strait Islander people due to transport, 1999–2000 to 2003–2004

In May 2007 the ATSB and the Australian Institute of Health and Welfare (AIHW) jointly released the above report on the transport injuries of Indigenous people. The report examines fatal and non-fatal injuries due to transport accidents for Indigenous persons in the Northern Territory, Western Australia, South Australia and Queensland, in the five-year period 1999–2000 to 2003–2004. Sixty per cent of the Indigenous population of Australia and 38 per cent of the total Australian population reside in these four jurisdictions.

Some of the findings of this research are listed below.

- On a population basis, Indigenous persons had more than twice the rate of fatal injury and 1.3 times the rate of serious injury due to transport accidents compared with non-Indigenous persons.
- More than half of both Indigenous persons (52 per cent) and non-Indigenous persons (55 per cent) fatally injured were car occupants. However, 35 per cent of Indigenous persons were pedestrians, compared with 13 per cent of non-Indigenous persons. Three per cent of Indigenous persons were motorcyclists compared with 13 per cent of non-Indigenous persons.
- Among the seriously injured, 47 per cent of Indigenous persons were car occupants compared with 34 per cent of non-Indigenous persons, 17 per cent of Indigenous persons were pedestrians compared with sever per cent of non-Indigenous persons while eight per cent of Indigenous persons were motorcyclists compared with 24 per cent of non-Indigenous persons.
- Rates of fatal and serious injury for males, both Indigenous and non-Indigenous, were higher than for females.
- The proportion of Indigenous persons among fatal injury cases rose from three per cent in major cities to 22 per cent in remote areas and 62 per cent in very remote areas. The proportion of Indigenous persons among serious injury cases rose from two per cent in major cities to 13 per cent in remote areas and 38 per cent in very remote areas.

Road safety research grants programme

On an annual basis, the ATSB makes available several small competitive road safety research grants. The programme invites researchers and community groups to submit innovative research ideas. In 2006–07 two grants were awarded, for research relating to electronic stability control devices in vehicles, and ‘eco-drive’ driving styles that encourage both safer driving and fuel conservation. Five grant reports were published in 2006–07, on motorcycle helmet protection, driver fatigue management, intelligent transport systems to support law enforcement and an evaluation of full frontal impact occupant protection. More details on these grants and the reports published are provided at Appendix 2.

The ATSB 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. In 2006–07, the ATSB contributed to:

- collection and analysis of vehicle crashworthiness and aggressivity data (co-sponsored by state transport agencies and motoring clubs)

- development of a model licence re-assessment procedure for older drivers (Austroads)
- assessment of the safety performance of pedal and motor cycle helmets and identification of design improvements to help reduce crash injury.

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 ATSB's 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 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 Group includes representatives of the road transport authorities and major research organisations, and the ATSB convenes a meeting of the Group once a year. At the meeting held at the Gold Coast in October 2006, the delegates agreed that the next conferences would be held in Melbourne (October 2007) and South Australia (in 2008).

National Road Safety Strategy Panel

The ATSB convenes, chairs and provides 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 8 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 ATSB chairs the Motorcycle Safety Consultative Committee (MSCC), which usually meets once a year in Canberra. The Committee provides a forum where the Australian Government (represented by the ATSB and other departmental staff as appropriate), major rider associations and the motorcycle industry can comment on national motorcycle safety issues. During 2006–07 the Committee met in June 2007 and considered a range of issues. Topics discussed included: safer roadside signage, lane splitting and filtering; frontal identification for motorcycles; motorcycle safety public education material; and the impact of increased motorcycle usage on National Road Safety Strategy targets.

The deliberations of the MSCC resulted in work commencing on several projects including the development of a guide on effective protective clothing for motorcyclists and marketing strategies for distributing the *Ride On* DVD educational resource produced by the ATSB.

In August 2006 an ATSB review of the MSCC concluded that the committee had fulfilled its role as specified in its terms of reference and that its period of operation should be extended to June 2009.

Marketing and Public Education Forum

The Marketing and Public Education Forum includes representatives from all jurisdictions and the ATSB, 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.

Heavy Vehicle Safety Strategy Task Force

The ATSB is a member of this Task Force which is chaired by the National Transport Commission. The Task Force monitors progress on implementation of the Heavy Vehicle Safety Strategy and associated Action Plan for 2005 to 2007.

Indigenous Road Safety Working Group and Forum

The ATSB chairs 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 2006–07, the ATSB chaired Working Group meetings on 19 September 2006, 25 October 2006 and 20 February 2007.

On behalf of the Working Group, the ATSB, in partnership with the Office of Road Safety in Western Australia, held the third national Indigenous Road Safety Forum in Broome, Western Australia from 23 to 25 October 2006. About 60 delegates from health, safety, justice and education fields attended the forum.

On 23 October delegates visited Beagle Bay, a local Aboriginal community, to gain an insight into local road safety issues. On 24 October the Hon Jim Lloyd MP, Minister for Local Government, Territories and Roads, officially opened the forum. The forum content featured presentations from selected speakers and a number of workshop discussion groups and was designed to update delegates on developments related to Indigenous road safety

Delegates reacted positively to working with their road safety colleagues and produced a number of recommendations. These included: adding more information on drink driving, funding opportunities and driver licensing programmes to the HealthInfoNet Indigenous Road Safety Website; developing national educational resources on restraint-wearing; supporting the use of seat belt reminders in new road vehicles; and improving the quality of road trauma statistics.

Australasian Traffic Policing Forum

The Australasian Traffic Policing Forum (ATPF) was originally established to foster best practice in road safety and traffic law enforcement among state police services. Its current membership includes senior traffic police managers from all Australian states and territories, and New Zealand. The ATSB is also a permanent member of the Forum, with a particular role in supporting constructive linkages between police and other road safety organisations. The ATPF normally meets twice a year. In 2006–07 the ATSB attended meetings on the Gold Coast (October 2006) and in Sydney (May 2007).

Public information on road safety

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

Other road safety contributions

The ATSB provides occasional discretionary grants and sponsorships for worthwhile road safety activities that support the Australian Government's road safety policy objectives. During 2006–07, the Bureau contributed to:

- the Australian Road Assessment Program (AusRAP), an initiative of the Australian Automobile Association, which assesses the safety of Australian roads according to crash risk and design characteristics
- SmartDemo 2007, a national transport technology demonstration event convened by Intelligent Transport Systems Australia (ITS Australia)
- HealthInfoNet Indigenous Road Safety Web Resource, a website co-funded by a number of state and territory governments, dedicated to the sharing of information about road safety issues affecting Indigenous people
- Road safety awareness materials for drivers and cyclists produced by the Amy Gillett Foundation
- Australasian College of Road Safety national conference on infants, children, young people and road safety
- creation of a documentary by Schools Broadcasting Australia to be shown on SBS Television, featuring high school students exploring driver safety issues.

The ATSB also co-sponsored a delegate to attend the World Youth Assembly for Road Safety, held in Geneva from 23 to 24 April 2007, as part of the first United Nations Global Road Safety Week.

Rail

Role

The ATSB's Rail Safety Unit conducts rail safety investigations on the Defined Interstate Rail Network (DIRN) using 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 & Territory authorities. The ATSB also has a mandate from the Australian Transport Council to coordinate the publication of the National Rail Occurrence Data, from data supplied by the various state and territory rail regulators.

Key rail safety activities and results

In 2006–07 the ATSB initiated 13 rail safety investigations on the DIRN under the TSI Act 2003 and began 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 released nine final and two preliminary rail investigation reports containing a total of 39 safety recommendations to rail industry stakeholders. The final investigation reports related to five level crossing collisions, one derailment, one rolling stock irregularity, one freight loading irregularity, and a collision between a train and a road/rail vehicle. The median completion time for the nine rail investigations was 369 days. The ATSB received 46 rail accident and incident notifications in 2006–07.

Rail safety statistics

The Rail Safety Regulators Panel (RSRP) regularly provides the ATSB with rail safety data for the Bureau to publish. Currently the data includes the six-year period 2001–2006, and is to be updated twice a year. The data comprises counts for deaths and serious injuries and the following six key categories of occurrence:

- Derailments
- Collisions
- Level Crossing Occurrences
- Signals Passed at Danger
- Loading Irregularity
- Track and Civil Infrastructure Irregularity

The data is published at <www.atsb.gov.au/rail/statistics.aspx> and also features in Table 6 and Appendix 7 to this Annual Review.

Key rail investigation reports published during 2006–07

Lismore rail level crossing collision

At 0714:25 on Thursday 25 May 2006, a southbound Kenworth 1995 K100E rigid tipper truck and quad axle trailer collided with an eastbound freight train at the Lismore Skipton Road level crossing in southern Victoria. The 34-year-old male driver of the truck was fatally injured in the accident. The two train crew were uninjured. The level crossing was passively protected by advance warning signs, give way signs and pavement markings only. The speed limit for road traffic over the level crossing was 100 km/h. The line speed limit for trains at the crossing was 115 km/h but the train, in this instance, was limited to 110 km/h.

Train 4AM3 was 1,356 m long, weighed 4,382 tonnes, had three locomotives hauling it, and was travelling at a speed of 112 km/h at the time of the collision. The truck and quad axle trailer combination was 19 m long, weighed 48 tonnes and was mainly loaded with citrus pulp.

The truck collided with the side of the second locomotive, adjacent to the trailing bogie. The estimated speed of the truck was between 53 and 78 km/h at impact and more likely to be toward the upper end of this range. The force of the impact was sufficient to derail this locomotive and the following locomotive. Forty-one of the train's 64 wagons then derailed as a result. This portion of the train (844.8 m long) was compressed into an area 128 m long, about 45 m wide and up to 12 m high.

At the time of the accident, the area surrounding the level crossing was enveloped in very heavy fog. The evidence suggests that visibility was as low as 20 m and certainly no greater than 50 m.

The train locomotive headlight was illuminated and the horn was sounded twice before impact. Testing established that the headlight was as specified and aligned correctly and that the sound levels of the horn were within expected levels.

The emergency response was both timely and adequately resourced and site management processes were appropriate. The magnitude of the recovery task was such that the track was not re-opened until 0045 on Wednesday 31 May, nearly six days after the occurrence.

Neither the deceased truck driver nor the company that he worked for had any history of traffic offences or other non-compliances that would indicate an increased risk for this type of accident. Notwithstanding this, the investigation found that the truck was not being driven in a manner consistent with the prevailing conditions of reduced visibility or at a speed that would have allowed the truck to be stopped short of any hazard on the road.

The investigation found that the Lismore Skipton Road level crossing did not comply fully with the relevant standards relating to road signage or the guidelines for sighting distances for passive level crossings controlled by give way signs. However, it is unlikely that these factors contributed to the accident.

At the time of the accident the processes for calculating sighting distances at passive level crossings were contained in State warrants and varied considerably across jurisdictions. The investigation noted that the Australian Standard Manual of uniform traffic devices, 1742(7) was under review and that the draft contained several initiatives aimed at improving warnings for motorists at active level crossings and a consolidation of sighting distance formulas for passive level crossings.

The investigation noted that in times of reduced visibility motorists may not be able to safely negotiate a passive level crossing based on sighting distances alone. This is regardless of whether give way or stop control is used.

The investigation also noted that the Victorian Department of Infrastructure had scheduled the Lismore Skipton Road level crossing for upgrade from passive to active protection in March 2007 and that the Australian Transport Council approved a level crossing strategy in June 2006 that was aimed at modifying road user behaviour to improve railway level crossing safety.

Safety actions recommended, as a result of this investigation, relate to:

- audits aimed at ensuring compliance with the relevant level crossing signage standards and sighting guidelines across Victoria
- considering measures to encourage vehicle drivers to drive according to the environmental conditions and to recognise the increased risk at passive level crossings in times of reduced visibility
- ensuring that both road and rail authorities evaluate the risks posed by the operation of B-double/higher mass limit trucks.

Harden derailment

On Thursday 9 February 2006 at about 0351 an XPT passenger train travelling from Melbourne to Sydney derailed near Harden in New South Wales. An inspection by the driver found one wheel on the trailing wheelset of the trailing bogie of the leading power car had derailed. During recovery operations the axle of the derailed wheel was found to have completely sheared with a crack in the radius relief area between the gear and wheel seats. The point of drop off was determined to be at approximately the 390.325 km point from Sydney Central station. The train travelled a further 4.2 km before coming to rest at the 386.100 km point.

The ATSB's investigation of the derailment concluded that train ST22 had derailed as a result of the axle completely fracturing. The axle had fractured due

to the initiation and propagation of a fatigue crack. Once the crack had grown to critical size, the axle was unable to withstand further operational stresses, which resulted in the overload of the remaining net section of the axle. Once the axle had fractured, the wheelset became unstable on the rail and eventually derailed one wheel.

The train's operator, RailCorp subsequently inspected other trains and discovered 13 other XPT power car axles which had surface defects with the potential to initiate similar fatigue cracks in critically stressed areas. The ATSB's examination of five of the axles, which exhibited fatigue cracks, revealed a crystalline material, consistent with track ballast, embedded in the surface defects that had initiated each crack. It was probable that impacts from track ballast from unknown location(s) had led to the formation of the cracks in the axles.

Although a definitive rate for the propagation of the fatigue cracks could not be established, the propagation of the cracks was determined to be consistent with a low stress and high cycle mechanism. Given that it was likely that the cracks propagated over a relatively long period, an effective maintenance regime should have detected the cracks before they reached the point where they led to total axle failure. The operator's maintenance contractor had carried out routine testing of the axles using magnetic particle inspection (MPI). The investigation found that this testing was ineffective and resulted in the fatigue cracks going undetected for a considerable period of time.

RailCorp and the Independent Transport Safety and Reliability Regulator of New South Wales have undertaken a number of safety actions which include measures aimed at the early detection and prevention of axle fatigue cracks in XPT and other diesel fleet rail vehicles to limit the risk of further axle failures.

Additionally, the ATSB has issued a safety advisory notice advising the risks associated with axle failures as a result of fatigue cracks initiated by ballast strikes and the need for rail vehicle operators to review their maintenance practices accordingly.

Benalla derailment

At approximately 0641 on 2 June 2006, the crew of Interail freight service 5MB7 reported that their train had derailed while traversing the No. 3 points located at the Melbourne end of the Benalla crossing loop. Two locomotives and 19 wagons derailed, 16 wagons sustained major damage. Two track machines stabled in a cripple road adjacent the crossing loop were heavily damaged. A Victorian Railway Institute Hall near the site also sustained severe structural damage.

No serious injuries occurred to the crew of the locomotive or the operators of the track machines; however, the train drivers were taken to hospital for observation and treated for shock. There is no evidence to suggest any medical or toxicology issues that affected the performance of either the driver or the co-driver. No

defects were identified with the signalling system. The signalling system was regularly maintained in accordance with applicable maintenance standards and there was no history of signalling abnormalities.

As a result of its investigation, the ATSB identified several factors which contributed to the derailment of train 5MB7 on 2 June 2006. The train driver was not expecting to cross a train at Benalla and thus assumed that he was being routed through the main line. He probably failed to correctly interpret and then respond to signal ES6377. As a result he was unable to slow the train to a safe speed for negotiating the facing points. The driver responded some 14 seconds beyond the available sighting point of No. 2 Signal. Had he responded earlier he could have slowed the train and potentially reduced the consequences of the derailment.

Two-driver operation was a primary defence employed by Interail to prevent unintended driver actions. The failure of the co-driver to look for and then validate/respond to the signal aspect displayed by signal ES6377 and No. 2 Signal was a clear breakdown of this defence and probably a contributing factor in the derailment. The driver and co-driver were both probably in a state of degraded arousal/vigilance when they passed signal ES6377 and while approaching No. 2 Signal.

Safety actions recommended include a review of crew resource management strategies, examination of mentoring responsibilities, and improvements to processes for the regular re-certification of drivers.

The ATSB recommendations arising from rail accident investigation reports are detailed in Appendix 4.

Rail investigations in progress at 30 June 2007

As at 30 June 2007 the ATSB had 12 rail investigations ongoing under the *Transport Safety Investigation Act 2003*. The Bureau was also assisting the Victoria's Office of the Chief Investigator, Transport and Marine Safety with its investigation of the Kerang level crossing collision, under Victorian legislation. The TSI Act investigations were:

- a derailment of a freight train at Yerong Creek, New South Wales, on 4 January 2006
- a safeworking irregularity occurrence at Adelaide Railway Station, South Australia, on 28 March 2006. On 13 April 2006 the ATSB released an interim recommendation related to the incident
- a rolling stock irregularity occurrence near Seymour, Victoria, on 12 September 2006
- a collision between a freight train and a boom lift vehicle at Geelong, Victoria, on 26 October 2006

- a derailment near Tarcoola, South Australia, on 1 November 2006
- a level crossing collision between a grain train and a semi-trailer near Illabo, New South Wales, on 2 November 2006
- a level crossing collision between a scheduled passenger service train (Overland) and a rigid tipper truck & trailer combination near Wingeel, Victoria, on 15 November 2006
- a level crossing collision between a scheduled passenger service train (The *Ghan*) and a double-trailer road train at Ban Ban Springs Station, Northern Territory, on 12 December 2006. On 9 February 2007 the ATSB released a preliminary report regarding the accident
- a level crossing collision between a grain train and a semi-trailer at Back Creek, New South Wales, on 10 March 2007
- a level crossing collision between a mineral train and a car at Kalgoorlie, Western Australia, on 14 May 2007
- a derailment near Roopena, South Australia, on 22 May 2007
- a derailment near Bates, South Australia, on 10 June 2007.

ATSB rail safety recommendations released and safety actions taken in 2006–07

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

During 2006–07 the ATSB issued 39 rail safety recommendations. The recommendations broadly relate to:

- level crossing safety and risk, particularly in relation to heavy vehicles
- loading of freight wagons
- maintenance practices related to the early detection and prevention of axle fatigue cracks
- train crew alertness, interaction and responsibilities
- safety of track work sites.

The ATSB's investigation reports have also provided information to the rail industry about ways to improve rail safety and, in particular, aspects of risk assessment and public education of level crossings.

Participation in rail safety forums

During 2006–07, 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 Wheel/Rail Interface Conference in Brisbane in September 2006
- The International Rail Safety Conference in Dublin in October 2006
- The AusRAIL 2006 Conference in Brisbane in November 2006
- The Rail Safety 2007 conference in Sydney in February 2007
- The Human Factors in Safety conference in Brisbane in March 2007
- The Rail 2007 conference in Sydney in April 2007
- The Australasian Railway Association's Understanding Rail Course in Melbourne in August 2006 and Sydney in June 2007
- The Railway Technical Society of Australasia, selected branch meetings in SA and Qld.

The ATSB continued to liaise with state authorities at their request to explain the provisions of the *Transport Safety Investigation Act 2003,* ongoing development of safety databases, and associated matters.

Training for rail industry personnel

During 2006–07 nine rail industry staff representing track access providers and rail accreditation authorities completed an ATSB human factors training course in Canberra, four in November 2006 and five in May 2007. The November attendees also included a rail officer from the Indonesian National Transportation Safety Committee.

Marine

Role

Marine accident investigation

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

Since 1 July 2003 the Marine Investigation Unit 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 into the unit's casualty database.

Investigations result in a published report which includes the facts of the incident, an analysis, conclusions and recommendations. 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.

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 Organization, and to overseas maritime colleges and universities. All reports are available for download from the ATSB's website.

Key marine safety activities and results

While the ATSB was funded for around ten new marine investigations in 2006–07, the marine investigation unit initiated 15 new investigations from a total of 117 marine accident and incident notifications recorded. The Bureau released 14 marine investigation reports, three of these in a shortened report format. The released reports had a median completion time of 320 days, up from 2005–06 due to the release of two older reports but less than the 365 day target. The reports included a total of 38 safety recommendations to marine industry stakeholders. At 30 June 2007 the ATSB was continuing 11 marine safety investigations.

The 14 investigation reports released comprised: one sailing vessel knockdown, four groundings, three fires (one report encompassed two separate fires), one collision, three crew fatalities, one serious injury and one close quarters situation when a tanker broke free from its mooring and was being set toward the land in a cyclone.

In addition to the safety investigation activities, the Marine Investigation Unit continued a safety awareness programme aimed at the Australian commercial fishing industry. The programme's aim is to raise awareness within the fishing industry of the recurring factors that the ATSB has found in its 24 investigations of collisions between trading ships and fishing vessels. To 30 June 2007, the Bureau had held meetings with fishermen in all states (and the Northern Territory) except Victoria and Tasmania.

The ATSB's 14 marine investigation reports released in 2006–07 are listed at Appendix 3, the 38 recommendations made in 2006–07 as a result of the ATSB's marine investigations are listed in at Appendix 4 and the 11 ongoing marine investigations are listed at Appendix 5.

Key marine investigation reports published during 2006–07

Crimson Mars – grounding

At 1400 on 1 May 2006, *Crimson Mars* sailed from Bell Bay, northern Tasmania with a local pilot on board. The sky was cloudy and the visibility was clear with a light south-easterly wind. During the ship's turn to port around Garden Island, at about 1440, starboard instead of port helm was applied for approximately one minute. The error was not noticed initially and by the time maximum port helm was applied at 1441, a grounding was inevitable. Soon after, the pilot ordered both anchors to be let go and the main engine to be run at emergency full astern in an attempt to reduce effects of the impact. At 1442 the ship grounded on Long Tom Reef as the port anchor was let go and the main engine run astern.

The ship, with its main engine running astern, moved off the reef and refloated at 1446. An attempt to retrieve the anchor resulted in the failure of the port windlass. The ship remained anchored until 1605 when two tugs arrived to assist. The anchor cable was cut and left in the river with the port anchor. The ship then returned to the Bell Bay anchorage with the assistance of the tugs.

An inspection of the ship revealed that it was severely damaged and that temporary repairs could not be carried out in Bell Bay. The ship's departure was delayed until contingency arrangements could be put in place. *Crimson Mars* sailed from Bell Bay on 12 May for Hualien, Taiwan, to discharge its cargo and carry out permanent repairs.

The ATSB investigation report identified several contributing factors and made recommendations to address them.

The report has been very well accepted by the pilotage industry in particular and is being used as a case study by several pilot training organisations.

Global Peace/Tom Tough – collision

On the evening of 24 January 2006 *Global Peace* entered Gladstone harbour for the transit to the Clinton Coal Terminal. The plan was for the ship to berth at Clinton number three berth with the assistance of three harbour tugs.

As the ship was approaching the berth, the pilot ordered all three tugs to stop pushing and to lay alongside. The master of the aft tug, *Tom Tough*, laid the tug alongside the ship, with the tug at an angle of about 15 degrees to the ship's side. The tug's bow was in line with the front of the ship's accommodation.

At about 2354, *Tom Tough*'s starboard main engine unexpectedly shutdown, and the tug's stern swung sharply to starboard. The tug's starboard quarter made heavy contact with the ship, puncturing the ship's shell plating in way of the port heavy fuel oil tank. Oil immediately began to flow into the harbour.

The investigation found that a crack in the tug's starboard main engine clutch oil discharge pipe resulted in the system being emptied of oil. The resultant loss of system pressure activated the engine shutdown.

The ATSB investigation report identified a number of contributing factors and made recommendations to address them and it highlighted the need for greater risk analysis in the towage industry.

Marine safety actions linked to ATSB marine reports and recommendations

The ATSB issued six recommendations in its report on the grounding of the bulk carrier *Crimson Mars* while departing the port of Bell Bay in Tasmania. These addressed pilotage procedures and practices, both on the part of Tasports and ships' masters generally. As a result, Tasports reviewed their entire passage planning procedures including contingency planning and their procedures for the use of mobile phones during pilotage. The investigation also identified issues regarding bridge design for consideration by Classification Societies (who publish classification rules for vessel construction and service and whose certificates are used for insurance purposes).

The ATSB report on the collision between the bulk carrier *Global Peace* and the tug *Tom Tough* at Gladstone, Queensland, and the resultant oil spill included four recommendations, three of which addressed the need for a better approach to risk analysis in the towage industry. The Adsteam Harbour company commissioned the School of Mechanical Engineering at the University of Adelaide to investigate and report on the causes of the clutch oil pipe failures and suggest

design and construction changes. The company also decided to replace the port and starboard pipes onboard *Tom Tough* and similar vessels and designed a protective block for fitment forward of the aft fender on these vessels to reduce the consequences of any future contacts with other vessels or structures.

Participation in marine safety forums

Marine Accident Investigators International Forum (MAIIF)

The 15th session of the Marine Accident Investigators International Forum was held at the Hotel Miramar Intercontinental, Panama City from 14 to 18 August 2006. Thirty-one authorities from 26 countries took part, under the chairmanship of the United States.

The Second Vice President of Panama and Administrator of the Panama Canal, Mr Ruben Arosemena Valdez opened the meeting.

The meeting followed the well-established format, which consisted of reports from members on the last twelve months' activities, reports on activities at the International Maritime Organization (IMO), papers and general discussion on safety issues, as well as debate on the future direction of MAIIF.

Papers of note included:

- The fire aboard *Star Princess,* jointly prepared by the Marine Accident Investigation Branch of the United Kingdom, the United States Coast Guard and National Transportation Safety Board of the United States
- The explosion of directly reduced iron (DRI), by the Marshall Islands
- The Transportation Safety Board of Canada's Integrated Safety Investigation Methodology
- A review of the emerging trends on the concept of safety culture within the maritime domain, by Malta.

Australia presented papers on the progress of the correspondence group on the IMO Code for the Investigation of Marine Casualties and Incidents and made a presentation on marine occupational accidents in the Australian jurisdiction for the years 2001–2006.

The meeting was highly constructive and the network of international marine casualty investigators continues to be strengthened, particularly with the participation of representatives from the major flags of Panama and Liberia.

Flag State Implementation (FSI) Sub-Committee

The ATSB participated in the 15th meeting of the IMO's FSI Sub-Committee which was held in London from 4 to 8 June 2007.

High on the agenda was the review of the Code for Investigation of Marine Casualties and Incidents (Assembly Resolution 849 (20) refers). Australia had submitted a paper to the previous meeting of the Sub-Committee proposing that the Sub-Committee review and modify the provisions of the Code and ultimately that the Code be Annexed to the Safety of Life at Sea (SOLAS) Convention as a set of mandatory and recommended provisions for casualty investigation.

The intention was to provide a set of guiding principles to Flag and Substantially Interested States who were investigating marine casualties, in particular very serious casualties, and a clearer mandate for them than had existed before in the IMO's various resolutions and the United Nations Convention on the Law of the Sea (UNCLOS). This accords with the longstanding practice in international civil aviation and the provisions of Annex 13 to the Chicago Convention on International Civil Aviation.

Since the previous Sub-Committee meeting the ATSB had coordinated an inter-sessional correspondence group which had undertaken a great deal of work reviewing the Code. On the first day of the meeting the Casualty Analysis Working Group was convened to further consider the provisions of the amended Code. Some 60 delegates formed the working group which was chaired by the United States of America.

By the conclusion of the Sub-Committee meeting, delegates had agreed on the provisions of the amended Code, the draft SOLAS regulation and the proposed Maritime Safety Committee (MSC) resolution to give the Code effect. When the Code is approved and adopted at the next two meetings of the MSC the Code will be a mandatory IMO instrument. This will be a watershed in global marine casualty investigation. For the first time there will be a mandatory requirement to conduct a marine safety investigation into very serious marine casualties including deaths, loss of vessels, or damage to the vessel which results in severe damage to the environment. In all, the meeting was very successful for Australia through the ATSB in both coordinating the inter-sessional correspondence group and also in the working group in explaining and amending the various provisions of the Code.

Maritime conferences, training and presentations

Members of the Marine Investigation Unit also made presentations at other forums throughout the year including:

- fishermen, seafood industry councils and state regulatory authorities as part of the commercial fishing industry awareness programme
- a number of Advanced Marine Pilot training programmes.

Aviation

Role

As Australia's prime aviation safety investigation agency, the ATSB 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.

From 1 July 2003 all air transport safety matters as listed in section 23 of the TSI Act that occur in Australia must be reported to the ATSB. The Bureau then decides if it will investigate. Investigating selectively allows the Bureau to more thoroughly analyse those occurrences it 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.

ATSB investigations are for the sole purpose of improving safety. This is accomplished by identifying safety issues during an investigation. The ATSB will then work cooperatively with organisations, such as the Civil Aviation Safety Authority, Airservices Australia, aircraft manufacturers and operators, who are best placed to effect changes to improve safety. Action taken by these organisations will be reported in ATSB reports as Safety Action. In cases where no action is taken, the ATSB will issue Safety Recommendations to the appropriate organisations.

As with similar bodies worldwide, ATSB recommendations are not mandatory. The ATSB seeks to encourage change through safety action ahead of its final report.

The ATSB publicises its aviation safety results through:

- aircraft accident/incident reports
- aviation safety research reports
- safety recommendations and advisory notices and information circulars
- articles in magazines such as CASA's *Flight Safety Australia*
- participation in safety conferences and forums.

Key aviation safety activities and results

In 2006–07, the ATSB received and assessed more than 13,300 aviation notifications, of which 112 were categorised as aviation accidents and 7,720 as aviation incidents. The Bureau initiated 89 new occurrence investigations and continued its commitment to investigator training through the Diploma of Transport Safety Investigation.

During 2006–07, the ATSB released 80 aviation investigation and technical reports, down from 93 in 2005–06, with a median time from occurrence date to report release of 358 days, down slightly from 379 days last year and close to the target of 365 days. The drop in reports released from 93 to 80 was due to resource diversions including the heavy resource commitment to the Lockhart River investigation (involving up to a dozen investigators for nearly two years), the input to coronial inquests, training ATSB staff in preparation for SIIMS, investigator and technical support to Indonesia for Garuda and other high profile accidents, and training several new investigators who joined the ATSB during the year. Uncompleted investigation reports increased slightly from 81 at the end of 2005–06 to 87 at 30 June 2007. The number of investigations more than 12 months old dropped from 14 to nine.

Aviation investigation reports released during 2006–07 included:

VH-TAG Fairchild SA227-AC Metro 3 aircraft loss of control incident near Canberra

VH-MIB Robinson R22 Mariner fatal accident near Tobermorey, NT

VH-BKM Beech Bonanza A36 fatal accident near Tenterfield, NSW

9V-SYB Boeing 777-312 engine failure near Melbourne, Vic.

VH-NIT Air Tractor AT-602 fatal accident near Ballidu, WA

VH-ZNZ Lancair 360 at Bankstown Aerodrome, NSW

VH-ZXZ Gyroflug Speed Canard fatal accident 20 km SW Saint George, Qld

VH-LQH Beech King Air fatal Toowoomba, Qld accident – reopened investigation

VH-BQN Air Tractor AT802A fatal accident at Wynella Station, Qld

VH-TFU Fairchild Metroliner fatal accident near Lockhart River, Qld

VH-FIN Cessna 310R fatal accident near Tamworth, NSW.

At the beginning of 2007–08 the ATSB continued to investigate 87 aviation occurrences and technical safety matters including:

VH-UYB Cessna U206 fatal accident near Willowbank near Ipswich, Qld

VH-PYN Piper PA-31-350 fatal accident 28km north of Condoblin, NSW

VH-SEF Metroliner SA227-AC serious incident near Gayndah, Qld

VH-BST Lancair 320 near Archerfield Aerodrome, Qld

VH-MNI Beechcraft 58 fatal accident near McArthur River Mine, NT

VH-MFI Bell 206b (III) fatal accident 15 km E Parkes Aerodrome, NSW

VH-AKY BAC 167 Strikemaster fatal accident 20 km NE Bathurst Aerodrome, NSW

VH-ZGZ Piper PA-31-350 9 km SE Raglan, Qld

VH-FVF Dromader M18A fatal accident 20 km SSW Cootamundra, NSW

VH-HBS Robinson R44 fatal accident 10 km W Gunpowder, Qld

VH-CJZ Air Tractor AT-802A fatal accident 56 km E Collerenebri, NSW.

Aviation occurrence investigation data

	Financial year									
Occurrence type	97–98	98–99	99–00	00–01	01–02	02–03	03–04	04–05	05–06	06–07[P]
Accident	244	227	203	214	178	155	152	157	124	112
Serious incident		1	12	8	7	10	9	27	25	20
Incident	3985	5683	5253	5880	5457	5831	4408	5783	7410	7700
Total notified occurrences	4229	5911	5468	6102	5642	5996	4569	5967	7559	7832

P – Provisional data only

Note: Occurrences are those notifications received by the ATSB that are assessed to meet accident and incident definitions for the purpose of entry to the aviation safety database (SIIMS). The legal basis for this assessment changed from 1 July 2003.

Occurrences reported since 1997–98 under Part 2A of the *Air Navigation Act 1920* and since 1 July 2003 under the TSI Act increased from 4,229 reported in 1997–98 to 7,883 occurrences reported to the ATSB in 2006–07.

Some important events accompanied the change in notifications over the period from 1997–98. Domestic high-capacity airline departures fell by nearly 44 per cent between July 2001 and October 2001 as a result of Ansett's financial collapse in September that year. Ansett's demise coincided with the September 11 terrorist attack in the United States, which further disrupted air transport operations, and particularly international travel. Despite the profound effects of Ansett's departure from Australian aviation, activity has rebounded and the expansion of Qantas, Virgin Blue, and more recently Jetstar, has seen activity increase by around 27 per cent from the levels of mid-2001. Changes in airline activity tend to be reflected as fluctuations in reporting.

As the ATSB receives many airspace-related incident notifications, the introduction of electronic lodgement of incident reports by Airservices in 1998 saw notification rise markedly. Reporting rates have also varied in response to other events,

including the contamination of Avgas fuel for piston engine aircraft in late 1999 and early 2000, which saw much of the general aviation fleet on the east coast temporarily grounded and flying activity for that year unusually low.

Since mid-2003, aviation occurrences have been reported to the ATSB under the TSI Act and TSI Regulations. Overall, these regulations detail more events that must be notified to the ATSB compared with under the earlier *Air Navigation Act 1920*. Despite a comprehensive programme of education for the aviation community about the changes associated with the introduction of the TSI Act, notifications fell immediately after its introduction. But as the different sectors of the industry familiarised themselves with the new reporting requirements, notifications began to grow. In many cases, the ATSB receives notification of events that fall outside the scope of the TSI reporting requirements suggesting the different aviation sectors are now more willing to report events that they feel have relevance to aviation safety. During the same period, the number of accidents reported declined from 244 in 1997–98 to 112 in 2006–07.

Key aviation investigation reports published during 2006–07

Final report on the 15-fatality aviation accident near Lockhart River, Qld

On 4 April 2007 the ATSB's Executive Director released the Bureau's final 532-page report into the 15-fatality accident on 7 May 2005 involving a Fairchild SA227-DC Metro 23, registered VH-TFU. The aircraft was being operated by Transair on an instrument flight rules regular public transport service from Bamaga to Cairns, with an intermediate stop at Lockhart River. There had been three factual reports, a research report and ten recommendations released in the interim. The final report included the results of detailed equipment, wreckage and recorder investigation and review of over 100 interviews and 25,000 pages of documentary analysis by a committed team of up to a dozen investigators over nearly two years.

At about 1143:39, the aircraft impacted terrain in the Iron Range National Park on the north-western slope of South Pap, a heavily timbered ridge, approximately 11 km north-west of the Lockhart River Aerodrome. It was destroyed by the impact forces and an intense, fuel-fed, post-impact fire and was not survivable. Weather conditions in the Lockhart River area were poor and necessitated the conduct of an instrument approach procedure for an intended landing at the aerodrome. The cloud base was probably between 500 ft and 1,000 ft above mean sea level and the terrain to the west of the aerodrome, beneath the runway 12 RNAV (GNSS) approach, was probably obscured by cloud.

As the copilot was making the radio broadcasts during the approach, it is very likely that the 40-year old pilot in command (PIC) was the handling pilot. The crew commenced the Lockhart River Runway 12 RNAV (GNSS) approach, even though the crew were aware that the 21 year old copilot did not have the appropriate endorsement and had limited experience to conduct this type of instrument approach. A non-directional beacon approach was also available at Lockhart River, and both pilots were endorsed for that approach. Despite the weather and copilot inexperience, the PIC used descent and approach speeds and a rate of descent greater than specified for the aircraft in the Transair Operations Manual, and exceeding those appropriate for establishing a stabilised approach.

During the approach, instead of a final approach speed of 117–130 kts, the aircraft was averaging about 175 kts. Instead of descending at no more than 1,000 feet per minute, the aircraft was descending at about 1,700 feet per minute. This did not meet the recommended criteria for a stabilised approach. The aircraft was also about 800 feet below the segment minimum safe altitude. The pilot in command had a history of fast flying, including without properly endorsed crew, and had been surprised by high terrain using this same approach ten days before when flying with a different copilot.

The ATSB assessed 19 'contributing safety factors' for which it had sufficient evidence to conclude that without each of these factors, the accident would probably not have occurred, or another contributing factor would probably not have occurred or existed. Ten of these involved the crew and most directly led to the accident. While the investigation was complicated by an inoperative cockpit voice recorder, no witnesses, and the extent of destruction of the aircraft, it determined that the crew probably experienced a very high workload during the approach and probably lost situational awareness about the aircraft's position along the approach path before the 'controlled flight into terrain'.

In addition to the substantive crew actions and local conditions that contributed to the accident, the investigation identified seven contributing safety factors relating to Transair. Transair's processes for supervising the standard of flight operations at the Cairns base had significant limitations, such as not using an independent approved check pilot to review operations, reliance on passive measures to detect problems, and no defined processes for selecting and monitoring the performance of the base manager. In addition, Transair's standard operating procedures for conducting instrument approaches had significant limitations, such as not providing clear guidance on approach speeds, not providing guidance for when to select aircraft configuration changes during an approach, no clear criteria for a stabilised approach, and no standardised phraseology for challenging safety-critical decisions and actions by other crew members. Transair's organisational structure, and the limited responsibilities given to non-management personnel, resulted in high work demands on the

Transair chief pilot. This resulted in a lack of independent evaluation of training and checking, and created disincentives and restricted opportunities within Transair to report safety concerns with management decision making.

The investigation identified two contributing safety factors that related to the regulatory oversight of Transair. The ATSB concluded that CASA did not provide sufficient guidance to its inspectors to enable them to effectively and consistently evaluate several key aspects of operator's management systems. These aspects included evaluating organisational structure and staff resources, evaluating the suitability of key personnel, evaluating organisational change, and evaluating risk management processes. CASA also did not require operators to conduct structured and/or comprehensive risk assessments, nor did it conduct such assessments itself, when evaluating applications for the initial issue or subsequent variation of an Air Operator's Certificate.

The investigation also identified 21 other safety factors which did not meet the definition of a contributing safety factor or which could not be as clearly linked to the accident because of lack of evidence, but which were still considered to be important to communicate in an investigation report with a focus on future safety. In addition to some aspects of Transair's processes and regulatory oversight activities, these safety factors related, among other things, to the possibility of poor intra-cockpit communication, instrument approach design, instrument approach chart presentation, and other regulatory requirements.

This investigation identified important learning opportunities for pilots, operators and regulatory agencies to improve future aviation safety and to seek to ensure such an accident never happens again. During the course of the investigation, the ATSB issued 10 safety recommendations and encouraged other safety actions. Safety action has been taken by several organisations to address the safety issues identified during this investigation. A number of additional safety recommendations were issued by the ATSB, including seven recommendations to CASA on its regulatory oversight activities and regulatory requirements. Recommendations on aspects of instrument approach charts were also issued to Airservices and Jeppesen. The ATSB did not issue recommendations regarding the serious safety issues of the operator because Transair had surrendered its Air Operator's Certificate on 4 December 2006 and ceased to operate.

Evacuation of Boeing 717-200 aircraft at Hobart Airport

On 17 May 2005, a Boeing 717-200 aircraft, registered VH-VQI, was scheduled to operate a regular public transport flight from Hobart to Sydney departing at 0600 Eastern Standard Time, with six crew and 26 passengers. During the starting of the right engine at 0606, the aircraft dispatcher noticed sparks on the outer right side of the engine cowl and advised the pilot in command (PIC) to shut down the right engine as there was a fire. The sparks were due to a failure of the air turbine starter for the right engine during the engine start sequence.

As the right engine was spooling down, the dispatcher noticed that the amount of sparks and smoke was still increasing and he told the PIC 'we'll have to get everyone off'. The PIC replied 'Do you want me to do an evacuation?' which the dispatcher confirmed. The PIC then immediately made a public address system (PA) announcement 'This is your captain. Evacuate, evacuate, evacuate'.

The investigation found that the flight crew were engaged in conversations not confined to the engine start process or other operational matters during both engine start sequences. The operator's sterile flight deck policy for flight crew did not commence until after the engines were started. There was some misinterpretation of information between the aircraft dispatcher and PIC due to a lack of standard phraseology and no evacuation awareness education for aircraft dispatchers.

Twenty-three seconds after the PIC made the evacuation PA announcement, he called for flaps 25. Eight seconds later, at the PIC's direction, the copilot started to read the 'Passenger Evacuation Checklist' from the checklist card they had been using for earlier checks. The evacuation occurred while still in darkness. As a result of the PIC calling for the passengers to evacuate the aircraft before the Passenger Evacuation Checklist was initiated: the wing flaps were not set to the extended position while passengers were exiting the aircraft (as is necessary when using overwing exits); the emergency lights in the dark tail section of the aircraft were not illuminated during the evacuation; and the copilot was still completing the checklist with the PIC in the cockpit up to the time all passengers had evacuated and so could not direct the evacuation from the ground. The cabin crew evacuated themselves from the aircraft without making any contact with the flight crew and the flight deck door remained closed and locked.

All three of the floor level exits were opened by cabin crew. The forward Door Right 1 escape slide fell to the ground uninflated when the door was opened. It is probable that the door was incorrectly armed before the evacuation. The Door Right 1 flight attendant was unaware that this door's girt bar had a fixed floor bracket rather than two spring latches and therefore differed from the forward Door Left.

A number of ground personnel ran to the front of the aircraft and helped 22 passengers off the forward Door Left 1 slide and directed them towards the terminal. Four passengers exited by the Door 2 slide at the rear of the aircraft and ran into the middle of the apron. Given the passenger load, the overwing exits were not opened.

Fairchild SA227-AC Metro III Aircraft Loss of Control, Lake George, NSW

On 21 November 2004, the crew of a Fairchild Industries SA227-AC Metro III aircraft, registered VH-TAG, was conducting an endorsement training flight near Lake George, 33 km north-east of Canberra Airport. The flight included

a planned in-flight engine shutdown and restart, conducted at an altitude below 4,500 ft (about 2,200 ft above ground level (AGL)). During the engine restart preparation, the instructor departed from the published procedure by moving the power lever for the left engine into the beta range and directing the pilot to select the unfeather test switch. These actions were appropriate to prepare an engine for start on the ground with a feathered propeller, but not during an airstart. As a result, the propeller on the left engine became fixed in the start-locks position. The crew lost control of the aircraft and it descended 1,000 ft, to about 450 ft AGL, before they regained control. The crew could not diagnose the source of the loss of control and proceeded to start the left engine while the propeller was fixed on the start-locks. As a result, the crew lost control of the aircraft for a second time and it descended 1,300 ft, to about 300 ft AGL, before they regained control. The SA226/SA227 aircraft contain no lockout system to prevent pilots from intentionally moving the power lever into the 'beta range' during flight. It was the first time the instructor had given a Metro endorsement and he was subject to time pressure to complete the endorsement. His ongoing difficulties in adapting to his employment tasks were not successfully dealt with by the operator. He had a limited understanding of the aircraft's engine and propeller systems, and had not practiced an airstart for eight years as the CASA check and training approval did not include an assessment of all flight critical exercises.

As a result of this occurrence, the aircraft operator has changed its Check and Training Manual for asymmetric training to require engine shutdown exercises to be conducted at or above 10,000 ft above ground level in the Metro aircraft. The operator has also changed the asymmetric training syllabus item 'use of un-feather pump' in its Check and Training manual to reflect the intent of the Aircraft Flight Manual that the unfeather pump should be discussed after an engine shutdown during training, but not necessarily used.

The operator has obtained CASA approval for all Metro endorsements to be completed at a Metro simulator centre. The operator advised that they have replaced the tape-based flight data recorders on both their SA227-AC Metro III aircraft with solid-state flight data recorders. The Engineering Order relating to this fitment required rework of the installation inter-wiring to meet the ARINC 542A parameter input specification for this recorder and testing for compliance with the Civil Aviation Orders. The operator also advised that it undertook a functional check of the audio quality from all channels of the cockpit voice recorder fitted to VH-TAG to determine if the aircraft or recorder needed any maintenance action.

As a result of this occurrence, the Civil Aviation Safety Authority (CASA) reported that it will ensure that an assessment of the pilot's instructional ability is conducted and that all critical flight sequences are assessed, according to a

candidate's capability. CASA will also ensure that company operations manuals require training to be conducted in accordance with published checklists and that this is an integral part of any ground and in-flight assessment.

On 10 February 2006, the Australian Transport Safety Bureau issued two recommendations to address deficiencies in the maintenance and associated legislation of on-board recorders.

Key aviation safety recommendations 2006–07

The ATSB strongly prefers to encourage positive safety actions and to report those actions undertaken in its final reports if this is possible, to avoid the need to make safety recommendations. However, some recommendations remain necessary, especially when there are international safety implications.

In 2006–07, the ATSB raised and issued 19 aviation safety recommendations. Also, 41 different aviation occurrence investigations resulted in 205 separately identified safety actions by industry, regulators and the ATSB.

Aviation safety recommendations 2006–07

The 19 recommendations issued during 2006–07 covered important issues, namely:

- The United States Federal Aviation Administration revising the Title 14 Code of the Federal Regulations, Part 23.1155, to specify a positive means to prevent operation of the propeller in the beta mode while in flight (regardless of pilot action), unless the aircraft is certified for such use (R20060017).
- The need for Airservices Australia to review guidance material and training for aerodrome controllers on the provision of relevant traffic information, to enhance pilot situational awareness (R20060018).
- Addressing pilot workload for the area navigation global navigation satellite system (RNAV (GNSS)) approach. Losses of situational awareness were reported as more common for (RNAV (GNSS)) approaches than all other approaches except the non-directional beacon (NDB) approach, which involved similar workload and situational awareness levels (R20060019).
- Review of approach chart interpretability on RNAV (GNSS) approach charts, including distance (R20060020).
- Review by Airservices Australia to determine whether designs could be developed that are closer to the optimum approach profile for area navigation global navigation satellite system (RNAV (GNSS)) approaches, within the ICAO Pans-Ops obstacle limitations (R20060021).
- The need to revise the naming convention for approach waypoints. The current five capital letters for waypoint names (final letter differing to identify each

segment of the approach) was reported to cause clutter on the charts and on Global Positioning System (GPS) and Flight Management System (FMS) displays, and also increase the chance of a pilot misinterpreting a waypoint (R20060022).

- The need for CASA and Airservices Australia to address late notice of clearance by air traffic control for aircraft to conduct an area navigation global navigation satellite system (RNAV (GNSS)) approach, particularly for high-capacity airline pilots (R20060023 & 24).
- The need for CASA to address the adequacy of guidance material for CASA inspectors. The ATSB acknowledged CASA's actions to recruit systems specialists and the importance of professional judgement in performing regulatory oversight (R20070002).
- The need for CASA to address the regulatory requirement for operators to conduct and provide a risk assessment of initial issue or subsequent renewal of an Air Operator's Certificate (AOC) as well as CASA's ability to evaluate such risk assessments. The need for CASA's ongoing development of risk assessment concepts (R20070003).
- The need for CASA to address the lack of a systemic process for determining the relative risk levels of airline operators (R20070004).
- The need for CASA to include pilot workload and potential hazards in the original flight validation. Also, hazards currently assessed in the flight validation are very limited. The ATSB acknowledged that CASA may consider pilot workload and potential hazards during instrument approach revalidation (R20070005).
- The need for CASA to consider more broadly the structure and content of operations manuals. The ATSB acknowledged CASA's intention to issue an advisory circular on multi-crew operations (R20070006).
- The need for CASA to address the ICAO Annex 4 specification for instrument approach charts to include coloured contours to depict terrain in certain situations (R20070007).
- The need for CASA to address the Lockhart River Runway 12 RNAV (GNSS) approach design which, based on available evidence, resulted in mode 2A ground proximity warning system alerts and warnings when flown on the recommended profile or at the segment minimum safe altitudes (R20070008).
- The need for Jeppesen to address the safety issue of the chart design philosophy of its approach charts (R20070009).

- The need for Jeppesen Sanderson Inc. to address its protocols for depicting terrain on its approach charts. Jeppesen's criteria for including contour lines on approach charts does not fully meet the specifications of the ICAO Annex 4 standard 11.7.2 (20070010).
- The need for Airservices Australia's instrument approach charts to depict the terrain contours on the plan-view and the terrain profile on the profile-view. They do depict the segment minimum safe altitudes (R20070011).
- The need for Bombardier Aerospace to address the issue of adequate guidance for the flight crew to resolve the abnormal operation of the aircraft systems in both the operator's and the manufacturer's Quick Reference Handbook (QRH) for the DHC8-300 aircraft (R20070012).

VH-TFU Fairchild Metro 23 fatal accident near Lockhart River on 7 May 2005 – Risk assessments relating to Air Operators Certificates (R20070003)

R20070003 issued on 4 April 2007

CASA did not require operators to conduct structured and/or comprehensive risk assessments, or conduct such assessments itself, when evaluating applications for the initial issue or subsequent variation of an Air Operators Certificate.

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority undertake further work to address this safety issue.

CASA response summary 1 June 2007 : Monitor

CASA acknowledges this recommendation but does not support its categorisation as a contributing safety factor at paragraph 3.2.4.

There is no legislative requirement that operators conduct, or that CASA requires such operators to conduct or itself to conduct, structured and/or comprehensive risk assessments, when operators make an application for the initial issue or subsequent variation of an Air Operator's Certificate. However, as acknowledged by the ATSB, CASA has encouraged operators to adopt the Safety Management System (SMS) over the past 10 years and many have done so.

CASA is drafting an amendment to Civil Aviation Order (CAO) 82.0 to mandate SMS to ensure that all passenger-carrying operators establish and use a system for managing safety. It is anticipated that this amendment will be made before the end of 2007. An SMS, by its nature, will include a structured risk assessment methodology for evaluating change, including change of the scope of operations.

The ATSB report acknowledges that CASA intends to mandate Crew Resource Management training for passenger carrying operators. The proposed amendment to CAO 82.0 will also require Air Operator Certificate holders to provide this type of training for their crews.

CASA has also employed six Field Safety Advisors who provide safety advice to members of the aviation community. This is particularly important to industry members living in regional areas who do not have the opportunity to receive safety information from other sources. The programmes of safety education being provided, including SMS advice and education, are a continuation of those provided by CASA for more than a decade.

CASA is producing a booklet for operators about Change Management which will be published for distribution in July 2007. CASA is developing a Safety Management 'toolkit' for smaller operators. This will be introduced by September 2007 in the form of the successful 'Briefing in a Box' concept. This Toolkit will identify means by which an operator can better understand and evaluate issues such as equipment, routes, key personnel, classification of operations and organisational structures in a changing environment. In addition, CASA is developing a product that addresses non-technical skills for flight crew such as situational awareness, fatigue, threat and error management and workload issues.

The requirement for operators to have a structured risk assessment methodology will be included in the proposed Civil Aviation Safety Regulation (CASR) Part 119 (Air Operator Certification - Air Transport). This Part is planned to be made in 2008. CASA will publish an acceptable means of compliance and an Advisory Circular (AC) on the subject. This will provide guidance material for industry to assist in complying with particular legislative requirements.

VH-TFU Fairchild Metro 23 fatal accident near Lockhart River on 7 May 2005 – Jeppesen RNAV (GNSS) approach charts (R20070009)

R20070009 issued on 4 April 2007

There were several design aspects of the Jeppesen RNAV (GNSS) approach charts that could lead to pilot confusion or reduction in situational awareness. These included limited reference regarding the distance to run to the missed approach point, mismatches in the vertical alignment of the plan-view and profile-view on charts such as that for the Lockhart River runway 12 approach, use of the same font size and type for waypoint names and NM [nautical miles], and not depicting the offset in degrees between the final approach track and the runway centreline.

The Australian Transport Safety Bureau recommends that Jeppesen Sanderson Inc. address this safety issue.

Jeppesen Sanderson Inc. response summary 31 May 2007 : Monitor

Jeppesen Sanderson Inc. is considering possible chart enhancements to address this safety issue. Jeppesen has informed the ATSB that it will be conducting internal meetings and reviews of all aspects of this safety issue, and will inform the ATSB in writing of the outcomes.

VH-TFU Fairchild Metro 23 fatal accident near Lockhart River on 7 May 2005

Airservices Australia instrument approach charts (R20070011)

Airservices Australia's instrument approach charts did not depict the terrain contours on the plan-view. They also did not depict the terrain profile on the profile-view, although the segment minimum safe altitudes were depicted. The Australian Transport Safety Bureau recommends that Airservices Australia address this safety issue.

Airservices Australia response summary 25 May 2007 : Monitor

Airservices Australia are concerned that depicting terrain contours on the plan and profile of instrument approach charts may unintentionally create situations that adversely affect flight safety.

One concern we have is that the inclusion of this information on the plan of the charts will create chart clutter, making the retrieval of flight critical data from these charts more difficult, with a possible degradation of flight safety.

Airservices Australia are also concerned that providing pilots with more information than is required for them to fly the procedure profile could result in inappropriate use of the information. Instrument approach charts are designed to be used for instrument approach to the runway. If pilots fly the procedure profile and adhere to the published minimum safe altitudes for the various segments of the approach, aircraft will be protected from the underlying obstacles and terrain. Deviations below the profile are discouraged by the chart format with minimum altitude blocks shown below the profile. By also depicting the terrain contours on the chart profile, we would not like to create in pilot's minds the false impression that there is room to descend below the published minimum safe altitudes and still be protected from terrain.

The Australian position in relation to the depiction of terrain contours on the plan and profile of instrument approach charts was developed in consultation with CASA. As the concerns we have in relation to operational flying and pilot behaviour are not wholly within our competency, Airservices will consult with CASA to determine the most effective safety outcome.

Follow-up action in 2006–07 on recommendations issued in 2005–06

Recommendation R20050013 issued on 23 December 2005

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority alert operators and review the continuing airworthiness of all Australian-registered Fairchild Industries SA227 model aircraft, or other aircraft model types using fuel immersed capacitance-type fuel sensors (probes), with specific regard to possible high impedance wire chafing within the fuel tank.

CASA response of 5 July 2006

As a result of further communications with the Civil Aviation Safety Authority (CASA) on the issue following notification of another fuel probe from a different aircraft displaying the same anomaly, CASA conducted a review to further examine the issue. It provided the ATSB with an extensive report detailing the review. The conclusion of the report stated:

'Following the review CASA maintains that:

1. CASA's original findings are valid.
2. The risk of fuel tank explosions due to electrical shorting of the fuel probes in the SA227 is negligible.
3. The Metroliner SA227 is not covered by SFAR [Special Federal Aviation Regulation] 88 or recent amendments to FAR [Federal Aviation Regulation] 25 issued by the FAA [US Federal Aviation Administration].
4. The SDR [Service Difficulty Report] records on this defect needs to be reviewed in light of conflicting anecdotal evidence to the contrary.'

The review also included proposed actions to revise Airworthiness Bulletin 28-1 to better represent fuel related hazards and to develop and publish additional educational material on the matter.

ATSB response to CASA's 5 July 2006 response

Although the Civil Aviation Safety Authority considers the risk of fuel tank explosions due to electrical shorting as negligible, the Bureau considers the possible introduction of an ignition source into a fuel tank by way of electrical discharge or shorting, even though of low energy, as undesirable.

The ATSB has classified the recommendation as closed-partially accepted.

Follow-up action on Terrain Awareness Warning Systems

Recommendation 20060008 issued on 8 March 2006

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority review the requirements for Terrain Awareness Warning Systems for Australian registered turbine-powered aircraft below 5,700 kg, against

international standards such as ICAO Annex 6 and regulations such as FAR 91.223, with the aim of reducing the potential for Controlled Flight Into Terrain (CFIT) accidents.

The Civil Aviation Safety Authority should also consider the requirements for Terrain Awareness Warning Systems for Australian-registered turbine-powered helicopters against the background of the US National Transportation Safety Board (NTSB) recommendation for the fitment to turbine-powered helicopters certificated to carry six or more passenger seats.

CASA response of 16 August 2006 to this recommendation

CASA accepts the recommendation and will take the following action:

CASA will consider various aspects in relation to the fitment of Terrain Awareness Warning Systems for Australian-registered turbine-powered aircraft below 5,700 kg, including:

- cost benefit analysis of costs to industry
- how fitment would improve safety in this class of aircraft
- CASA policy on fare paying passengers
- impact on freight operators
- training in the use of the equipment
- the lead time required prior to fitment.

The ATSB has classified this recommendation as Closed-Accepted.

Aviation safety actions 2006–07

In 2006-07 the ATSB's aviation safety stakeholders undertook 205 separately identified safety actions linked to 41 ATSB aviation investigations as well as actions on recommendations. The ATSB also undertook separate safety actions relating these aviation investigations in addition to recommendation actions. These stakeholder safety actions identified by occurrence report number include:

- An engine manufacturer, Rolls-Royce UK, removed from service two engines identified as being at risk of surging due to degraded High Pressure Compressor (HPC) efficiency and has developed an algorithm to alert changes of HPC efficiency. Rolls-Royce will review engine parameter data in greater detail if Electronic Health Monitoring alerts and troubleshooting reveal no findings. This may lead to a recommendation that the engine is removed from service. The aircraft maintenance manual will be updated to specify an inspection check of the condition of the rotor path lining immediately adjacent to the borescope port hole and the need to contact the engine manufacturer if no evidence of lining loss is found (200403110).

- An operator advised that it had incorporated into its aircraft-specific operating procedures the emergency procedures from the flight manual supplements related to autopilot and electric trim. The maintenance provider advised that it had incorporated the use of shadow boards for more effective control of 'shop' tools. CASA was due to release the final version of the Civil Aviation Advisory Publication titled Multi-engine Aeroplane Operations and Training by the end of July 2007. CASA also advised that returning the aircraft configuration to normal is a housekeeping matter that is good practice for all maintenance organisations. CASA has referred the matter to the Aviation Safety Promotion Branch for Field Safety Advisors to address with maintenance organisations. CASA is also addressing the matters with maintenance organisations in the course of normal business (200501000).
- The Robinson Helicopter Company issued Safety Notice SN-40, titled 'Postcrash Fires' advising that to reduce the risk of injury in a postcrash fire, it is strongly recommended that all occupants wear a fire-retardant *Nomex* flight suit, gloves, and hood or helmet. Some helicopter or light plane occupants have survived an accident only to be severely burned by fire following the accident (200401917).
- As a result of a loss of pressurisation occurrence, the aircraft operator issued a newsletter describing the incident and the actions of the crew and revised recurrent training to include a loss of pressurisation event with emphasis on PAN calls, transponder codes, public address to the cabin and use of crew oxygen masks. The operator also advised that they would audit the check and training personnel to ensure consistency of instruction and change the Cabin - Safety Equipment and Procedures Manual Volume B3 to highlight the differences between the actual oxygen mask that will be deployed during a depressurisation event and that used for the pre-takeoff safety briefing. The operator will also publish information on the changes to the cabin crew manual in the company safety newsletter and use this occurrence as the basis of a training exercise for cabin crew (200505683).
- The aircraft manufacturer of the 9M-MRG Boeing 777 aircraft, in addition to previous safety actions, revised the B777 Flight Crew Training Manual to include information on UPSET RECOVERY procedures and to include information on disconnecting the Primary Flight Computers. The manufacturer also revised the B777 Quick Reference Handbook to add an AIRSPEED UNRELIABLE checklist that reinforced the use of pitch and thrust, and the B777 Flight Crew Operations Manual improved the description and standardised wording for the disarmed versus the disconnected state of the autothrottle system (200503722).

- Following a crosswind landing event occurrence at Melbourne, the operator recommended that its pilots should give increased attention to continuously monitoring the wind data and information. It reviewed its pilot training to encourage executing a go-around in the case of abrupt changes in an aircraft's attitude as a result of increased wind gusts and/or other severe meteorological conditions. Airservices Australia reported that it was developing Air Traffic Control (ATC) procedures to ensure clearly identified responsibilities for passing amended weather information to landing aircraft. The aircraft manufacturer published an article highlighting the risks associated with dual sidestick inputs by flight crews in Airbus aircraft. The International Federation of Air Line Pilots' Associations (IFALPA) published an article in the June 2006 issue of its IFALFA News which reviewed the risks affecting the landing at Melbourne Airport and reported that it was developing a Safety Bulletin for its members to address a number of safety issues affecting crosswind operations in high-capacity aircraft (200505311).
- As a result of investigations into the failure of the right engine from Boeing 717-200 registered VH-VQB, the engine manufacturer Rolls-Royce has implemented monitoring of the P30 engine parameter and a borescope inspection of the HPT1 NGV assembly to test degradation and metal-loss within the NGV assembly. Rolls-Royce also changed the maintenance requirements for the hot-section of the engine during routine or unplanned workshop visits, requiring the replacement of degraded HPT1 NGV segments that would otherwise have been repaired and returned to service. The engine manufacturer also introduced design actions to improve the robustness of the HPT1 NGV assembly and the functionality of the HPT blade dampers. Rolls-Royce has released Service bulletins SB-BR700-101579 and SB-BR700-101546 to implement changes to the blade and NGV configuration aimed at reducing the potential for premature NGV degradation and enhancing blade vibration damper reliability (200501189).
- As a result of a breakdown of separation standards occurrence, Airservices Australia incorporated a change to The Australia Advanced Air Traffic System (TAATS) software so that all inbound jet aircraft to Avalon Airport are now presented as blue track symbols on the approach radar air situation display (ASD). Aircraft displayed with a blue track symbol announce to the controller that the aircraft is inbound. Melbourne Operations has issued a Local Instruction requiring that the Melbourne Approach East controller (east controller) pass on radar-derived position information to both the Melbourne Departures North and South controllers by 30 NM north-east of Melbourne on all jet traffic inbound to Avalon from the north-east of Melbourne, and coordinate a descent level with them. Airservices Australia also mandated that controllers display an Avalon arrivals window on ASDs so that those aircraft that are arriving at Avalon Airport are highlighted to the controllers

concerned. Airservices further instructed the flow controller and/or the operations supervisor on duty to make the east controller aware of traffic inbound to Avalon from the north-east of Melbourne airport, and established an Avalon Procedures Committee (200600395).

Highlighted aviation safety actions

Sydney runway incursion

Airport operator safety actions

The Sydney (Kingsford Smith) airport operator is developing an updated version of the runway incursion chart for distribution and publishing on the internet.

Tug operator safety actions

In conjunction with the Sydney (Kingsford Smith) airport operator and the air traffic service provider, the tug operator has: deleted the company name from tug callsigns; issued a safety alert notice to all company drivers on air traffic control surface movement radio communications that highlighted this occurrence; highlighted the safety issues involved and lessons learnt; and is reviewing towing procedures to ensure that all staff involved in the procedure operate as a team.

Air traffic service provider safety actions

As a result of their investigation into the runway incursion occurrence, Airservices has distributed a runway incursion awareness information letter to all tug drivers at Sydney and Brisbane Airports, briefed tug drivers from one company operating at Sydney Airport following a request from the safety manager, Airservices also commenced consulting with industry on having all runway crossing traffic using the Aerodrome controller (ADC) frequency instead of the surface movement controller (SMC) frequency. Also, the service provider is developing ongoing strategies to address runway incursions. Those strategies include: examining a proposal to amend surface radar movement parameters to provide an earlier alert of runway strip infringements; selecting a contractor to enhance surface monitoring systems at Brisbane, Melbourne and Sydney Airports; reviewing the use of company names in callsigns of vehicles operating on airports; including the Royal Australian Air Force in the Runway Incursion Group; and developing runway safety teams at other airports, including joint user airports (200505170).

VH-JIV Wirestrike – Saint Albans, NSW

Power supply company safety actions

As a result of this accident, the power supply company undertook extensive safety action, including: to immediately suspend helicopter inspections and appoint an internal accident investigation team to investigate and report on matters relating to the accident; make recommendations to recommence helicopter operations; engage an aviation risk management consultant to

assess the hazards affecting the company's aerial surveillance operations; and implement safety actions arising from recommendations of the internal investigation team. A full description of the Safety Action that the power supply company undertook is at Appendix A of the investigation report (200601663).

Telephone company safety actions

As a result of this accident, the telephone company indicated that the single-strand telecommunication cable support wire that the helicopter struck would be removed.

Civil Aviation Safety Authority safety actions

The Civil Aviation Safety Authority indicated that, in conjunction with the Aerial Agricultural Association of Australia, it intended publishing a wirestrike article in the November-December 2006 issue of its *Flight Safety Australia* magazine.

VH-ZNZ Lancair aircraft – Bankstown

Civil Aviation Safety Authority (CASA) safety actions

As a result of the two recent fatal accidents involving amateur-built experimental Lancair aeroplanes, the CASA Chief Operating Officer (COO) requested a review of Lancair operations be undertaken. A review panel comprising a number of CASA staff and an industry representative was formed. The review panel produced a report and made three recommendations (below) to the CASA COO. CASA advised that the following safety action had been undertaken in response to the Lancair review panel recommendations:

- (That an article be published in *Flight Safety Australia.*) An article 'Slick Singles' about new generation aircraft was published in the November-December 2006 edition of the *Flight Safety Australia* magazine.
- (That guidance material for transition and recurrent training be developed for flight crew of high performance experimental aircraft.) CASA's view is that a Civil Aviation Advisory Publication for Civil Aviation Order 40.1.0 section 4.4 may not be needed. However, the development of some guidance material may be worthwhile and the ATSB was invited to provide input to the next Flight Training Industry Development Panel meeting.
- (That guidance material on risk assessment and mitigation be developed for authorised persons to ensure third party risks are appropriately considered when issuing an experimental certificate.) Guidance material had been developed on risk assessment and mitigation in regard to the issuing of experimental certificates and it was being progressively delivered to authorised persons.

The ATSB presented the safety issues identified by the Bankstown Lancair investigation to CASA. In December 2006 CASA revised and reissued the *CASA*

Flight Instructor Manual – Aeroplane, with increased emphasis on engine failure on take off considerations and in particular aeroplane control, partial power loss and turn back. CASA was considering developing an Evening Safety Seminar presentation on engine failure after take off and emergency procedures. Once developed, CASA Field Safety Advisors would deliver it to pilot groups on request. A change to the *Day Visual Flight Rule (VFR) Syllabus – Aeroplanes* was feasible, but would involve CASA in considerable work to not only change the syllabus but promote it to industry. CASA has written to authorised persons advising them to consider the fitment of stall warning devices.

Sport Aircraft Association of Australia safety actions

The ATSB presented the relevant safety issues identified by the Bankstown Lancair investigation to the Sport Aircraft Association of Australia (SAAA) and understands that the SAAA plans to review the guidance given to authorised persons affiliated with the SAAA in regard to stall warning characteristics and other airworthiness features when applying operating limitations. The SAAA also plans cooperating with the insurance industry to form a 'Lancair breed group' and produce an aircraft familiarisation syllabus for high performance aircraft.

Australian Transport Safety Bureau safety actions

The ATSB has initiated a special investigation (ATSB investigation number 200603722) as a result of this and other occurrences, including the Cherokee Six accident at Hamilton Island on 26 September 2002 (ATSB investigation number 200204328). The Bureau will investigate the factors that affect loss of control following engine power loss (including partial power loss) after takeoff.

Aviation safety promotion

Along with CASA and other bodies, the ATSB provides safety information to the aviation industry. 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 1 lists articles published during 2006–07)
- Contributing to aviation publications and journals

- Maintaining the Aviation Self Reporting Scheme and the REPCON Confidential Aviation Reporting Scheme.

Presentations at aviation conferences and safety forums

Effective safety systems depend on communication, a free exchange of information between safety professionals, and the ability to target those directly involved, including operators and managers.

To help spread the safety message in 2006–07, investigators spoke to a variety of organisations including:

- aero clubs and flying training schools
- aerial agriculture conferences
- airport firefighters
- ambulance services
- aviation safety investigators conferences and training courses
- Australian Defence Force Academy
- the Avalon air show
- Bureau of Meteorology
- flight safety and other industry forums
- helicopter operators and conferences
- Indonesian National Transportation Safety Committee course
- Regional Airspace Users Advisory Committees
- Royal Aeronautical Society
- Royal Australian Navy
- Singapore Civil Aviation Authority
- tertiary institutions
- Women Pilots' Association.

Professional conferences address engineering, human factors, flight operations, air traffic control, cabin safety and flight recording issues.

In 2006–07, ATSB aviation and technical staff attended:

- Crash Scene Investigation symposia, Darwin, Hobart, Sheppparton, Cairns – July–October 2006 – 1 ATSB presentation at each
- International Society of Air Safety Investigators Cancun, Mexico 13 September 2006 – 1 ATSB presentation

- Association of Asia Pacific Airlines, Bangkok Sept 2006 – 1 ATSB presentation
- Accident Investigator Recorder meeting at BEA Paris 26 September 2006 – 1 presentation
- Emergency Management Conference Sept 2006 – 1 ATSB presentation
- Annual Scientific Meeting of the Australasian Society of Aerospace Medicine Launceston 21–24 September 2006 – 1 presentation
- International Conference on Structural Integrity and Failure, Sydney 27–29 September 2006
- 7th International Symposium of the Australian Aviation Psychology Association 9–12 November 2006 – 2 presentations
- Asia Pacific Directors General of Civil Aviation meeting in Bali December 2006 – 1 presentation
- International Transportation Safety Association meeting Ottawa April 2007– several presentations
- Flightscape Users conference Ottawa June 2007 and Flightscape Accident Investigation Working Group – 1 presentation
- Australian and New Zealand Society of Air Safety Investigators, Wellington NZ; June 9 2007 – 5 ATSB presentations.

Ministerial directions and discontinued aviations investigations

During 2006–07 no Ministerial directions were issued. The ATSB discontinued two preliminary investigations and downgraded the incidents to a level five occurrence. These incidents include:

- The pilot of a Cessna 404 registered VH-ENT and air traffic control submitted notification reports which revealed that air traffic control instructed the pilot to maintain 5,000 ft due to crossing traffic at 6,000 ft. He reported that he trimmed the aircraft to maintain 5,000 ft, but it climbed to 5,140 ft. The pilot noticed the aircraft climbing and immediately initiated a descent. Air traffic control reported that as the crossing aircraft passed, the Cessna 404 was observed on radar at 5,400 ft. The crew of the crossing aircraft did not sight the Cessna 404 or receive a Traffic Collision Avoidance System (TCAS) advisory or alert. The pilots report also advised that, following the occurrence, the Cessna 404's altitude encoder was checked and was found to have an error. The encoder was subsequently repaired. The ATSB commenced a level 4 investigation to determine if safety was compromised. An assessment of available information indicates that although there was a breakdown

of separation standards there was limited safety benefit in continuing the investigation. The ATSB downgraded the occurrence to level 5 and discontinued the investigation (200604922).

- On 29 June 2006 at Sydney Airport a departing Boeing Aircraft Company 737 (B737) aircraft registered VH-VOG and an arriving Robinson Helicopter Company R44 (R44) helicopter registered VH-HCU were part of an occurrence involving a reduction in the required visual separation standard between them. A preliminary ATSB investigation into this level 4 occurrence determined that the pilot of the R44 had sight of the B737 at all times, and that there was no risk of a collision between the B737 and the R44. The inadvertent reduction in the required visual separation standard was as a result of the pilot in command of the R44 misjudging the acceleration of the B737 during its take-off roll. Compared with other priorities, the likely safety outcomes of continued investigation did not warrant further allocation of resources (200603755).
- In addition, the ATSB has been undertaking a major technical analysis investigation relating to a range of failures in high-powered reciprocating engines. This investigation has been reclassified as a long-term research investigation and is expected to be completed by the end of 2007.

Coronial inquests

Coronial inquest attendance involved considerable ATSB resources for both preparation and attendance. In 2006–07, ATSB aviation investigators attended two coronials in Kununurra WA in August 2006, the VH-LQH Toowoomba accident coronial in Brisbane in January 2007, the May 2007 VH-CSH helicopter accident coronial in Mudgee NSW, and the Lockhart River coronial inquest on Thursday Island in Brisbane in June 2007 (and early July). The findings of those inquests were, in the main, consistent with the ATSB investigation findings. The Queensland State Coroner brought down his findings on the Lockhart River inquest on 17 August 2007.

The Aviation Saftey 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.

In early 2007–08 ATSB investigators will also attend the upcoming Benalla accident coronial inquest after the date is confirmed and further inquests in Narranderra (VH-ZIP), Parkes (VH-MFI), Sydney (VH-ZNZ) and Melbourne (VH-OAO).

International cooperation

ATSB support to Indonesia for major accident investigation

In 2006–07 the ATSB assisted the Indonesian National Transportation Safety Committee (NTSC), particularly with its investigation of the accident involving a

Garuda Boeing 737-400 in Yogyakarta on 7 March 2007, in which one cabin crew member and 20 passengers died, including five Australians; with two Australians seriously injured, two receiving minor injuries and one uninjured.

An ATSB on-site team of three investigators worked in Yogyakarta and Jakarta between 8 and 18 March. A further four investigators and support staff worked on the aircraft's flight recorders in Canberra. Initial data from the flight data recorder (FDR) was forwarded to the NTSC on 11 March, followed by a computer animation of FDR data on 16 March. Impact-related problems with the aircraft's cockpit voice recorder (CVR) meant that the data could not be downloaded by the ATSB in Canberra so an ATSB investigator took the CVR data module to the manufacturer (Honeywell) in Seattle where the points in the memory module were reset and data successfully downloaded. Three Indonesian investigators transcribed the CVR data at the ATSB in Canberra from 22 and 24 March. The ATSB also helped the NTSC draft a preliminary report.

The NTSC released this report to ICAO, the ATSB, and the US National Transportation Safety Board (NTSB) under ICAO Annex 13. On 5 April, the NTSC authorised the ATSB to release the report to the Australian families of the accident victims and on 11 April, the NTSC publicly released a summary of the report, including recommendations, in the form of a media release. The ATSB is assisting the NTSC to draft the final report of the Yogyakarta accident.

The ATSB has a very good working relationship with the NTSC and has assisted them in the last couple of years with training and with CVR/FDR downloads and analysis. In addition to the Garuda accident, the Bureau agreed to provide an accredited representative to assist with the 1 January 2007 Adam Air accident investigation. As resources permit, we will continue to respond to NTSC requests for assistance in the interests of bilateral cooperation and future safety in our region.

International recognition of ATSB aviation activities

The following international journals featured the listed article topics on ATSB aviation investigation, technical analysis and research reports.

Publication	Topic
ISASI Forum January–March 2007	*Improving the Quality of Investigation Analysis* By Dr Michael Walker
Thai Flight Safety Information July–September 2006 Vol.11 No.3	Four ATSB safety briefs on – Engine Failure, Flight Management System Computer Malfunction, Infringement of Separation, STAR non Compliance
Aero Safety World (Flight Safety Foundation) September 2006	*Crew Loses Control During Restart Attempt* Fairchild Metro III near Lake George, NSW
Aero Safety World (Flight Safety Foundation) October 2006	*Good On You, Mates* An ATSB comparative aviation accident study of Australia, US, Canada, UK and NZ
Aero Safety World (Flight Safety Foundation) October 2006	*Losing the Cabin* article based on ATSB Research Report on Depressurisation Accidents and Incidents involving Australian Civil Aircraft
Aero Safety World (Flight Safety Foundation) February 2007	*Child Restraints in Australian Commercial Aircraft*
Aero Safety World (Flight Safety Foundation) March 2007	*Threat and Error Detectives* based on the ATSB Safety Report *Regional Airline Operation Safety Audit*

Aviation Safety Research

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

The ATSB released 10 internal aviation safety research reports in 2006–07:

- *International Fatality Rates: A Comparison of Australian Civil Aviation Fatality Rates with International Data*

- *An Analysis of In-flight Passenger Injuries and Medical Conditions – 1 January 1975 to 31 March 2006*
- *Fatal Aircraft Accidents: Far North Queensland in Context*
- *Perceived Pilot Workload and Perceived Safety of RNAV(GNSS) Approaches*
- *Pilot Incapacitation: Analysis of Medical Conditions Affecting Pilots Involved in Accidents and Incidents – 1 January 1975 to 31 March 2006*
- *Human factors analysis of Australian aviation accidents and comparison with the United States*
- *How Old is Too Old? The impact of ageing aircraft on aviation safety*
- *Australian Aviation Safety in Review*
- *An analysis of fixed-wing and rotary-wing aircraft accidents involving private operations, 2001 to 2005*
- *Radiotelephony Readback Compliance and its Relationship to Surface Movement Control Frequency Congestion.*

A short description of each ATSB aviation research report is provided at Appendix 1, and the five projects that an earlier safety grant programme funded are at Appendix 2. Two higher profile studies released during the year were:

Australian Aviation Safety in Review

As part of the ATSB mission to improve aviation safety the ATSB developed and published *Australian Aviation Safety in Review*. The format of the report was loosely based on the *Nall Report*, produced annually by the United States' Aircraft Owner's and Pilots Association (AOPA) Air Safety Foundation, which summarises the accident trends and factors for general aviation (GA). In line with the ATSB's responsibilities, *Australian Aviation Safety in Review* covers all major categories of aircraft operations, from Regular Public Transport (RPT) to general aviation, and some information about sports aviation.

Also, the report provides some demographic data on Australian aviation to measure the levels of aviation activity in Australia, and provide a context within which to examine the accident trends. Accident rates are presented both in terms of the number of accidents and as rates per 100,000 hours, to enable comparison between operational categories. The report provides insights and information about key trends and emerging issues in aviation safety.

The ATSB intends to release this report on a regular basis to inform both the aviation community and the wider public about Australian aviation activity and accident trends.

Perceived Pilot Workload and Perceived Safety of RNAV (GNSS) Approaches

Area navigation global navigation satellite system (RNAV (GNSS)) approaches have been available in Australia since 1998 and are now a common non-precision approach. However, since their introduction there has been little research into pilot workload and safety in other than the high-capacity airline environment. The ATSB undertook this survey of 3,500 Australian pilots with an RNAV (GNSS) endorsement on their instrument rating, prompted by the lack of prior research, and in parallel with the ATSB's investigation of the fatal accident involving a regional airliner conducting an RNAV (GNSS) approach at Lockhart River in May 2005. A questionnaire asked them to rate their perceived workload, situational awareness, chart interpretability, and safety on a number of different approach types. Additional questions asked pilots to outline the specific aspects of the RNAV (GNSS) approach that affected these assessments.

Responses were received from 748 pilots, with answers analysed by aircraft performance category. For pilots operating Category A and Category B aircraft (predominantly single and twin-engine propeller aircraft), the RNAV (GNSS) approach resulted in the highest perceived pilot workload, more common losses of situational awareness, and the lowest perceived safety compared with all other approaches evaluated, apart from the Non Directional Beacon (NDB) approach. For pilots operating Category C aircraft (predominantly high-capacity jet airliners), the RNAV (GNSS) approach only presented higher perceived pilot workload and less perceived safety than the precision Instrument Landing System (ILS) approach and visual day approach but lower workload and higher safety than the other approaches evaluated. The respondents were most concerned that the design of RNAV (GNSS) approaches did not use references for distance to the missed approach point on the approach chart and cockpit displays. Other problems raised were short and irregular segment distances and multiple minimum segment altitude steps, that the RNAV (GNSS) approach chart was the most difficult chart to interpret, and that five letter long waypoint names differing only by the last letter can easily be misread.

The report, released as a discussion paper in August 2006, and then as a final report in December 2006, made several recommendations to Airservices Australia and CASA to improve the safety of these approaches. These recommendations were also included in the ATSB's final report of the Lockhart River accident.

Technical and Projects

Role

The Technical and Projects Branch of the ATSB was established in September 2004 and has responsibilities primarily concerned with organisational capability. In particular, the branch seeks to ensure improved Bureau capabilities and responsiveness to external customers. The Technical and Projects Branch responsibilities include technical analysis, notifications and confidential reporting, legislation, training and development, and projects.

Technical analysis

The ATSB Technical Analysis section provides the capability to examine, in detail, the physical and recorded evidence associated with safety occurrences from all modes of transport. Specialists in materials and systems failure investigation and recorded data analysis 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 2006–07 output of 69 technical reports and projects included 14 stand-alone investigations, specialist support studies and technical support to international agencies. The 2006–07 work included:

- recovery and analysis of data from a Fairchild Industries Metro 23 aircraft that was involved in a multi-fatality accident while on approach to Lockhart River airport, Qld, on 7 May 2005
- examination and analysis of components from an XPT passenger train derailment accident at Harden, NSW
- examination and analysis of components from an oxygen fire aboard a ship
- analysis of electrical discharge damage to a Pratt & Whitney PT6 gas-turbine engine
- examination and analysis of steering components from an imported four-wheel drive sports utility vehicle and a light truck, for DOTARS Vehicle Safety Standards Branch
- assistance to the Indonesian National Transportation Safety Committee (NTSC) with their investigations of three incidents/accidents involving regular passenger transport aircraft.

During 2006–07, two staff resigned from the section which resulted in a substantial increase in workload for the remaining staff. As of July 2007 the section has recruited one replacement Material Failure Analyst and is seeking another Material Failure Analyst. The section's active industry involvement

included the presentation of working papers to the ICAO Flight Recorder Panel meeting, the Evolving System Safety Conference and the 2007 ANZSASI annual conference and seminar.

At the beginning of the 2007–08 financial year, 49 technical investigations including 13 stand-alone investigations were underway across the section, including:

- assistance to the Indonesian NTSC with the recovery and analysis of data and audio from an Indonesian Boeing 737 that was involved in a runway over-run fatal accident at Yogyakarta airport, Indonesia on 7 March 2007
- ongoing assistance to the Directorate Defence Aviation and Airforce Safety (DDAAFS) with flight recorder downloads from the Black Hawk helicopter accident off Fiji which occurred on 29 November 2006
- examination and analysis of airframe components from an in-flight break up accident on 5 October 2006
- examination of flight recorder data from a runway excursion incident at Sydney, NSW on 14 July 2007
- assistance to the Japanese authorities with their investigation into an emergency evacuation from an Australian-registered Airbus A330
- examination of a boiler fire from the marine vessel *Shirane*.

In addition, the section 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 receipting 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 level 5 occurrence details into the Safety Investigation Information Management System (SIIMS) aviation database.

For the financial year 2006–07, the ATSB received in excess of 13,300 aviation notifications of which 7,832 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 and value added accordingly
- level 6 occurrences - reports assessed as not satisfying the definitional requirements of a transport safety matter.

The SIIMS aviation database is the primary application used to record statistical data relating to level 1 to 5 aviation occurrences.

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 for all aviation notifications regardless of classification status.

Confidential reporting

Confidential reporting involves managing marine and aviation confidential reporting schemes and the voluntary reporting aspects of the Aviation Self Reporting Scheme (ASRS). These 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 self reports of unintentional regulatory breaches.

From 1 July 2006 to 30 June 2007, eight reports were processed through the Confidential Marine Reporting Scheme. During the same period, three reports were processed through the ASRS. From 29 January 2007, the commencement of the aviation confidential reporting scheme (REPCON), to 30 June 2007, 62 REPCON reports were processed and 25 notices issued.

Legislation

The ATSB's legislative responsibilities involve implementing and considering possible amendments to legislation and regulation critical to the Bureau's operations, including the *Transport Safety Investigation Act 2003*. Supporting memoranda of understanding with ATSB stakeholders are also coordinated.

Transport Safety Investigation Act 2003

The *Transport Safety Investigation Act 2003* (TSI Act) and Regulations have proved to be broadly effective in facilitating the ATSB's independent, no-blame, systemic transport safety investigations.

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.

Aviation confidential reporting legislation

On 29 January 2007 the *Air Navigation (Confidential Reporting) Regulations 2006* came into effect. The Regulations provide the Australian aviation industry with a scheme to report aviation safety concerns under a legislative guarantee of confidentiality. The scheme is known as REPCON (Report Confidentially). REPCON meets the intent of Recommendation 8.2 and Standard 8.3 of Annex 13 to the Chicago International Convention on Civil Aviation Aircraft Accident and Incident Investigation, regarding voluntary incident reporting schemes.

Memoranda of Understanding

Adding to the existing Memoranda of Understanding (MoU) with industry and Government agencies, in 2006–07 the ATSB signed a new MoU with the New South Wales Independent Transport Safety Reliability Regulator. Work continues on updating and revising existing MoUs, as well as consideration being given to developing new MoUs with other agencies. 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 12 Transport Safety Investigation (TSI) Diplomas to staff in 2006–07, with a further 13 in progress.

Diploma of Transport Safety Investigation core training courses for 2006–07 included:

- Investigation analysis
- Basic and advanced OH&S (including blood-borne pathogens)
- TSI Act 2003
- Coronial witnesses
- Media awareness and releases
- Human factors
- Negotiation skills
- Cognitive interviewing
- Critical incident stress debriefing
- Cultural intelligence

- Digital photography
- Senior (advanced) and remote area first aid.

As well as base operational readiness training, the ATSB has continued to develop an advanced training and development strategy designed to support investigation functions in a more challenging environment such as a major public transport accident investigation. Learning methods now embedded include mode-specific professional development courses, knowledge sharing initiatives, professional coaching/mentoring regimes, and continued targeted tertiary studies.

Advanced training and professional development courses for 2006–07 included:

- Maritime revalidations (Master Mariner)
- Wheel/rail interface
- Various aircraft general familiarisations (including B737 NG, Embraer 170/190 and the Cirrus Airframe Parachute System)
- Strategic media management
- Parliamentary processes
- Preparation for Senates Estimates and other Parliamentary inquiries
- Internal leadership programme
- Coaching and mentoring.

ATSB support of relevant tertiary education opportunities for 2006–07 included:

- Masters of Business Administration
- Masters of Education (Adult Education and Training)
- Masters of Business (Management)
- Masters of Fire Investigation
- Graduate Diploma of Languages (Mandarin Chinese)
- Graduate Certificate of Aviation Management
- Graduate Certificate of Statistics
- Advanced Diploma of Engineering (Aerospace).

The Australian Quality Training Framework (AQTF) 2007

The essential standards for registration of Registered Training Organisations (RTO) are currently subject to proposed changes. The Bureau has recently positioned itself to meet these new changes and to continue to provide the accredited TSI Diploma qualification. The Australian Quality Training Framework

2007 outcome-focused standards will allow for a more streamlined approach to ensure that investigation staff have the skills and knowledge needed to perform their duties in accord with prescribed ATSB investigation work level standards.

Projects

Technical and Projects Branch's project responsibilities include the Safety Investigation Information Management System (SIIMS) Project which is the newly developed aviation occurrence database replacing the current OASIS (Occurrence Analysis Safety Information System) aviation database. The ATSB's SIIMS project to replace the current aviation occurrence database 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.

The ATSB successfully commissioned the Safety Investigation Information Management System (SIIMS) in April 2007 when all aviation investigation work on new investigations transferred to SIIMS. The project was delivered on time and within budget and is already improving processes for managing information, assessing and analysing evidence and reporting on investigations. Additional SIIMS work includes re-coding historical data and building web links. A further phase involving the marine and rail modules and other enhancements, is expected to be completed in the second quarter of 2007–08.

Information and Coordination

Role

The Information and Coordination section plays a central role within the ATSB in releasing transport safety investigation and research reports, raising safety awareness and knowledge by providing information to stakeholders, and coordinating parliamentary and departmental briefings and responses to subpoenas and Freedom of Information requests.

Information

The ATSB's information responsibilities involve coordinating report releases, media liaison, disseminating safety information, publishing and graphic design, freedom of information, and the ATSB website. Specific responsibilities include:

- issuing media releases and managing issues likely to generate national media interest
- providing safety information to stakeholders and the community
- releasing ATSB investigation reports

- designing and publishing safety investigation and education materials
- developing materials in support of larger public communication events and launches
- responding to Freedom of Information requests and preparing responses to subpoenas and writs
- managing the ATSB's website
- building and maintaining effective relationships with the transport industry
- editorial responsibilities for the ATSB supplement in *Flight Safety Australia* and industry publications
- graphic standards and style for all ATSB publications.

Coordination

The section's specific coordination responsibilities include briefing material for Question Time and Senate Committee hearings, departmental briefings, the ATSB Annual Review, DOTARS Annual Report and quarterly performance reports.

Media

Public interest in the ATSB's activities and findings require a well-planned media response. The ATSB can be reached through its media contact officer or rostered duty officer (24 hours, seven days a week).

The section organised media conferences with respect to the following high-profile aviation accidents and investigation reports:

- VH-TFU Lockhart River fatal accident – second Interim Factual Report – 31 August 2006
- VH-ZGZ Piper Navajo fatal accident near Raglan, QLD on 31 October 2006 – on-site interview
- VH-DIC Piper PA30 aircraft fatal accident. at Casuarina Beach near Kingscliff, New South Wales – on-site interview 5 February 2007
- Garuda Indonesia's fatal accident-Yogyakarta, Indonesia – covered the work undertaken to download data from the Garuda aircraft's Flight Data Recorder (FDR) and issues with the Cockpit Voice Recorder (CVR) – 31 March 2007
- VH-TFU Lockhart River fatal accident final report – 4 April 2007.

These media conferences helped ensure that the extensive media coverage that followed was well-informed and responsible. They also helped to publicise the ATSB's safety role.

Information requests

During 2006–07, the section responded to an estimated 5,700 requests for safety information. Responses ranged from giving verbal information on safety-related issues to distributing accident investigation reports, research and analysis reports and road safety public education materials.

The section also fielded media inquiries and promoted public awareness of the ATSB's safety resources.

Release of ATSB investigation reports

Information staff disseminate ATSB investigation reports to the Minister, departmental Executive, regulatory authorities, directly involved parties and those with a special interest in the investigation, safety stakeholders, the industry and members of the public.

Reader satisfaction with ATSB reports

The ATSB is keen to ensure its reports address the needs of its readership, whether they are interested members of the public, organisations, or individuals with a stake in the report's findings or contents. To measure our performance, and to better understand our readers' needs, the ATSB commissioned an independent research firm, Colmar Brunton Social Research (CBSR), to conduct a survey of readers across the range of ATSB reports. The survey was conducted over two weeks in June 2007, following e-mail alerts to ATSB subscribers and advertisements in the national press that invited responses from individuals or organisations that had read at least one ATSB report during the past 12 months.

The online survey attracted a total of 406 responses and despite some delivery issues, the ATSB was encouraged by the results. Colmar Brunton found that respondents were all highly satisfied with the quality and readability of ATSB reports. The table below shows that 89 per cent of all respondents were either extremely satisfied (70 per cent) or somewhat satisfied (19 per cent). The survey results also suggests that ATSB reports are meeting the needs of respondents (on average they scored 8.3 out of 10 for relevance, and 8.1 out of 10 for usefulness to readers).

	Extremely satisfied	Somewhat satisfied	Neutral	Somewhat dissatisfied	Extremely dissatisfied
Total	70%	19%	5%	4%	2%
Aviation Safety Investigation Reports	70%	19%	5%	4%	2%
Marine Safety Investigation Reports	71%	16%	4%	4%	4%
Rail Safety Investigation Reports	67%	22%	6%	4%	1%
Aviation Safety Research Reports	70%	10%	15%	5%	0%
Road Safety Research Reports	73%	23%	0%	0%	5%

The survey also revealed some other important findings, including that many respondents were regular consumers of ATSB investigation and research reports, and that their interest in transport safety extended to more than one transport mode.

As a result of the survey findings, special attention is being given to ways that we might enhance the readability and timeliness of ATSB reports. Suggestions included the more extensive use of diagrams or images to illustrate important or more complex matters raised in reports. Feedback was also provided about the topics that ATSB research reports might cover in the future.

The ATSB is grateful to all those who took part in the survey and shared their views with us.

Freedom of Information and legal matters

The ATSB began 2006–07 with two Freedom of Information requests (FOIs) on hand and received eight FOIs during the financial year. The Bureau completed three FOIs within 30 days and one between 30 and 60 days. Five FOIs were withdrawn. At 30 June 2007 one FOI was on hand. The section also attended to two subpoenas within specified timeframes. No ATSB FOI decisions were subject to Internal Reviews in 2006–07.

An ATSB-related hearing in the Federal Court dealt with the *Elbe Shipping* matter which was a constitutional challenge to the validity of sub-section 60(5) of the *Transport Safety Investigation Act 2003*. The Federal Court handed down a primary decision in favour of the Australian Government on 5 July 2007, which is now being appealed to the Full Court of the Federal Court. The ATSB was not involved in any 2006-07 hearings of other Courts (apart from coronial inquests), nor the Administrative Appeals Tribunal (AAT), nor with any applications to the Ombudsman with respect to FOI applications.

Publishing services

Publishing services staff provide quality control of publications produced internally and externally as well as maintaining the Bureau's corporate identity and website. This is regarded as pivotal to maintain and enhance the international reputation of the Bureau as an independent no-blame investigation agency.

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
- research and analysis reports
- road safety public education material - including advice on child safety, drink driving, speeding, learner driving, fatigue, child restraints, motorcycle safety and first aid
- accident and incident statistics
- safety recommendations
- media alerts and releases
- speeches and 'audio grabs' of media briefings
- free 'subscription' information service
- safety articles and links of interest.

Users can request copies of road safety education material and teaching resources including the *Key Facts for New Drivers* and the *Simple Guide to Child Restraints*, or order online other ATSB safety information products such as the *Ride On* motorcycle safety DVD and the *Safe Transport* corporate DVD. Interactive access is available to the ATSB road safety fatality statistics database, so users can seek specific reports via an interactive database portal.

The site's notification forms for Accident and Incidents, the Aviation Self Reporting Scheme, and the REPCON confidential aviation reporting scheme provide a secure option for reporting aviation safety accidents and incidents and making other confidential reports. The site's free subscription information service announces 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 2006–07, the site attracted approximately 800,000 new visitor sessions and by 30 June 2007 was averaging over 109,000 hits per day. The number of hits increases markedly following the release of high-profile information or reports, particularly in aviation and road safety. Across the 2006–07 year there were approximately 30 million hits.

Transport safety performance statistics

Cross-modal safety comparisons

Table 1 compares the relative risk of fatal injury to users of all major forms of land and air transport in Australia. Airline travel is by far the safest form. Bus and rail are the safest forms of motorised land transport, while motorcycling is the least safe of all forms of transport.

Table 1: Relative risk of fatal injury by transport mode, Australia

Transport mode	Relative fatality rate based on passenger kilometres travelled (car travel 1.0)
Aviation	
High-capacity RPT	0.0
Low-capacity RPT	0.2
Fixed-wing General Aviation	5.7
Road	
Car	1.0
Bus	0.2
Motorcycle	26.7
Rail	0.2
Marine[1]	0.0

Note: *1993 is the latest year for which comparable data are available*
Source: *ATSB*

Multimodal trends (deaths)

Table 2 shows the number of deaths in each of the major transport modes from 1997 to 2006. Road deaths have declined annually since the commencement of the *National Road Safety Strategy 2001–2010*, with the exception of 2005 when there was a three per cent increase in deaths relative to 2004.

1 Marine public transport via ferries

Table 2: Australian transport fatalities by mode, calendar years 1997 to 2006

Year	Road	Rail	Marine	Aviation
1997	1767	68	46	28
1998	1755	59	46	46
1999	1764	47	51	42
2000	1817	46	42	38
2001	1737	56	59	39
2002	1715	59	48	24
2003	1621	48	41	23
2004	1583	47	41	23
2005	1627	38	39	37
2006	1599	40	na	34

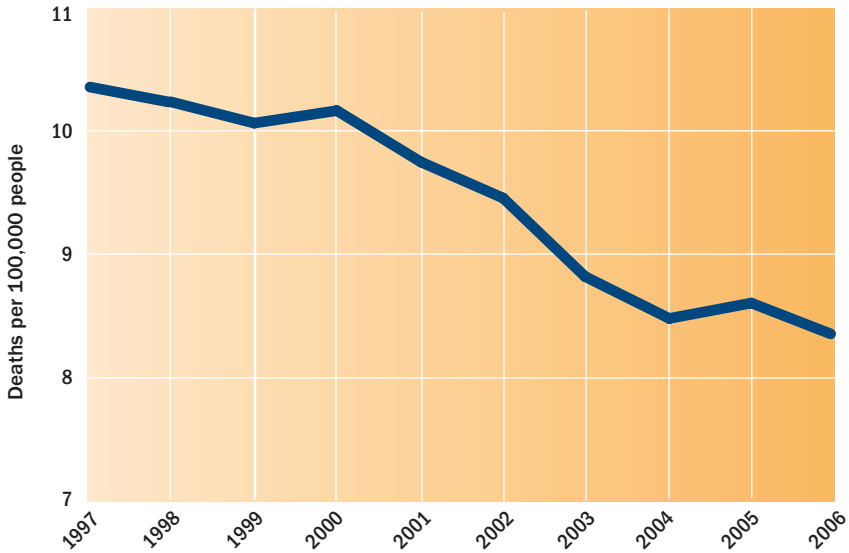
Sources: *ATSB (road and aviation), Australian Bureau of Statistics (rail and marine).*

Note: *Figures for rail and marine in 2004 and 2005 are estimates only.*
Note that the aviation fatalities data includes VH-registered sports aviation, gliding operations, foreign-registered aircraft within Australian territory, excludes Military-registered aircraft and parachuting fatalities where aircraft safety was not a factor.

na: *not available.*

The overall transport accident death rate across road, rail, marine and aviation decreased from 10.4 deaths per 100,000 population in 1997 to 8.3 in 2006 (Figure 1).

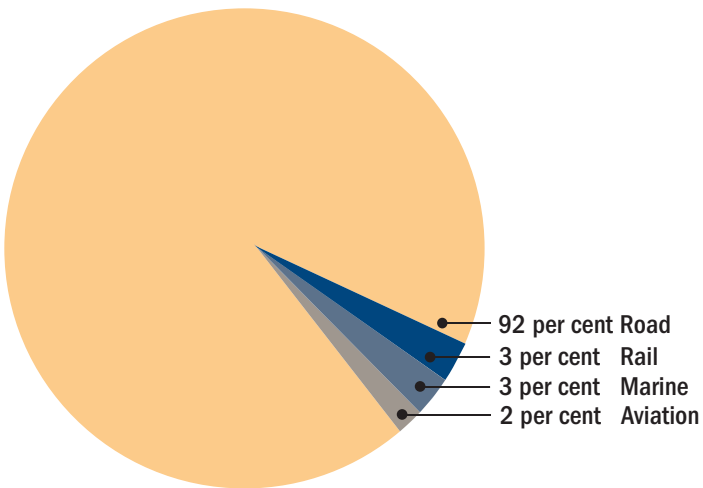
Figure 1: Australian transport fatalities (all modes) per 100,000 population, 1997 to 2006



Source: Chart compiled from data sourced from the ATSB and the Australian Bureau of Statistics.

Figure 2 shows that road trauma is by far the largest contributor to deaths in transport. It accounted for 93 per cent of total transport deaths between 2002 and 2006.

Figure 2: Australian transport fatalities by mode, 2002 to 2006

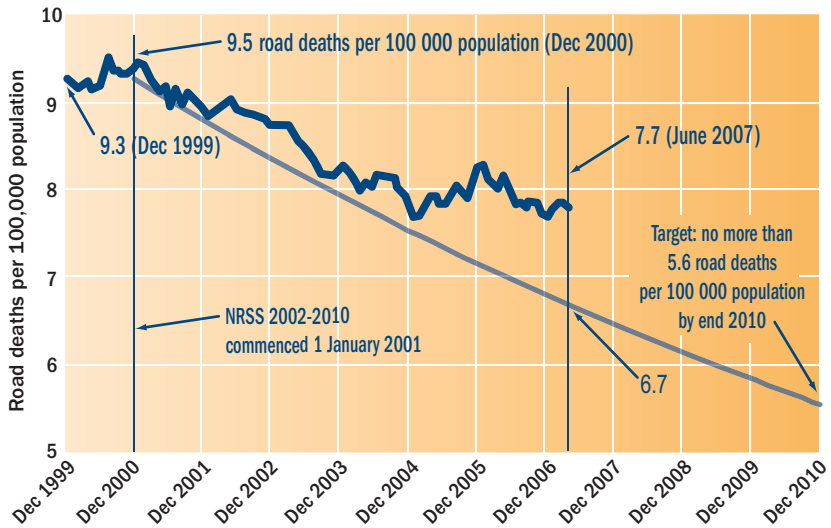


Source: ATSB (road and aviation). Australian Bureau of Statistics (rail and marine).

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 death rates per 100,000 population, 1999 to 2007



Source: *ATSB*

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-2007 the Australian 12-month road death rate per 100,000 population stood at 7.7, a fall of 17.2 per cent from the base NRSS rate. On a straight line projection between the rate at 1 January 2001 and the target rate of 5.6 by the end of 2010, the projected rate for mid-2007 was 6.7 deaths per 100,000 population, a projected fall of 28.2 per cent. The substantial challenge of meeting the 2010 target is evident.

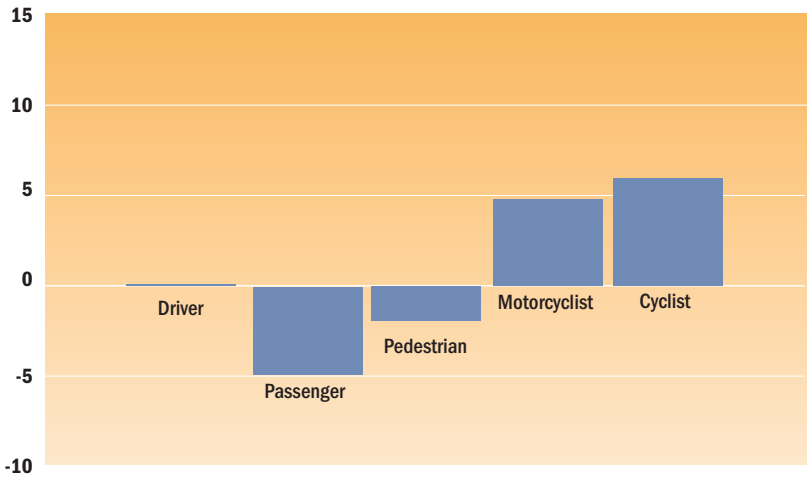
During the first six years of operation of the Strategy:

- vehicle occupant deaths declined by 16 per cent (207 fewer deaths)
- pedestrian deaths declined by 21 per cent (60 fewer deaths)
- motorcyclist deaths increased by 25 per cent (47 more deaths)
- Bicyclist deaths increased by 26 per cent (8 more deaths).

Average annual change

As shown in Figure 4, the number of deaths in the motorcyclist sub-group has grown by approximately 4.9 per cent per year for each of the past five years. By comparison, the annual number of deaths in the motor vehicle passenger sub-group has fallen by approximately 4.9 per cent per year. No change was observed in driver deaths.

Figure 4: Average annual change in deaths among road user groups over the past five years to June 2007



Source: *ATSB*

Serious injuries

Most states and territories compile data from police records to monitor the number of people seriously injured in road crashes, but this data is not available from all states. The data in Table 3 were compiled for the ATSB by the Australian Institute of Health and Welfare (AIHW), using information extracted from the National Hospital Morbidity Database. The figures reflect the number of people admitted to hospital as a result of injuries involving road vehicles travelling on public roads. 'Road vehicles' include motor vehicles, pedal cycles, trams, ridden animals and animal-drawn vehicles (when they travel on a public road). Cases where people died before discharge from hospital are excluded. The data must be interpreted with caution as there is potential for variation over time in admission practice, especially for lower severity cases, and changes over time in the coding of external causes of injury.

Reports from this data series are avaliable in the road safety statistics section of the ATSB website.

Table 3: Seriously injured persons by road user group, July 1999 to June 2004

Period	Drivers	Passengers	Pedestrians	Motorcyclists	Cyclist	Other	Total
1999–00	8470	4955	2930	4514	3424	2405	26698
2000–01	8813	5027	2916	4642	3056	2240	26694
2001–02	9532	5272	2901	5096	3292	2347	28440
2002–03	9077	4815	2670	5040	3591	2333	27526
2003–04	9738	4908	2578	5385	3676	2497	28782

Source: Australian Institute of Health and Welfare (AIHW)

Road death rates by state/territory

As indicated in Table 4, road death rates per 100,000 population by the end of 2006 were lower than those at the end of 2000 in all jurisdictions except Tasmania. Over this same six-year period, the national road death rate declined by 17 per cent.

Table 4: Australian road deaths per 100,000 population by state/territory, 1999 to 2006

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	27.7	3.1	8.7
2003	8.1	6.7	8.2	10.3	9.2	8.6	26.7	3.4	8.2
2004	7.6	6.9	8.0	9.1	9.0	12.0	17.5	2.8	7.9
2005	7.5	6.9	8.3	9.6	8.1	10.5	27.0	8.0	8.0
2006	7.3	6.6	8.3	7.5	9.9	11.0	20.3	4.0	7.8

Source: ATSB, ABS

At the end of June 2007, the national fatality rate stood at 7.7 deaths per 100,000 population, compared with a rate of 6.7 that would have represented pro-rata progress towards the 2010 target. NSW (6.6), Victoria (6.6), South Australia (6.7) and the ACT (5.2) achieved fatality rates at or below the pro-rata rate. The others had substantially higher rates: Queensland (8.9), Western Australia (10.9), Tasmania (11.8) and the Northern Territory (22.6).

Truck safety trends

Table 5 shows the number of deaths in road crashes involving articulated trucks in each jurisdiction between 2000 and 2006. The predominantly downward trend since the commencement of the *National Heavy Vehicle Safety Strategy 2003–2010* (NHVSS) is encouraging.

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.

Table 5: Australian road deaths in crashes involving articulated trucks, by state/territory, 2000 to 2006

	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	32	35	17	13	5	1	0	155
2006	69	n/a[a]	37	10	11	8	2	0	n/a[a]

Source: *ATSB*

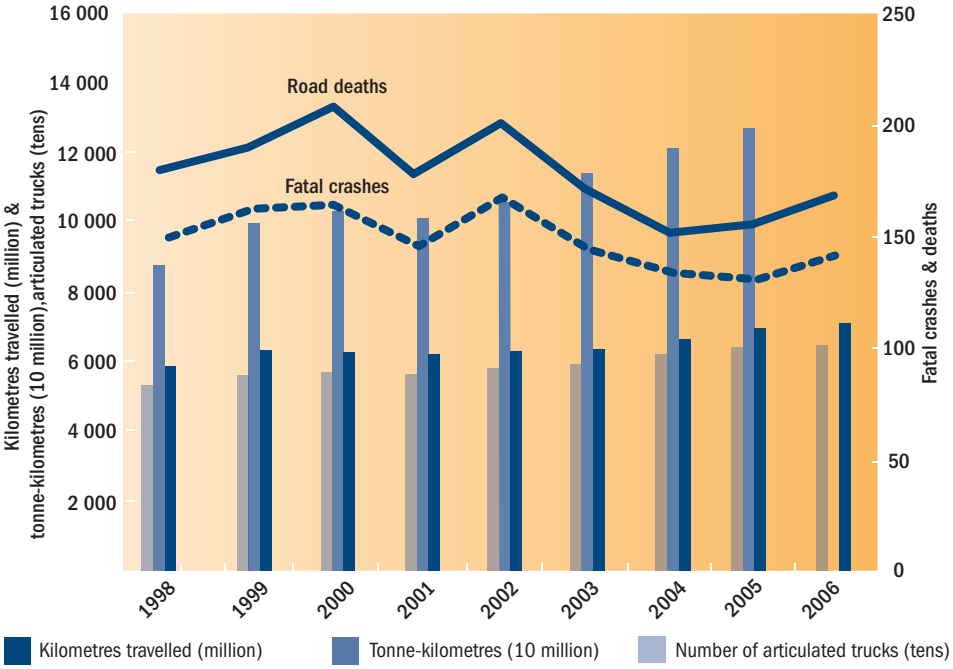
a *Data for Victoria in 2006 is unavaliable*

Road deaths and fatal crashes involving articulated trucks have declined by 21 per cent since the 2003 introduction of the NHVSS. Over the same period, kilometres travelled, tonne-kilometres, and articulated truck numbers all increased – by 12 per cent, 19 per cent (to 2005 only), and 12 per cent respectively (see Figure 5).

Overall, between 1998 and 2005, (the latest period for which activity data are available across all variables):

- road death rate per kilometre travelled declined by 26 per cent
- road death rate per tonne-kilometre declined by 39 per cent
- kilometres travelled by articulated trucks increased by 17 per cent
- articulated truck tonne-kilometres increased by 43 per cent
- articulated truck numbers increased by 17 per cent.

Figure 5: Australian road deaths and fatal crashes involving articulated trucks, articulated truck kilometres travelled, tonne-kilometres, and number of articulated trucks, 1998 to 2006



Source: *ATSB, ABS*

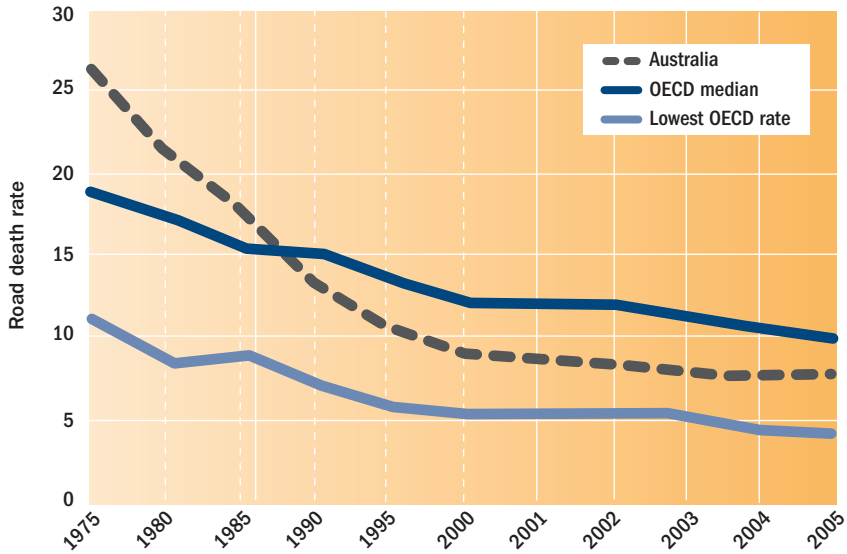
The ATSB developed an Australian Truck Crash Database to investigate serious casualty crashes involving both articulated trucks and heavy rigid trucks. Unfortunately, serious injury data for New South Wales were not available. The database incorporates data for the years 2000, 2002 and 2004.

International road safety comparisons

The public risk associated with road use declined significantly in Australia between 1975 and 2005. In 1975, Australia-wide there were 26.6 road deaths per 100,000 population; this rate had fallen to 8.0 deaths in 2005—a drop of 70 per cent.

Over this same period, the median rate for Organisation for Economic Co-operation and Development (OECD) nations also declined. In 1975 the OECD median rate was 18.5 deaths, and in 2005 it had reduced to 9.5 deaths—a drop of 49 per cent.

Figure 6: Road deaths per 100,000 population, OECD median, lowest OECD rate, and Australia, 1975 to 2005



Source: *ATSB, IRTAD*

Australia's reduction in the rate of road deaths per 100,000 population reflected a greater improvement than that achieved by the OECD median over the 1975–2005 period:

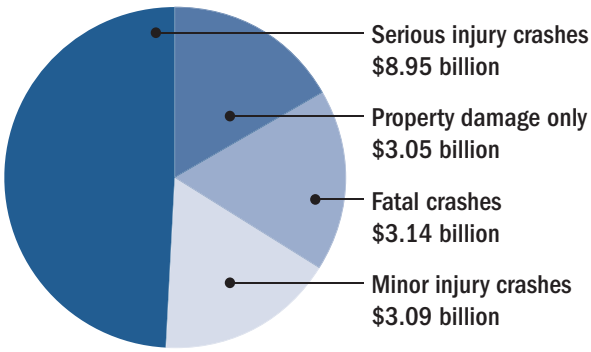
- in 1975 the Australian rate was 44 per cent above the OECD median
- in 2005 the Australian rate was 16 per cent below the OECD median.

Cost of road accidents

- Road crashes impose a substantial economic burden on the Australian community as a whole and on particular groups within the community. The cost of road crashes in Australia in 1996 has been conservatively estimated at $18 billion in 2005 dollar values (ATSB update of BTE estimate).

Figure 7 shows the breakdown of these costs across crashes of different severity categories.

Figure 7: Annual cost of road crashes by type of crash



Source: *Road crash costs in Australia BTE Report 102*

Rail safety trends

Table 6 presents rail fatalities for the latest available 10-year period. The figures show fluctuations in rail fatalities from year to year, with an overall downward trend.

Table 6: Rail safety occurrence data 2001 to 2006

Occurrence type	2001	2002	2003	2004	2005	2006
Deaths (non-suicide)	56	59	48	44	38	40
Serious injuries (exc. NSW)	83	97	50	74	69	134
Derailments +—	202	255	167	182	145	118
Collisions +—with						
- infrastructure	45	44	68	85	102	103
- persons	63	69	52	54	49	45
- road vehicles	36	31	20	31	16	15
- rollingstock	8	7	3	12	12	14
- other trains	12	16	16	6	19	11
Level crossing collisions with						
- road vehicles	90	93	86	72	71	80
- persons	14	14	13	8	7	9
Signals Passed at Danger						
- driver misjudged, completely missed while running and starting against signal	387	305	324	468	439	418
- signal restored as train approached	496	527	635	796	720	689
Loading irregularity	371	504	485	600	559	630
Track/civil infrastructure irregularity	831	1460	1504	1626	1094	1035

+— *Running line*

Source: Rail Safety Regulators Panel (RSRP)

Table 7: Costs of rail accidents in Australia – 1999 ($ Million)

	Rail accidents		Other rail-related incidents		
Type of costs of rail accidents	All rail related incidents	Level crossing rail accidents	Level crossing accidents involving motor vehicles	Suicides and attempted suicides	All rail-related incidents
Workplace productivity	20	8	3	19	50
Household productivity	19	8	3	18	48
Medical/ ambulance/ rehabilitation	2	0	1	3	6
Quality of life	11	5	2	12	31
Total	52	21	9	53	135
Productivity costs	56	0	1	0	57
Other costs	4	0	0	1	5
Overall total	**111**	**22**	**10**	**53**	**196**

Source: *BTRE*
Note: *All figures are in 1999 dollars, are based on a discount rate of 4 per cent, and are rounded to the nearest million dollars.*

Marine safety trends

Tables 8 and 9 show database details of marine investigations from 1991 to June 2007.

Table 8: Australian marine investigations by incident type, 1 January 1991 to 30 June 2006, and 1 July 2006 to 30 June 2007

Incident type	1991–2006	2006–07	Total
Grounding	60	4	64
Collision	40	1	41
Fire/explosion	25	3	28
Foundering	10	–	-
Structure	5	-	-
Equipment	14	-	-
Berthing	7	-	-
Machinery damage	12	-	-
Accidents causing fatalities	31	3	34
Accidents causing serious injuries	11	1	12
Other	-	2	2
TOTAL	**215**	**14**	**229**

Source: ATSB

Table 9: Number of vessels involved in incident investigations by vessel type, 1 January 1991 to 30 June 2006 and 1 July 2006 to 30 June 2007

Vessel type	1991–2006	2006–07	Total
Bulk carrier	106	4	110
Tanker	23	3	26
Container	17	-	17
General	19	1	20
Roll on/roll off	8	1	9
Livestock	5	-	5
Supply/offshore	10	2	12
Tug	5	1	6
Training	5	-	5
Fishing vessel	30	-	30
Passenger	4	1	5
Pleasure	8	-	8
Other	8	2	10
TOTAL	**248**	**15**	**263**

Source: ATSB

Aviation safety trends

Australia has a relatively good international aviation safety record.

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 4,200 kg)
- Low-Capacity (Regular Public Transport aircraft with a seating capacity of 38 or less seats or a maximum payload of 4,200 kg)
- Charter (non-scheduled passenger and freight operations)
- General Aviation (aircraft used for aerial work, training, private, business and recreational operations).

Aviation Accidents

Accidents and fatal accidents involving Australian-registered aircraft by category, years 1997–98 to 2006–07 are detailed in the following table and figures.

Table 10: Aviation accidents and fatal accidents for the 10 year period 1997–98 to 2006–07

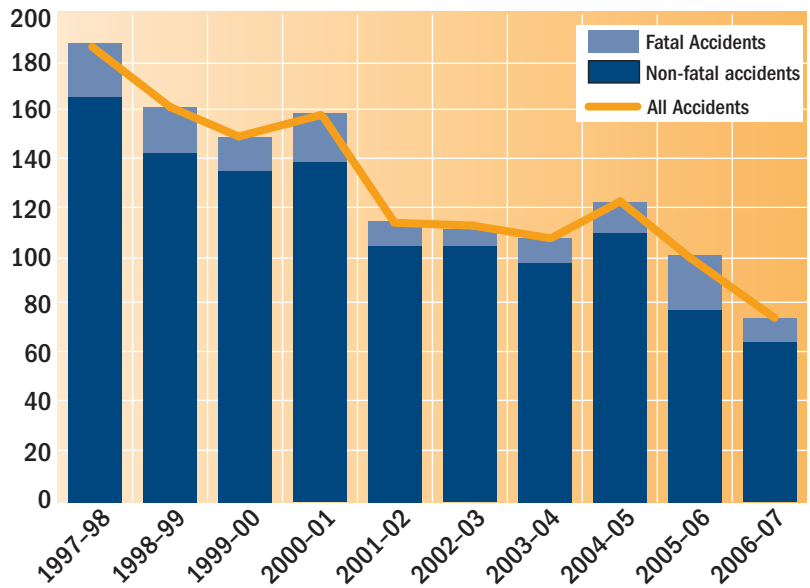
	97–98	98–99	99–00	00–01	01–02	02–03	03–04	04–05	05–06	06–07
High-Capacity										
All accidents	0	4	6	3	2	0	1	1	2	0
Fatal accidents	0	0	0	0	0	0	0	0	0	0
Low-Capacity										
All accidents	1	3	3	2	3	4	2	1	1	0
Fatal accidents	0	0	1	0	0	0	0	1	0	0
Charter										
All accidents	44	38	15	33	25	20	20	14	8	12
Fatal accidents	3	4	1	5	5	2	1	0	2	0
General Aviation										
All accidents	187	158	150	158	114	113	108	121	97	74
Fatal accidents	21	15	14	19	9	8	11	11	18	9

Source: *ATSB*

Note: *General Aviation data includes VH-registered private, business, flying training, and aerial work (including aerial agriculture). VH-registered gliding, ballooning and sports aviation operations have not been included.*

High-Capacity aircraft operations continue to be the safest in the country, with extremely low accident rates. As Table 10 shows, both High-Capacity and Low-Capacity operations are very safe in terms of the number of accidents reported. For the General Aviation and Charter sectors, the number of accidents each year is larger, and there is scope to examine trends with more confidence.
Figure 8 shows all General Aviation accidents and fatal accidents over the decade to 2007.

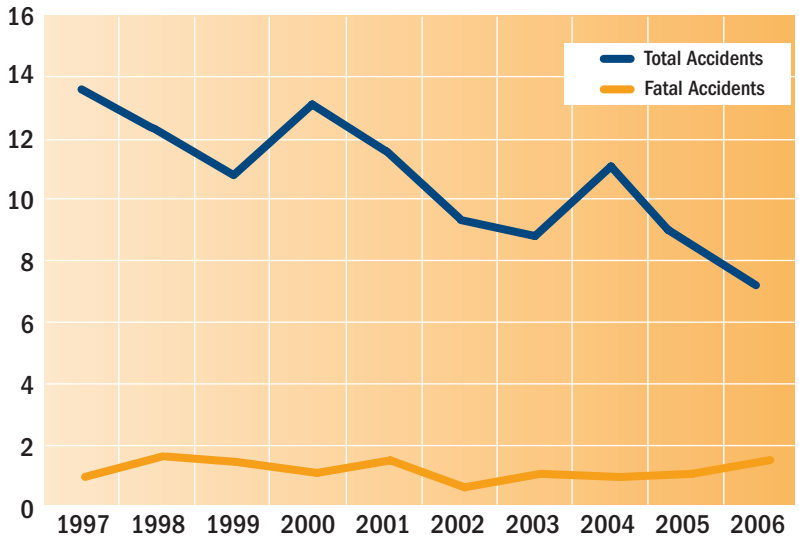
Figure 8: Fatal accidents and total accidents involving Australian-registered General Aviation aircraft, financial years 1997–98 to 2006–07



Source: *ATSB*

Figure 8 shows a downward trend in total accidents recorded in the General Aviation sector. An additional perspective may be obtained by examining accident rates based on the number of hours flown. Figure 9 shows accident rates for the General Aviation sector in Australia over the 10 calendar years 1997 to 2006. Figure 8 and Figure 9 do not include accidents involving VH-registered aircraft conducting ballooning, gliding or sports aviation operations.

Figure 9: Accidents involving Australian-registered General Aviation aircraft per 100,000 hours flown, calendar years 1997 to 2006



Source: *ATSB and the BTRE*
Note: *2006 data is provisional*

Figure 9 shows a statistically significant overall decrease in the General Aviation accident rate over the last decade.

In addition to hours flown, aviation accident rates can also be estimated in terms of aircraft departures.

Table 11: Australian-registered High-Capacity Air Transport traffic (departures and hours), calendar years 1997 to 2006

Year	Departures (x1,000)	Hours Flown (x1,000)
1997	295.1	718.2
1998	293.1	708.5
1999	293.4	709.5
2000	323.2	777.2
2001	339.9	798.8
2002	310.1	720.3
2003	326.8	758.7
2004	379.3	882.2
2005	393.7	922.6
2006	410.9	953.8

Source: *BTRE*
Note: *2006 data is provisional*

Table 12: Australian-registered Low-Capacity Air Transport traffic (departures and hours), calendar years 1997 to 2006

Year	Departures (x1000)	Hours Flown (x1,000)
1997	325.0	276.7
1998	329.5	285.5
1999	331.3	285.4
2000	326.7	285.7
2001	275.4	249.2
2002	220.3	208.4
2003	204.4	197.2
2004	192.0	185.8
2005	196.8	199.2
2006	174.2	173.4

Source: *BTRE*
Note: *2006 data is provisional*

Table 13: Australian-registered Charter traffic (hours flown), calendar years 1997 to 2006

Year	Hours Flown (x1,000)
1997	478.7
1998	490.6
1999	499.8
2000	470.8
2001	458.9
2002	438.6
2003	423.1
2004	475.2
2005	477.5
2006	473.5

Source: *BTRE*
Note: *2006 data is provisional*

From 1997–2006, high-capacity activity generally increased with a slight decrease occurring in 2002 and 2003 associated with the collapse of Ansett. From 1997–2006 activity in the low-capacity airline sector initially increased before a period of stability in the late 1990s. Since 2000, activity has decreased by approximately 40 per cent and can in part be attributed to the collapse of Ansett and an increase in low cost jet carrier operations, which has limited the associated regional airlines' activity. Charter activity has remained fairly stable

in recent years. Tables 14, 15 and 16 provide accident information for High-Capacity, Low-Capacity and Charter Operations respectively, for the financial years 1997–98 to 2006–07. The data is presented in terms of the investigation levels used by the ATSB to record accidents and incidents. Occurrence levels have varied over time, with the balance between level 4 and 5 in particular influenced by resource availability and investigator workload.

For complete definitions of investigation levels refer to Appendix 6 or the ATSB website.

Table 14: Accidents involving Australian-registered High-Capacity aircraft by investigation level, financial years 1997–98 to 2006–07

	Investigation level				
Year	2	3	4	5	Total
97–98	0	0	0	0	0
98–99	0	1	2	1	4
99–00	1	2	3	0	6
00–01	0	0	2	1	3
01–02	0	0	0	2	2
02–03	0	0	0	0	0
03–04	0	1	0	0	1
04–05	0	0	0	1	1
05–06	0	2	0	0	2
06–07	0	0	0	0	0

Source: ATSB

Table 15: Accidents involving Australian-registered Low-Capacity aircraft by investigation level, financial years 1997–98 to 2006–07

	Investigation level				
Year	2	3	4	5	Total
97–98	0	0	1	0	1
98–99	0	0	3	0	3
99–00	1	1	1	0	3
00–01	0	0	2	0	2
01–02	0	0	1	2	3
02–03	0	0	0	4	4
03–04	0	0	0	2	2
04–05	1	0	0	0	1
05–06	0	0	1	0	1
06–07	0	0	0	0	0

Table 16: Accidents involving Australian-registered Charter aircraft by investigation level, financial years 1997–98 to 2006–07

	Investigation level				
Year	2	3	4	5	Total
97–98	0	2	41	1	44
98–99	1	4	33	0	38
99–00	0	1	9	5	15
00–01	1	5	3	24	33
01–02	1	1	8	15	25
02–03	1	1	7	11	20
03–04	0	1	3	16	20
04–05	0	2	5	7	14
05–06	0	2	4	2	8
06–07	0	0	3	9	12

Source: *ATSB*

Table 17 shows that, based on hours flown, both High- and Low-Capacity aircraft operations have significantly lower accident rates than do charter operations.

Table 17: Australian-registered aircraft accidents per 100,000 departures and per 100,000 hours flown (high-capacity, low-capacity and charter), calendar years 1997 to 2006

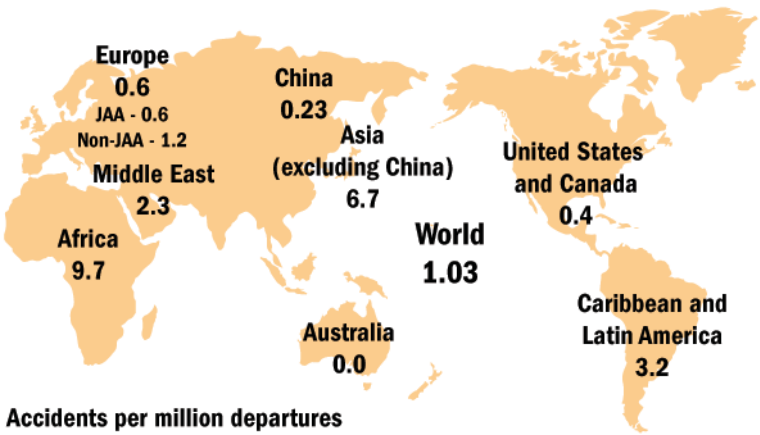
	High-Capacity		Low-Capacity		Charter
Year	Accidents per 100,000 departures	Accidents per 100,000 hours flown	Accidents per 100,000 departures	Accidents per 100,000 hours flown	Accidents per 100,000 hours flown
1997	0.0	0.0	0.0	0.0	10.4
1998	0.3	0.1	0.6	0.7	8.4
1999	2.4	1.0	0.9	1.1	4.2
2000	0.9	0.4	0.9	1.1	5.5
2001	0.9	0.4	1.1	1.2	7.0
2002	0.3	0.1	1.8	1.9	4.6
2003	0.3	0.1	1.5	1.5	5.7
2004	0.3	0.1	0.0	0.0	3.2
2005	0.3	0.1	0.5	0.5	1.9
2006	0.2	0.1	0.0	0.0	2.1

Source: *BTRE*
Note: *2006 data is provisional*

International aviation comparison

Compared with the rest of the world, Australia has the lowest accident rate for high-capacity aircraft (see figure 10). In Canada for example, the number of accidents per 100,000 hours for such airlines varies each year from 0.4 to 1.2 and was 0.4 in 2001. International comparisons of high-capacity operations are often based on hull losses per million departures.

Figure 10: International comparison of hull losses per million departures, calendar years 1996 to 2005



Source: *International Civil Aviation Organization*

Figure 10 provides data for the period 1996 to 2005 for the different regions of the world compared with the world average of 1.2 hull losses per million departures. Australia is the lowest for the world at 0.0 hull losses per million departures. Australia has never had either a hull loss or a fatal accident involving a high-capacity jet aircraft however, 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.

Aviation incidents

Compared with accidents, there are considerably more incidents recorded. Tables 18 to 20 show the incidents recorded by investigation category for high-capacity, low-capacity and charter aircraft.

Table 18: Reported incidents involving Australian-registered High-Capacity aircraft by investigation level, financial years 1997–98 to 2006–07

	Investigation level				
Year	2	3	4	5	Total
1997–98	0	0	527	398	932
1998–99	0	0	637	1035	1673
1999–00	0	1	244	1277	1524
2000–01	0	0	29	1727	1765
2001–02	0	0	31	1557	1592
2002–03	0	0	21	1676	1700
2003–04	0	0	11	1465	1483
2004–05	0	0	23	2191	2220
2005–06	0	0	17	2190	2211
2006–07	0	0	23	2128	2152

Table 19: Incidents involving Australian-registered Low-Capacity aircraft by investigation level, financial years 1997–98 to 2006–07

	Investigation level				
Year	2	3	4	5	Total
1997–98	0	3	284	160	447
1998–99	1	3	320	323	647
1999–00	1	2	126	536	665
2000–01	0	5	15	809	829
2001–02	1	1	10	561	573
2002–03	0	1	4	512	517
2003–04	0	1	5	565	571
2004–05	0	3	12	622	637
2005–06	0	1	6	592	599
2006–07	0	0	14	532	546

Table 20: Incidents involving Australian-registered Charter aircraft by investigation level, financial years 1997–98 to 2006–07

	Investigation level				
Year	2	3	4	5	Total
1997–98	0	0	178	163	341
1998–99	0	1	192	230	423
1999–00	0	0	61	311	372
2000–01	0	1	6	399	406
2001–02	0	0	5	358	363
2002–03	0	0	2	364	366
2003–04	0	0	3	394	397
2004–05	0	1	9	493	503
2005–06	0	0	7	507	514
2006–07	0	0	6	609	615

Source: ATSB

Although changes in investigation level definitions over time complicate comparisons, Tables 18 and 20 show that over the period from financial year 1997–98 to 2006–07, the yearly number of reported incidents involving High-Capacity and Low-Capacity air transport operations has increased. Many of the incident reports received by the ATSB, and its aviation predecessor, involve airspace-related issues. The introduction of electronic safety incident reports from Air Services Australia during 1998, which facilitated incident reporting of increasing comprehensiveness, has contributed significantly to the increased reporting. The ATSB also contributed to the increase by adopting a more comprehensive incident recording policy during this period including recording all reported bird strikes instead of only those seriously damaging aircraft. The new TSI Act and Regulations, which came into effect on 1 July 2003, initially led to a reduction in reporting. But this has now picked up as industry awareness of the new requirements has increased. Table 21 shows reported incident rates for high-capacity, low-capacity and charter aircraft. In contrast to reported charter accidents per 100,000 hours (see Table 17), charter incidents per 100,000 hours are significantly fewer than those reported by the high-capacity and low-capacity sectors. This is likely to reflect the better reporting culture within the Regular Public Transport (RPT) sectors, but perhaps also differences in the types of airspace where these operations normally take place. If charter operations more frequently operate outside controlled airspace compared with airline operations, we would expect fewer airspace related incidents involving these operators would be expected.

The ATSB is currently reviewing the TSI Regulations, taking account of experience gained over the last four years to determine whether changes to the prescribed list of the immediately and routinely reportable matters are warranted. After Government approval, industry stakeholders will be consulted as necessary as part of this review.

In order for the ATSB to extract more value from the notifications received, a study is being conducted to examine trends in reportable matters between 2001 and 2006 for high-capacity and low-capacity transport operations. The first study is examining the pattern of immediately reportable matters (IRM), with a subsequent study to examine routine reportable matters (RRM). Initial indications from the study of IRM suggests that most categories of reportable matter have not changed significantly over the period studied. Breakdown in separation standards is the only category of IRM to show an increase since 2001, and that increase largely parallels the increased aviation activity in high-capacity air transport operations. It is also worth noting that of the 279 breakdown in separation events notified to the ATSB for high-capacity air transport, only seven were serious enough to warrant a more detailed examination compared with other investigation priorities. Many of these other occurrences involved only minor breaches of the separation standards, and on their own did not represent a serious risk to flight safety.

ATSB data also shows that violation of controlled airspace events has trended downwards.

Table 21 shows reported incident rates for high-capacity, low-capacity and charter aircraft. In contrast to reported charter accidents per 100,000 hours (see Table 14), charter incidents per 100,000 hours are significantly fewer than those reported by the high-capacity and low-capacity sectors. This is likely to reflect the better reporting culture within the Regular Public Transport (RPT) sectors.

Table 21: Incidents involving Australian-registered aircraft (High-Capacity, Low-Capacity and Charter), calendar years 1997 to 2006

	High-Capacity		Low-Capacity		Charter
Year	Incidents per 100,000 departures	Incidents per 100,000 hours flown	Incidents per 100,000 departures	Incidents per 100,000 hours flown	Incidents per 100,000 hours flown
1997	282.6	116.1	130.4	153.2	68.7
1998	460.3	190.4	170.3	196.5	79.7
1999	542.6	224.4	194.4	225.6	77.8
2000	514.5	214.0	233.2	266.7	88.1
2001	494.0	210.2	255.7	282.5	75.4
2002	556.5	239.6	237.9	251.4	90.1
2003	435.7	187.7	265.7	275.4	86.5
2004	498.8	214.5	314.0	324.6	93.0
2005	583.6	249.1	331.3	327.3	106.4
2006	515.2	222.0	294.5	295.9	119.1

Sources: *The ATSB and the BTRE*
Note: *2006 data is provisional*

Cost of aviation accidents

As with other transport modes, aviation accidents result in considerable losses to the community in terms of costs, fatalities and injuries. The Bureau of Transport Economics estimated in 2006 that the cost of aviation accidents was close to $114m in 2003–04 (see table 22). Reportedly, the direct cost of the 1999 QF1 Bangkok runway overshoot by a 747 was of the order of $100m. A 747 accident involving large numbers of fatalities could involve many hundreds of millions of dollars in overall costs.

Table 22: Contributions to cost of Australian aviation accidents and incidents, 2003–04

Airline Accident costs	per cent	$m
Workplace losses	31.03	$35.37
Household losses	28.93	$32.97
Property damage	23.42	$26.70
Quality of life	20.18	$23.01
Contingencies	10.79	$12.30
Total	100.00	$114.00

Source: *BTRE estimates.*
Note: *Contingencies is an allowance for: premature funeral costs and medical costs prior to death for fatalities; rehabilitation costs and medical costs for non-fatal injuries.*

International Transportation Safety Association (ITSA)

Chairmanship

The ATSB is a member of the International Transportation Safety Association (ITSA), which consists of 13 major independent transport safety investigation bodies from around the world. ITSA's objectives 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 Executive Director of the ATSB was Chairman of ITSA from March 2006 to March 2007, the 4th Chairman and first Australian Chairman since ITSA's formation in 1993. In March 2007 the responsibility transferred to the Chair of the Transportation Safety Board of Canada.

Internal management and processes

Financial overview

In 2006–07 the ATSB utilised $16.172m of operating expenditure (including $0.111m sourced from own revenue), and $0.714m of expenditure on capital projects, to deliver its investigation and safety outputs.

Investigation activity levels and expenditure in 2006–07 were broadly comparable with 2005–06, however overall operating expenditure was below the 2005–06 year in which above-budget expenditure was approved for additional road safety initiatives. ATSB expenditure distribution in 2006–07 comprised 79 per cent on investigation activities, 4 per cent on aviation safety research and 17 per cent on road safety activities (including research, statistics, public education and funding grants).

The ATSB operating budget allocation for 2007–08 includes the addition of $1.724m pursuant to the Government's Indonesia Transport Safety Assistance Package announced in the May 2007 Budget. Additional depreciation funding has also been allocated for SIIMS which became operational for aviation in April 2007 and is being extended to include rail and marine by December 2007. The ATSB, like all other DOTARS Divisions, is required to absorb the 4 per cent staff pay rise effective 1 July 2007 pursuant to the DOTARS Collective Agreement 2006–2009, and under which a further 4 per cent increase takes effect on 1 July 2008. The ATSB also continues to financially support the ongoing novice driver road safety education initiative by way of significant management coordination and contracting activity.

Comparisons

	2002–03 Actual $m	2003–04 Actual $m	2004–05 Actual $m	2005–06 Actual $m	2006–07 Budget $m
ATSB departmental expenses					
Employee expenses	8.860	10.020	11.733	11.460	13.049
Supplier expenses[1]	2.895	4.758	4.343	3.451	4.355
Depreciation expenses[2]	0.419	0.467	0.583	0.587	1.457
Other expenses	0.190	2.165	0.814	0.675	0.275
Total departmental expenses[3]	12.364	17.410	17.473	16.172	19.136
Revenue (own source)	0.336	0.398	0.203	0.111	0.000
Net cost	12.028	17.013	17.269	16.061	19.136
Capital expenditure					
Plant and equipment[4]	0.204	0.487	0.110	0.043	0.145
SIIMS Project[5]			0.289	0.671	0.334
Staffing					
Average staffing level (FTE) [6]	89	98	109	113	116

Notes:

1. *Supplier expense budget allocation includes a small $0.5m departmental component of the (extended) Black Spot Programme allocated to ATSB for road safety purposes.*
2. *2007–08 budget includes the first full year of depreciation expense for the SIIMS safety management system which became operational in April 2007 for aviation.*
3. *2007–08 budget includes the May 2007 Budget measure for the Indonesia Transport Safety Assistance Package of which ATSB has been allocated $1.724m in 2007–08 and approximately $1.9m/yr for the following two years.*
4. *The ATSB during 2001–02 transferred responsibility for the management of all its current and future IT capital projects to the Corporate division.*
5. *This represents employee expenses of ATSB staff working on the new Safety Investigation Information Management System 'SIIMS' for which funding was provided in the 2004 May Budget.*
6. *Average staffing FTE across the year. 2007–08 budget includes 4.8 average FTE pursuant to the Indonesia Transport Safety Assistance Package.*

The 2007–08 Portfolio Budget Statements include the ATSB's departmental expenses under Outcome 1 'Fostering an efficient, sustainable, competitive, safe and secure transport system'. The ATSB contributes to two departmental outputs viz Output 1.1.1 Investigation and Output 1.1.2 Safety. The table below shows ATSB resourcing by Output, including corporate overhead attributed to the ATSB.

ATSB Price of Outputs ($m)[7]

	2005–06 Actual $m	2006–07 Budget PAES $m	2006–07 Actual $m	2007–08 Budget PBS $m
Output 1.1.1 Investigation				
ATSB	12.982	13.910	12.752	15.993[8]
Corporate	5.968	5.760	6.595	6.740
Total	18.950	19.670	19.347	22.732
Output 1.1.2 Safety				
ATSB	4.491[9]	3.197	3.420[10]	3.143
Corporate	1.373	1.345	1.409	1.563
Total	5.864	4.542	4.829	4.706
Summary				
ATSB	17.473[11]	17.107	16.172	19.136
Corporate	7.341	7.105	8.004	8.303
Total	24.813	24.212	24.176	27.438

Notes:

7. The current DOTARS Output structure became effective in March 2005. Prior ATSB Annual Reviews reflect the former structure. The table shows the ATSB's contribution and attributed corporate overhead to each output. Other DOTARS Divisions also contribute to Output 1.1.2 Safety.

8. Includes Indonesia Transport Safety Assistance Package $1.724m.

9. Includes contributions for AusRAP $0.340m; Amy Gillet Foundation $0.050m; Rail Safety Data $0.080m and increased expenditure on a range of safety educational publications primarily in road safety.

10 Includes contributions for AusRAP $0.295m; Amy Gillet Foundation $0.042m.

11. Above budget expenditure was incurred with prior approval.

Comparison of staffing levels (year end FTE)

Classification level	2006–07 Actual 30 June 07	2007–08 Budget 30 June 08
Executive Director	1.0	1.0
General Manager	1.0	1.0
Deputy Director Transport Safety Investigation	4.0	4.0
Team Leader Transport Safety Investigation	8.0	7.0
Senior Transport Safety Investigator	46.7	54.0
Transport Safety Investigator	1.0	2.0
Executive Level 2	7.8	8.8
Executive Level 1	4.6	5.6
Australian Public Service Level 6	11.1	12.1
Australian Public Service Level 5	15.3	10.5
Australian Public Service Level 4	6.0	8.5
Australian Public Service Level 3	1.0	1.0
Australian Public Service Level 3 (GAPS)	2.0	1.0
Australian Public Service Level 1	1.0	0.0
TOTAL (year end FTE)	111.4	116.5

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 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.

Ministerial correspondence and briefing

Ministerial correspondence

The ATSB helped draft 179 responses to letters for the Ministers.

Briefing Minutes for Ministers

The ATSB submitted 237 briefing Minutes and 14 meeting briefs to Ministers.

Questions on Notice

During 2006–07 the ATSB drafted nine Questions on Notice responses and significant contributions to responses, excluding the Senate Committee responses listed below.

Parliamentary Committees

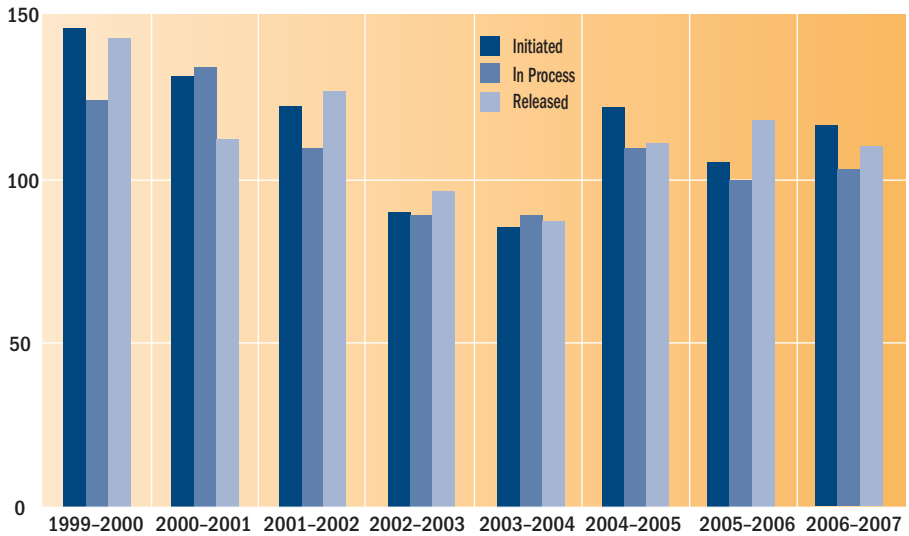
In 2006–07 the ATSB appeared at three Senate Estimates Hearings of the Rural and Regional Affairs and Transport Legislation Committee:

- Supplementary Budget Hearings in October 2006 after which the ATSB drafted answers to five questions on notice
- Additional Estimates in February 2007, after which the ATSB drafted answers to two questions on notice
- Budget Estimates in May 2007, after which the ATSB drafted answers to two questions on notice.

The ATSB also appeared before the Senate Committee Airspace Inquiry on 31 January 2007.

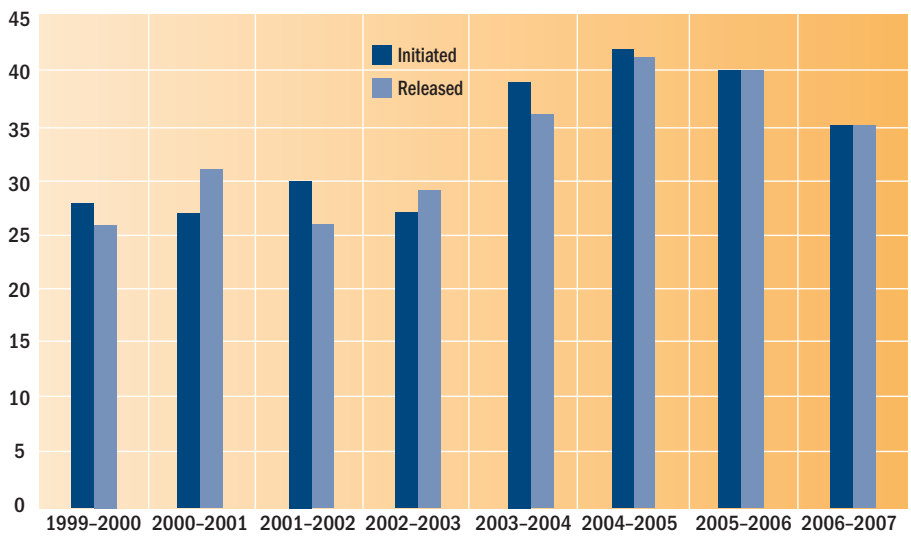
Overview of key safety outputs

Figure 11: ATSB occurrence investigations initiated/in process/completed (aviation, marine and rail modes)



Source: *ATSB*

Figure 12: ATSB statistical and research publications initiated/completed



Source: *ATSB*

Major accident preparedness

In 2006–07 the ATSB contributed to simulated 'desktop' emergency management exercises on marine and rail safety. The review and testing of the response capabilities of ATSB staff complemented previous testing of ATSB operational readiness.

In November 2006 the ATSB's executives participated with other agencies in a simulated rail emergency, exercise *Throstle*, and then in April 2007, in a marine emergency, exercise *Dargle*. Both exercises enabled participating agencies to better appreciate the respective roles and responsibilities of other agencies, coordinate responses, as well as to understand the impact of the emergency response scenario on each organisation.

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 $5.339m including specialist computer equipment and software (such as for air traffic control and aircraft data recorder analysis), a teleconferencing unit, and technical equipment such as electron and optical microscopes. A major addition in 2006-07 was the capitalisation of the major phase of the SIIMS project for $4.711m. 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 the ATSB 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.

The National Road Safety Strategy and the Action Plan for 2007 and 2008 also address equity issues specific to Indigenous road safety. In 2006–07 the ATSB supported continued collaboration among jurisdictions on Indigenous road safety issues by:

- convening and chairing three meetings of the Indigenous Road Safety Working Group
- convening on behalf of the Indigenous Road Safety Working Group a national forum in Broome, Western Australia, from 23 to 25 October 2006 to facilitate information sharing to improve Indigenous road safety
- 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*
- releasing on the ATSB website the research report *Injury of Aboriginal and Torres Strait Islander people due to Transport, 1999–00 to 2002–04*
- distributing on request, copies of the Aboriginal road safety video *Corrugations to Highways.*

Aboriginal reconciliation

The Department of Transport and Regional Services (DOTARS) *Reconciliation Action Plan* outlines how the Department contributes to the wellbeing and quality of life of Indigenous Australians. A programme initiative described in the Plan notes the functions of the Indigenous Road Safety Working Group which is chaired by the ATSB. The Group aims to strengthen and support the communication networks among road safety policy makers and practitioners to help reduce road trauma among Indigenous road users. The Group is responsible for convening a biennial national Indigenous road safety forum attended by government, safety and health practitioners. The next forum will be held in November 2008 with a performance indicator of the number of Indigenous people involved in the forum.

The ATSB also supports the employment initiative in the Plan and the DOTARS *Indigenous Employment Strategy and Indigenous Workforce Action Plan 2006–2009* by continuing to employ 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, road safety research and statistics. In addition, the ATSB also provides a broad range of safety information products.

Occupational health and safety (OH&S)

All ATSB investigators receive occupational health and safety training during their induction and are vaccinated against possible blood-borne pathogen hazards while conducting an on-site investigation. Bureau 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 about vaccinations. The ATSB training section also continues to make the OH&S and blood-borne pathogen awareness training available to selected external organisations.

During 2006–07, the ATSB inaugurated an internal panel of staff representatives to discuss relevant OH&S issues as they arise, and advocate courses of action to management. The panel currently comprises ten staff across the breadth of the organisation, including one member from each regional office, and a management representative at the Team Leader level. The panel meets monthly and to-date, has examined a range of issues, including the usability of online OH&S documentation, staff training needs, access of contractors to accident sites and the issue of personal protective equipment (PPE). A periodic e-mail newsletter, ATSB *OH&S Matters* keeps staff informed of the panel's agendas and the outcome of discussions. OH&S is also discussed in debriefs of relevant on-site investigations.

As opportunities arise, topic experts present issue-specific briefings to staff and first respondent personnel (police, fire and ambulance services). In 2007, the manufacturers of a popular light aircraft that is equipped with a rocket-propelled parachute system provided a comprehensive briefing to Bureau staff. The crash of such an aircraft within the greater Sydney area in February 2007 highlighted the unique dangers of the system to rescue and investigation personnel.

Looking ahead

Major projects and activities to be undertaken in 2007–08 include:

- Assess and enter more than 6,000 occurrence reports into the SIIMS database and assess confidential reports made under the REPCON scheme and Confidential Marine Reporting Scheme (CMRS)
- Commence and conduct approximately 80 aviation, 10 marine and 10 rail investigations, and complete investigations in a timely, high quality manner encompassing findings which lead to appropriate safety action and improvements in transportation safety
- Continue the introduction of the new SIIMS investigation system with expected roll-out to rail and marine in the second quarter of 2007–08 following deployment in aviation in April 2007. Complete the re-coding of historical data and website access
- Provide assistance and evidence as required to Coroners and coronial inquests
- Assist the Minister's inquiry into the CASA/ATSB relationship and legislation
- Facilitate the introduction of approved TSI Act amendment legislation into Parliament with associated consultation
- Contribute to the Transport Safety Assistance to Indonesia Package through specific investigation assistance, capacity building in aviation and marine and framework development, and respond to requests for other international investigation assistance
- Analyse and report on road safety issues which have been requested to be addressed by Ministers
- Release approximately 10 aviation safety research reports and 25 road safety statistical and research publications
- Continue to work with NSW and Victoria to facilitate the trial of a major cooperative novice driver education programme in those states
- Continue to contribute to international safety improvements including through the International Maritime Organisation, International Civil Aviation Organization, International Society of Air Safety Investigators, International Transportation Safety Association, and the Marine Accident Investigators International Forum.

Because much of the ATSB's work is necessarily reactive, many investigations will be undertaken in 2007–08 that were unknown at the beginning of the financial year.

Appendixes

Appendix 1: Research, statistical, and other non-investigation publications released in 2006–07

The ATSB released the following major publications during 2006–07. Most of the reports are available on the Bureau's website <www.atsb.gov.au> or can be obtained by telephoning 1800 621 372.

A Digest of Aviation and Road Safety Research Reports for 2006

Research organisation: ATSB

The ATSB undertakes research on a wide range of aviation safety and road safety topics. This Digest contains synopses of all research reports released by the ATSB during 2006.

Road safety research and analysis reports

Deaths of Cyclists due to Road Crashes

Research organisation: ATSB

The report gives an overview of the circumstances of road crashes in which cyclists died in the period 1991 to 2005 and provides more detail for 1996 to 2004, the latest period for which detailed data were available. It examines the incidence of helmet wearing among cyclist deaths, the major factors in fatal crashes involving cyclists and the main crash types. Age and gender distributions, day of week, time of day and speed limit at the crash site are also examined.

Characteristics of Fatal Road Crashes during National Holiday Periods

Research organisation: ATSB

This study examines annual trends in road fatality numbers for Christmas and Easter holiday periods, and undertakes a comparative analysis of crash factors between holiday periods and the remainder of the year. It uses recent data to revisit some of the issues addressed in earlier work.

Community attitudes to road safety: Community attitudes survey wave 19 (2006) (CR 229)

Research organisation: The Social Research Centre

This report documents the findings from the ATSB's latest survey of community attitudes to road safety. The nineteenth in a series of national surveys on community attitudes to road safety was conducted in March and April 2006. The in–scope population for the survey was persons aged 15 years and over, and the sample comprised private dwellings across Australia listed in the Electronic White Pages telephone directory. A total of 1,644 interviews were conducted, with an average interview length of 17 minutes. A disproportionate stratified sampling methodology was utilised to ensure adequate coverage of the population by age, sex, state/territory and capital city/other locations. The response rate (completed interviews divided by all contacts, excluding those 'away for survey period') was 66 per cent.

The issues examined include: perceived causes of road crashes, exposure and attitudes to random breath testing, attitudes to speed, perceptions of police enforcement, mobile phone use while driving, reported usage of seat belts, involvement in road crashes, and experience of fatigue while driving.

International Road Safety Comparisons: The 2005 Report

Research organisation: ATSB

This report presents detailed tables of road death rates for Organisation for Economic Co-operation and Development (OECD) nations and Australian states/territories. These rates allow Australia's road safety performance to be compared with other OECD nations while taking into account the differing levels of population, motorisation and distances travelled.

Injury of Aboriginal and Torres Strait Islander people due to Transport, 1999–00 to 2003–04

Research organisation: Australian Institute of Health and Welfare & ATSB

This report examines the injury, both fatal and non-fatal, of Indigenous persons in the Northern Territory, Western Australia, South Australia and Queensland due to transport accidents in the five-year period 1999–00 to 2003–04. Sixty per cent of the Indigenous population of Australia and 38 per cent of the total Australian population reside in these four jurisdictions.

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 by the ATSB using monthly data supplied by the eight states and territories.

The inaugural issue of Fatal Heavy Vehicle Crashes Australia – Quarterly Bulletin, January-March 2007

- A new 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.

Road deaths Australia: 2006 Statistical Summary

- This summary presents and analyses fatal crash data for 2006 and makes comparisons with previous years.

Road Safety among Indigenous Australians: A Statistical Profile

- This broad profile of road safety among Indigenous Australians was prepared as a discussion paper for the 3rd Indigenous Road Safety Forum and Working Group held in Broome, 23–25 October 2006. It comprises a demographic profile of Indigenous road fatalities based on Australian Bureau of Statistics (ABS) mortality data, and a comparative profile of crash types for Indigenous and non-Indigenous road fatalities in the Northern Territory, based on coronial data held in the ATSB Fatal Road Crash Database.

The ATSB provides public internet access to the latest fatal road crash data via a new user-friendly interface, SuperWEB. This new interface enables easier manipulation of figures, the construction of a variety of charts, and map-based representations of fatalities.

2006–07 Aviation Safety Research reports

International Fatality Rates: A Comparison of Australian Civil Aviation Fatality Rates with International Data

How does Australia's aviation safety record compare with that of other Western countries? To answer this, fatal accident and fatality rates for Australia were compared with similar rates for the United States, Canada, the United Kingdom, and New Zealand, between 1995 and 2004. The ATSB aviation accident and incident database was searched to identify all fatal accidents involving Australian civil-registered aircraft during this period. The dataset was then matched with comparable datasets for the overseas countries, taking into consideration the variation in operational definitions between the countries. Overall, the findings demonstrated that Australia has a good safety record, and one that is similar to those of the other countries examined.

An Analysis of In-flight Passenger Injuries and Medical Conditions – 1 January 1975 to 31 March 2006

With an aging population, an increasing number of air travellers, and longer routes being flown by bigger aircraft, the number of medical events involving passengers is anticipated to increase. The purpose of this study was to determine the most common in-flight medical problems in passengers, and what proportion of these events result in an aircraft diversion. The results of this study show that there is a low risk of passengers sustaining either an injury or a medical event as a consequence of travel on a civil-registered aircraft. When an in-flight medical event does occur, it is most likely not to be serious. In the majority of these cases, minor musculoskeletal injury is the most likely condition. In most cases the cabin crew will be able to effectively deal with the problem. Serious events are rare, and most commonly these are due to cardiac, neurological and respiratory problems. Diversions occur in the minority of events. When these events occur, they are most likely to be due to cardiac or neurological emergencies. In-flight deaths are rare.

Fatal Aircraft Accidents: Far North Queensland in Context

This research paper examined the number and rate of fatal accidents in Australia, Queensland and Far North Queensland involving aircraft with a maximum take-off weight of 11,000 kg or less between 1990 and 2005. The comparison of fatal accidents, fatalities and associated rates presented in this report provides a broad overview of the distribution of fatal aircraft accidents and associated fatalities across the states, territories and regions of Australia. This report shows that there is some apparent variation in the fatal accident rates across different parts of Australia, but with low fatal accident numbers, an assessment of statistically significant differences was not possible. There are inherent difficulties associated with assessing aviation safety from a regional perspective,

or within state boundaries. Hence, the results indicate what occurred in a particular region of Australia, but do not necessarily indicate the level of safety in a region.

Perceived Pilot Workload and Perceived Safety of RNAV (GNSS) Approaches

Area navigation global navigation satellite system (RNAV (GNSS)) approaches have been used in Australia since 1998 and have now become a common non-precision approach. The objective of this research project was to gain an understanding of the experiences and perceptions of RNAV (GNSS) approaches in Australia from pilots who are endorsed to conduct these approaches. Specifically, the report examined perceived pilot workload, perceived safety, chart interpretability, and situational awareness. These objectives were achieved through a pilot survey, which aimed to understand pilot views of these issues against other approach types. This research was conducted in parallel with the ATSB's investigation of the fatal accident at Lockhart River, and resulted in a number of safety recommendations to Airservices Australia and CASA to enhance the safety of this type of approach.

Pilot Incapacitation: Analysis of Medical Conditions Affecting Pilots Involved in Accidents and Incidents – 1 January 1975 to 31 March 2006

Incapacitation of a pilot due to the effects of a medical condition or a physiological impairment represents a serious potential threat to flight safety. The purpose of this research project was to investigate the prevalence, type, nature and significance of in-flight medical conditions and incapacitation events occurring in Australian civil aviation. The majority of pilot incapacitation events recorded by the ATSB do not involve a chronic or pre-existing medical condition. That is, they are largely unforeseeable events, often involving acute illnesses or injury. Many are not in themselves life threatening, but are capable of impairing a pilot's performance to the extent that safe operation of the aircraft may be adversely affected. The results of this study demonstrated that the risk of a pilot suffering from an in-flight medical condition or incapacitation event is low, with gastrointestinal illness the most common cause of in-flight incapacitation in the pilot population. However, if the pilot suffers a heart attack the risk of a fatal accident occurring increases.

Human factors analysis of Australian aviation accidents and comparison with the United States

This study provides a systematic analysis of the types of human error occurring in Australian civil aviation accidents. It also compares these results against a larger sample of accidents occurring in the United States (US). While the

types of accidents and flying operations varied slightly between Australia and the US, the pattern of aircrew errors were remarkably similar. Skill-based errors were the most prevalent type of aircrew unsafe act, followed by decision errors, violations and perceptual errors in both Australian and US accidents. Skill-based errors were also the most common error type irrespective of the severity of the accident. In Australia, decision errors and violations were more common in fatal accidents. The study demonstrated that the greatest gains in reducing aviation accidents could be achieved by reducing skill-based errors. Moreover, improvements in aeronautical decision making and the modification of risk-taking behaviour could reduce aviation fatalities.

How Old is Too Old? The impact of ageing aircraft on aviation safety

Around the world, there have been a number of aircraft accidents relating to age. Ageing of an aircraft can be a safety issue, but with adequate maintenance, the consequences of ageing can be mitigated. The purpose of this report was to examine the relationship between ageing aircraft and flight safety, to determine the chronological age of the Australian aircraft fleet, and to review current and future directions for the management of ageing aircraft. The picture of ageing aircraft in Australia is a reflection of the two basic approaches to managing the process of ageing: replacement strategies or additional and specific maintenance strategies. On the one hand, Australia's high-capacity Regular Passenger Transport fleet is well equipped with modern aircraft. At the other end of the scale, the piston-engine fleet is largely comprised of aircraft that have an average age of 30 years. Current and future maintenance programmes will act as a preventative measure to reduce the safety risk associated with ageing aircraft, provided operators adhere to these programmes.

Australian Aviation Safety in Review

As part of the ATSB's mission to enhance public awareness of aviation safety, the Aviation Safety Research section developed *Australian Aviation Safety in Review* to provide a readily accessible analysis of the Australian aviation sector, with a strong focus on safety trends. This publication covers all major categories of aircraft operations, from Regular Public Transport to general aviation, as well as sports aviation. This inaugural edition examines data from the calendar years 2001 to 2005. Future editions will update this information and continue to provide information in an easy to read format for a generalist audience.

An analysis of fixed-wing and rotary-wing aircraft accidents involving private operations, 2001 to 2005

The inaugural edition of *Australian Aviation Safety* in Review showed that private operations have the highest rate of fatal accidents within general aviation and the highest rate of fatalities. The report also noted the increasing number of rotary-wing aircraft registered in Australia, and corresponding to that, a growing

number of licence holders for rotary-wing aircraft. Hence, the ATSB considered it timely to take a closer look at private operations involving rotary-wing aircraft to better understand the nature of accidents in this type of aircraft. In doing so, this study investigated accidents by phase of flight and accident type to determine similarities and differences between accidents involving fixed-wing and rotary-wing aircraft conducting private operations for the period 2001 to 2005.

Radiotelephony Readback Compliance and its Relationship to Surface Movement Control Frequency Congestion

Communication within the air traffic system relies heavily on the verbal interaction between pilots and air traffic controllers to ensure the safe and efficient operation of air traffic. The use of standard phraseology and radio telephony procedures, such as readbacks, minimises the opportunity for misinterpretation between pilot and controller. Some concerns were raised by industry regarding the use of excess or non-standard phraseology in readbacks on the surface movement control frequency that result in radio congestion. The purpose of this report was to explore the relationship between excess or non-standard words in readbacks and its effect on frequency congestion.

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

July–August 2006

- *Executive Director's message–Progress on ATSB aviation safety research*
- *A comparison of Australian civil aviation fatality rates with international data*
- *An assessment of pilot performance during simulated flight*
- *Safety Briefs* (Collision with ground, Collision between two aircraft, Loss of control in flight, Collision with terrain, Fatigue cracking of trunnion fork, Runway separation).

September–October 2006

- *Executive Director's message–Reflecting on the ATSB's aviation outputs for 2005-06*
- *A comparison of Australian civil fatal aircraft accidents: Far North Queensland in context*
- *Lockhart River Accident- Overview of Interim Factual Report*
- *Safety Briefs* (Drug and alcohol use by pilots, Mid-air collision, Tail strike on takeoff, Engine failure, Runway excursion, Near collision on ground).

November–December 2006

- *Executive Director's message–Safety Investigation Information Management System (SIIMS)*
- *Preliminary report on the Strikemaster ex-military jet crash near Bathurst*
- *Aircraft evacuation at Hobart airport*
- *Safety briefs* (Lightning strike, Collision with Terrain, Flight control problems, Analysis of in-flight passenger injuries and medical conditions, In-flight engine fuel leak, engine failure).

January–February 2007

- *Executive Director's message–Repcon*
- *Have you been meaning to report a safety concern but don't know how to report it?*
- *Safety briefs* (Breakdown of separation, Engine in-flight shutdown, Runway incursion, Engine failure, structural failures, Airprox).

March–April 2007

- *Executive Director's message*
- *Is an uninterrupted fuel supply guaranteed for continued flight?*
- *Safety briefs* (Engine failure, Research report on pilot incapacitation, Breakdown of separation, Wirestrike, Hardened cockpit doors, Collision with terrain).

May–June 2007

- *Executive Director's message–ATSB support to Indonesia for major accident investigation*
- *Final ATSB investigation report on Lockhart River 15-fatality accident*
- *Safety Briefs* (Cracked window, Breakdown of separation, Smoke event, Air-ground communications, Ageing aircraft and flight safety, Engine power loss).

ATSB articles in Australian Safety Journals during 2006–07

Aviation safety

Tarmac magazine	July 2006	*ATSB Aviation Safety Research Grant Report*
Tarmac magazine	August 2006	*ATSB Final Report on the Mount Hotham Fatal Accident*
Tarmac magazine	September 2006	*Fatal aircraft accidents- Far North Queensland in Context*
Tarmac magazine	October 2006	*Lockhart River Interim Factual Report*
Tarmac magazine	November 2006	*Inflight Passenger Injuries and Medical Conditions*
Tarmac magazine	December 2006	*Aircraft Evacuation at Hobart Airport*
Aviator magazine	January 2007	*(War)Bird down in Bathurst*
Aviator magazine	February 2007	*Safety in Secret*
Aviator magazine	March 2007	*Human factors accidents Australia compared to the USA*
Aviator magazine	April 2007	*Is an uninterrupted fuel supply guaranteed for continued flight*
Aviator magazine	May 2007	*Final report of the Lockhart River accident.*
Aviator magazine	June 2007	*Air Tractor Ploughs into ground (VH-CJZ)*

Aviation safety in overseas publications

ISASI Forum	January–March 2007	*Improving the Quality of Investigation Analysis* By Dr Michael Walker
Thai Flight Safety Information Vol.11 No.3	July–September 2006	Four ATSB safety briefs on - Engine Failure, Flight Management System Computer Malfunction, Infringement of Separation, STAR non-Compliance
Aero Safety World (Flight Safety Foundation)	September 2006	*Crew Loses Control During Restart Attempt* Fairchild Metro III near Lake George, NSW
Aero Safety World (Flight Safety Foundation)	October 2006	*Good On You, Mates* An ATSB comparative aviation accident study of Australia, US, Canada, UK and NZ
Aero Safety World (Flight Safety Foundation)	October 2006	*Losing the Cabin* article based on ATSB Research Report *Depressurisation Accidents and Incidents involving Australian Civil Aircraft: 1 January 1975 to 31 March 2006*
Aero Safety World (Flight Safety Foundation)	February 2007	*Child Restraints in Australian Commercial Aircraft*
Aero Safety World (Flight Safety Foundation)	March 2007	*Threat and Error Detectives* based on the ATSB Safety Report *Regional Airline Operation Safety Audit*

Marine safety

Ausmarine magazine	September 2006	*Global Peace/Tom Tough* Gladstone Oil Spill

Rail safety

Railway Digest	August 2006	Greenbank train collision (submitted June 2006 so is also listed in previous Annual Review)

Road safety

Australian Local Government Yearbook	April 2007	*National Road Safety Action Plan for 2007–2008* includes motorcycle safety measures.

Multimodal safety

The Australian Logistics and Transport Review 2006	October 2006	*Multimodal Transport Safety Progress – October 2006*
National Navigation Logbook	September 2006	*Malu Sara* marine accident and Benalla aviation accident
Australian Infrastructure Review	May 2007	*Multimodal Transport Safety Progress – May 2007*

Appendix 2: ATSB safety research grants 2006–07

Road safety research grants

Successful applications

Two grants were awarded for research to be undertaken under the small road safety research grants programme funded by the ATSB.

An observation of the effects of Electronic Stability Control on real rural crashes within Australia

Applicant: Mr Jamie Mackenzie, Centre for Automotive Safety Research, University of Adelaide

The aim of this project is to observe the effects of Electronic Stability Control (ESC) on real rural crashes within Australia through the use of accurate vehicle dynamics simulations. Of particular interest is how the ESC system can mediate loss of control situations in order to lower the severity of a crash or prevent the crash from occurring at all.

The project will reconstruct real rural crashes using in-depth crash data from a database of South Australian rural crashes, and simulate these crashes on a sophisticated vehicle performance simulator. Simulations will then be re-run with the addition of simulated ESC to determine the likely outcome if the crashed vehicle had been fitted with ESC.

ESC is seen as a promising new vehicle safety measure, and this research will provide an estimate of the likely effectiveness of this technology in rural Australian conditions.

Eco-Drive as a road safety tool for Australian conditions

Applicant: Dr Mark Symmons, Monash University

Eco-Drive initiatives encourage drivers to modify their driving style to conserve fuel. Overseas results suggest a reduction in crashes can also be achieved. This project will critically examine past evaluations and recommend an Eco-Drive model suitable for Australia.

Evaluations of Eco-Drive programmes in the UK have found 20 per cent reductions in emissions and a 30 per cent reduction in crashes. This research aims to provide an assessment of the success of Eco-Drive programmes in Australia, and to identify features that characterise successful programmes.

Eco-Drive is a promising countermeasure in terms of potential road safety benefits, and it is also likely to generate significant environmental benefits, and fuel cost savings.

Road safety research grant reports issued in 2006–07

Helmet protection against basilar skull fracture

Authors: T. J. Gibson, K. Thai, Human Impact Engineering, A. J. McLean, Centre for Automotive Safety Research, University of Adelaide

In Australia, it is compulsory for all motorcyclists, pillion passengers and side-car passengers to wear helmets certified to AS/NZS 1698. Most riders prefer to wear full-face helmets, which appear to offer better facial protection during a crash. Some researchers have noted a greater prevalence of fractures to the base of the skull in full-face helmeted riders. The aim of this study was to improve the understanding of basilar skull fracture (BSF) causation in motorcycle crashes, to assess the capability of current helmets in reducing the risk of this injury and to assist in future standards setting.

A review of available field data on the incidence and causation of BSF to motorcyclists was completed and the findings compared with crashes collected in the CASR Head Injury Database. This database contains in-depth investigations of 174 mainly fatal motorcycle accident cases collected in South Australia between 1983 and 1994. It includes autopsy data, including an investigation of neck injury, the helmet and a detailed crash report. The CASR data was found to be representative of fatal crash studies in the literature and to consist of high severity crashes. In 70 per cent of the cases full-face helmets were worn. BSF was seen in 59 per cent of these cases. Almost 50 per cent of the severe impacts to the head were in the facial region and 42 per cent of these impacts were to the chin bar. The prevalence of BSF was found to be mainly due to the migration of the skull fracture to the base of the skull due to the severity of the impact to the face (and other regions of the head).

Only two motorcycle helmet standards currently include chin bar tests: Snell M2005 and UN ECE 22.05. The tests have significant differences in their requirements and do not specifically address the issue of basilar skull fracture. The test requirements were assessed using a typical current Australian full-face helmet. The results are discussed in terms of the protective requirements demonstrated in the field accident data and an understanding of current biomechanical injury tolerance. The study shows that the protection offered by the Australian motorcycle helmet needs to be extended to cover the facial area, with the aim of reducing facial fractures. The conflicting criteria required of a test method, to protect from facial fracture and brain injury, while not causing neck injury are also discussed.

Instrumentation to acquire road profile data for use in whole body vibration apparatus

Authors: J. Patterson, M. Schier, C. Owen, J. Pallant, Swinburne University of Technology

Previous research has demonstrated that vertical whole-body vibration can induce feelings reminiscent of fatigue and lassitude. Those studies used 4 Hz as the driving frequency as this has been shown to be prominent in road-induced vibration in heavy vehicles. A series of tests of cognition, brain function, heart rate and questionnaires concerning subjective effects were previously validated using 10 minutes of vibration at 4 Hz. This report describes the use of these measures in a comparison between the effects caused by 4 Hz vibration and a vibration pattern recorded from a road in a small articulated truck.

Twenty-two young healthy participants were exposed in separate experiments to 10 minutes of each vibration pattern. The results indicated that a road profile used to create a pattern of vertical vibration was as effective as 4 Hz in most respects. There were minor differences from the previous study but these may have been due to the smaller numbers who participated in the current study. The equipment developed to obtain the road profile acceleration data proved to be very effective at obtaining a signal suitable for use in controlling the hydraulic actuator. The differences in subjective and physiological responses to the two vibration profiles were minor, suggesting that 4 Hz may be a suitable substitute to 'real' road profiles in studying the effects of vertical vibration on fatigue.

Intelligent Transport Systems to Support Police Enforcement of Road Safety Laws

Authors: K.L. Young, M. Regan, Monash University Accident Research Centre

Police enforcement of road rules and regulations involves a wide range of complex tasks, many of which demand the use by police of modern technologies (e.g., fixed and mobile speed detection devices). The aim of this project was to identify and define, from first principles, Intelligent Transport Systems (ITS) and telematics technologies which have significant potential to enhance the effectiveness and efficiency of police enforcement activities in Australia. Telematics technologies allow the transmission of information via computers and wireless telecommunications technology, and are used in applications such as vehicle tracking systems, online vehicle navigation and information systems, and electronic toll collection.

The project was undertaken in three stages: identification of those Victorian road rules and regulations that are safety-critical; identification of the tasks currently undertaken by the Victoria Police in carrying out these safety-critical enforcement activities; and identification of suitable ITS and telematics technologies that

either currently exist, or could be brought together, to support and optimise the conduct of police enforcement activities. A number of new and existing ITS and telematics technologies that can be used to support police traffic enforcement were identified. These technologies have the potential to enhance traffic enforcement by providing practical support to police and encouraging drivers to comply with traffic laws. A number of challenges and issues associated with the use of automated enforcement technologies are discussed.

Crash-based Evaluation of Australian Design Rule 69 (Full Frontal Impact Occupant Protection)

Authors: M. Fitzharris, B. Fildes, S. Newstead, D. Logan, Monash University Accident Research Centre

In-depth data at MUARC was used to evaluate Australian Design Rule 69 (ADR 69), Full Frontal Impact Occupant Protection, with respect to both injury risk and cost of injury for drivers of passenger cars. The effectiveness of frontal airbag deployment was also examined. ADR 69 was introduced in Australia in mid-1995 and was based largely on the US occupant protection standard, FMVSS 208.

The results of this evaluation indicate reductions of 80% and higher in the likelihood of sustaining AIS 2+ head and face injuries, with even greater gains associated with frontal driver airbag deployment. The frontal driver airbag was particularly important in reducing the probability of chest injuries. The average injury cost savings for drivers of post-ADR 69 manufactured passenger cars was found to be as high as AUD$19,000 depending on the body region, while the combined injury cost saving associated with head, face, neck and chest injuries combined was AUD$27,000 on average per driver. The findings do, however, point the way forward for improvements in vehicle safety design for the further protection of the spine and the lower extremity in particular, where the regulation has had little impact among this sample of belted drivers. Limitations of this research and implications of these findings are discussed. Recommendations to build on the success of ADR 69 are made.

Managing Driver Fatigue: Quantifying real world performance impairment

Authors: S. D. Baulk, S. Biggs, C. van den Heuvel, K. Reid, D. Dawson, Centre for Sleep Research, University of South Australia

Driver fatigue remains a major cause of road crashes worldwide. It has been well established that increased wakefulness causes driving impairment, both in simulated and on-road driving. Fatigue management systems have used simple performance tests (such as visual reaction time), in an attempt to quantify the risk of impairment to performance in the real world. Little is known however, about the relationship between such measures.

The primary objectives of this study were: (1) To measure the decrements in performance caused by increasing levels of fatigue using a simple test of visual reaction time (PVT) and an interactive driving simulation task; and (2) To provide a link between simple and complex measures of performance. Secondary aims were: (a) examine the effects of fatigue on perception of performance; and (b) examine the effects of gender on fatigue, driving performance and perception thereof.

Extended wakefulness caused significant decrements in PVT and driving performance, as well as subjective sleepiness and perceptions of performance. While subjective measures normalised following recovery sleep, objective performance measures did not. Results suggest that although objective measures of both simple and complex performance are clearly linked, driving simulation cannot be replaced by a simple reaction time test. Gender differences were found in PVT performance and perceptions of driving ability, with females responding more slowly, and rating their driving as worse than males. Further research is needed to examine links between objective performance measures and to move closer to accurate assessments of fitness to drive. Results suggest that a cognitive-behavioural approach to driver fatigue countermeasures may be beneficial.

Aviation Safety Research Grants Programme

The Aviation Safety Research Grants Programme was a 3-year initiative introduced in 2003–04 to fund a number of one-off research projects suggested by the community or industry participants. The programme complemented the ATSB's targeted research programme by promoting innovative worthwhile research into aviation safety; expanding and consolidating the aviation safety knowledge base; and increasing the pool of effective aviation safety researchers. Funding for the current grants scheme concluded in 2005–06.

Aviation safety research grants reports issued in 2006–07

Assessing Institutional Resilience: A useful guide for airline safety managers?

Applicants: Dr Robert Dannatt

Significant attention has been given in the literature to aviation safety, with emphasis on the importance of developing and maintaining resilience to accidents. To date, this attention has remained at the conceptual level, with comparatively little empirical research undertaken to test the validity of concepts put forward in the literature. This report presents the findings of a qualitative study, investigating the factors perceived to facilitate safety culture and institutional resilience within airlines. Thirty-two senior managers, drawn from Safety Departments and Flight Operations Divisions, participated in the

research, representing 12 airlines operating in the Asian and Pacific regions. Themes emerging from the findings of this report include the importance of leadership roles undertaken by the board, senior management, chief pilots and safety departments, and the influence of both formal and informal performance management systems.

Public Attitudes, Perceptions and Behaviours towards Cabin Safety Communications

Applicant: Mr Andrew Parker

Years of cabin safety research have established the importance of the provision of passenger safety information, and the importance of passenger attention being paid to such communications. This study provides an overview of aircraft cabin safety communications in Australia, in terms of effectiveness, passenger attitudes to such communications and opportunities that exist for improvement. The results of this study revealed that most passengers agreed that paying attention to cabin safety communications is important. However, results revealed that behaviours do not always match this perception. Passenger attention levels to safety communications were found to be generally low. Of all communication types tested, the safety briefing was most prone to perceptions of reduced relevance through repeated exposure, while very low attention levels and perceptions of content establish safety cards as being generally ineffective.

Design and Evaluation of Auditory Icons as Informative Warning Signals

Applicants: Dr Catherine Stevens

Auditory icons are caricatures of everyday sounds that have the potential to not only alert an operator to a problem but also to inform them of the nature of the problem. Two experiments were conducted to investigate the application of auditory icons as warning signals to the civil aviation cockpit environment. Experiment 1 investigated effects of signal iconicity (iconic, abstract), modality, and task demand on warning recognition speed and accuracy. Experiment 2 investigated recognition speed and accuracy in response to four auditory iconic and four abstract warnings in an Advanced Aviation Training Device. The results of experiments suggest that there is potential for the use of auditory iconic warnings and bimodal warnings as the means, not only to alert, but also inform pilots about the nature of a critical incident.

Regional Airline Line Operations Safety Audit

Applicant: Captain Clinton Eames-Brown

Traditionally, the regional airline sector has experienced a higher accident rate than larger carriers, both in Australia and worldwide. Despite this, there appears to have been little research carried out in this segment of the industry, when compared with that conducted for and by major carriers. At present, a Line Operations Safety Audit (LOSA) is largely beyond the reach of regional airlines. A lack of resources limits an airline's ability to undertake flight data recorder analysis. Accordingly, little data exists to provide baseline information for normal scheduled regional services. This report provides an overview of the process involved in the conduct of a LOSA in a regional Australian airline, Regional Express, and contributes to baseline data on regional airlines being assembled by the University of Texas Human Factors LOSA Collaborative group. Greater LOSA participation by regional airlines may ultimately assist in driving safer operational outcomes for all industry participants including passengers, other customers, employees, shareholders and insurers.

The Impacts of Australian Transcontinental 'Back of Clock' Operations on Sleep and Performance in Commercial Aviation Flight Crew

Applicants: Dr Matthew Thomas

Within the domestic Australian aviation context, transcontinental operations present an area where the effective management of fatigue is critical. Routes between Perth and east coast cities in particular are frequently highlighted as problematic, according to evidence from confidential surveys of pilots. This is especially the case with late evening departures from Perth for early morning arrivals on the east coast, with a range of different rostering approaches to building duty structures. However, as transcontinental night-work continues because of operational demands, the challenge is to quantify the risks associated with this work, and provide sufficient scientific data to assist in safe rostering practices. This aim of the study was to provide objective data to inform fatigue risk management processes by determining the quantity and quality of sleep obtained by airline pilots during transcontinental back of clock operations, including where a subsequent domestic sector was flown after an overnight transcontinental leg, and any changes to subjective fatigue and neurobehavioural performance during these sectors.

Appendix 3: Investigation reports released in 2006–07 by mode

Rail reports released in 2006–07

Occurrence Date	Rail accident or incident	Location	Date release
30-Sep-05	Loading Irregularity & Minor Collision between Freight Train 5MA5 and Passenger Train 206A	Eden Hills, SA	04-Oct-06
11-Aug-05	Level Crossing Collision between Locomotive and Passenger Car	Horsham, Vic	22-Dec-06
25-May-06	Collision between Rigid Tipper Truck/Quad Axle Trailer and Freight Train 4AM3	Lismore, Vic	07-Feb-07
25-Sep-06	Collision between freight train 6PM9 & track mounted excavator	Inverleigh, Vic	26-Mar-07
04-Oct-06	Level crossing collision between Ballast Train and Semi-Trailer Truck	Tailem Bend, SA	15-Jun-07
20-Oct-06	Level Crossing Collision between Freight Train and Double Trailer Road-Train Truck	Elizabeth River, NT	28-Jun-07
09-Feb-06	Derailment of XPT Passenger Train	Harden, NSW	28-Jun-07
05-Jun-06	Level Crossing Collision between XPT Passenger Train ST24 and Passenger Car	Albury, NSW	29-Jun-07
02–Feb–05	Derailment of Train 5MB7	Benalla, Vic	29-Jun-07
Preliminary Report			
25-May-06	Level Crossing Collision between Freight Train and Rigid Tipper Truck with Quad Axle Trailer	Lismore, Vic	14-Jul-06
12-Dec-06	Level Crossing Collision between The Ghan Passenger Train and Double Trailer Road-Train Truck	Ban Ban Springs Station, NT	09-Feb-07

Marine reports released in 2006–07

Report Number	Date	Vessel(s)	Location	Date released
224	24-Jan-06	Collision between *Global Peace* and *Tom Tough*	Gladstone, Qld	06-Sep-06
207	28-Sep-04	Grounding of the ship *Mellum* in the port of Thevenard	Thevenard, SA	10-Nov-06
230	10-Apr-06	Crew member fatality on board *Probo Bear* - Port of Groote Eylandt, NT	Groote Island, NT	14-Dec-06
225	05-Feb-06	Crew member fatality on board passenger vessel *Pacific Sun*	Darling Harbour, Sydney, NSW	22-Dec-06
226	06-Apr-06	Hawser failure & manoeuvring difficulties on *Dampier Spirit*	Near Dampier, WA	20-Feb-07
215	24-May-05	Engine room fire on board *Java Sea*	Cairns, Qld	20-Feb-07
231	29-Aug-06	Grounding of the offshore tug/ supply *Massive Tide*	Rosemary Island, Off WA Coast	16-Mar-07
227	01-May-06	Grounding of *Crimson Mars*, River Tamar, Tasmania	River Tamar, Tas	16-Mar-07
233	22-Sep-06	Oxy-acetylene system fire on board *Searoad Mersey*	Webb Dock, Melbourne, Vic	02-Apr-07
223	04-Jan-06	Grounding of oil tanker *Desh Rakshak,* Port Phillip, Victoria	Port Phillip Bay, Vic	02-Apr-07
204	03-Jun-04	Knockdown, *Windeward Bound*, off Gabo Island, Victoria	Bass Strait, Vic	15-Jun-07
235	27-Jan-07	Crew member fatality on board *British Mallard* while berthed in Kwinana, WA	Kwinana, WA	22-Jun-07
234	11-Nov-06	Independent investigation into the engine room fire on board the French Antarctic supply ship *L'Astrolabe* in the Southern Ocean, south of Hobart, Tasmania 11 November 2006	Southern Ocean, Sth of Hobart, Tas	29-Jun-07
220	12-Sep-05	Independent investigation into the fires on board the Panamanian-registered accommodation platform *Safe Concordia* in Bass Strait, Victoria; 12 and 18 September 2005	Bass Strait, Vic	29-Jun-07

Aviation investigation and technical analysis reports released in 2006–07

Report number	Occurence date	Occurence number	Occurrence type	Registration	Location	State	Date released
1	21-Nov-04	200404589	Serious Incid.	VH-TAG	33km ENE Canberra, Aerodrome	ACT	19-Jul-06
2	07-Dec-05	200506614	Incident	VH-IME	28km W Cessnock	NSW	20-Jul-06
3	24-Sep-05	200504847	Accident	VH-BKM	35km E Tenterfield	NSW	09-Aug-06
4	10-Dec-05	200506443	Accident	VH-UMB/VH-BZA	2km NE Coldstream, (ALA)	VIC	10-Aug-06
5	30-May-04	200401917	Accident	VH-MIB	40km S Tobermorey Homestead, Populated place	NT	24-Aug-06
6	11-Nov-05	200507077	Re-Opened		Toowoomba, (ALA)	QLD	29-Aug-06
7	15-Dec-05	200506646	Incident	VH-LMY/ VH-HJS	Bankstown, Aerodrome	NSW	31-Aug-06
8	27-Apr-06	200602199	Accident	VH-SPI	Mabuiag Island, (ALA)	QLD	19-Sep-06
9	27-Feb-06	200601053	Incident	VH-LBA	40km NW Callion	WA	29-Sep-06
10	30-Apr-05	200501921	Incident	VH-LAX/ VH-PVX	Hobart, Aerodrome	TAS	03-Oct-06
11	20-Jul-06	200604137	Tech Analysis	PK-RIM	Medan, Aerodrome, Indonesia	Other	03-Oct-06
12	18-Aug-06	200604781	Incident	VH-TJI	near Brisbane, Aerodrome	QLD	04-Oct-06
13	12-Nov-05	200505808	Accident	VH-DEQ	Birdsville, Aerodrome	QLD	05-Oct-06
14	01-Sep-05	200504340	Serious Incid.	VH-OZF	Bankstown, Aerodrome	NSW	23-Oct-06
15	04-Jan-06	200600039	Accident	VH-KVN	Near Port Hedland Heliport, (ALA)	WA	24-Oct-06
16	25-Aug-04	200403110	Incident	9V-SYB	Melbourne, Aerodrome	VIC	31-Oct-06
17	17-May-05	200502137	Serious Incid.	VH-VQI	Hobart, Aerodrome	TAS	31-Oct-06
18	12-Aug-05	200503921	Serious Incid.	VH-OGP	SASRO, (IFR)	Other	07-Nov-06
19	22-Jul-06	200604209	Incident	VH-TQR	Canberra, Aerodrome	ACT	07-Nov-06
20	18-Nov-05	200505952	Incident	VH-OJD	near Nadi, Aerodrome	Other	09-Nov-06

Aviation investigation and technical analysis reports released in 2006–07 continued...

Report number	Occurence date	Occurence number	Occurrence type	Registration	Location	State	Date released
21	18-Aug-06	200604807	Incident	VH-OJP	Elbis, (IFR)	Other	09-Nov-06
22	19-Apr-06	200602115	Incident	VH-WBA/ VH-NXF	9km NW TASKA, (IFR)	WA	16-Nov-06
23	18-Mar-05	200501189	Incident	VH-VQB	38km SE Fliki, (IFR)	TAS	27-Nov-06
24	19-Aug-06	200604809	Incident	VH-HPB/Unknown	22km S Williamtown, Aerodrome	NSW	30-Nov-06
25	02-Mar-06	200601173	Tech Analysis		Canberra, Aerodrome	ACT	05-Dec-06
26	26-Mar-06	200601509	Accident	VH-ZIP	55km SW Narrandera, Aerodrome	NSW	05-Dec-06
27	20-Oct-05	200505170	Serious Incid.	HL7530	Sydney, Aerodrome	NSW	07-Dec-06
28	18-May-05	200502231	Tech Analysis	VH-IGW	13km WSW Young	NSW	11-Dec-06
29	17-Dec-05	200506780	Incident	VH-FWI	93km S Darwin, Aerodrome	NT	13-Dec-06
30	04-Apr-06	200601663	Accident	VH-JIV	7km S St Albans	NSW	14-Dec-06
31	02-Nov-06	200606594	Incident	VH-OGL	580km WSW Adelaide, Aerodrome, ATW	SA	18-Dec-06
32	04-Aug-06	200604475	Incident	VH-VWO	55 km SE Jandakot, Aerodrome	WA	19-Dec-06
33	13-May-05	200502316	Incident	VH-INM	Fig Tree Pocket	QLD	22-Dec-06
34	29-Jul-05	200504018	Safety Issue		Safety Issue Investigation, Populated place		05-Jan-07
35	19-Oct-04	200404085	Accident	VH-ZXZ	20km SW Saint George, Aerodrome	QLD	12-Jan-07
36	31-Aug-05	200504338	Incident	VH-VQD/VH-UUA	Brisbane, Aerodrome	QLD	31-Jan-07
37	09-Aug-05	200503971	Incident	VH-VBD	Sydney, Aerodrome	NSW	05-Feb-07
38	09-Nov-05	200505683	Serious Incid.	VH-VBI	46km S Tanta, (IFR)	NSW	06-Feb-07
39	12-Feb-06	200600738	Incident	VH-WYS	St Kilda	VIC	08-Feb-07
40	19-Aug-06	200604810	Serious Incid.	VH-JFV/VH-SSM	28km W Sydney, Aerodrome	NSW	16-Feb-07
41	25-Aug-06	200605091	Incident	VH-KEX/VH-ESZ	Hervey Bay, Aerodrome	QLD	16-Feb-07
42	05-Apr-06	200601688	Accident	VH-ZNZ	Bankstown, Aerodrome	NSW	21-Feb-07

Aviation investigation and technical analysis reports released in 2006–07 continued...

Report number	Occurence date	Occurence number	Occurrence type	Registration	Location	State	Date released
43	25-Jan-06	200600395	Incident	VH-MWQ/VH-VQQ	13km NE Melbourne, Aerodrome	VIC	08-Feb-07
44	01-Aug-05	200503722	Serious Incid.	9M-MRG	36km S DONGA, (IFR)	WA	01-May-07
45	31-May-06	200603111	Incident	VH-UJA/VH-VBH	17km W Melbourne, Aerodrome	VIC	29-Sep-06
46	29-Jul-06	200604360	Incident	VH-ARU/ VH-VQN	2km NNW Hamilton Island, Aerodrome	QLD	05-Dec-06
47	02-Dec-05	200506298	Serious Incid.	VH-VBC	46km W Mackay,	QLD	29-Jun-07
48	29-Jun-06	200603726	Incident	VH-QOD	56km N Brisbane, Aerodrome	QLD	26-Jun-07
49	19-Oct-06	200606215	Incident	VH-TQX	65km NNE Melbourne, Aerodrome	VIC	26-Jun-07
50	19-Sep-06	200605559	Accident	N73410	Canyonleigh	NSW	05-Dec-06
51	07-May-05	200501977	Accident	VH-TFU	11km NW Lockhart River, Aerodrome	QLD	14-Dec-06
52	19-Dec-05	200507079	Accident	N2969	Watson's Island	Other	21-Feb-07
53	06-Jan-05	200500004	Accident	VH-BQN	2.7km ESE Wynella Station	QLD	28-Jun-07
54	18-Jan-06	200600958	Tech Analysis	PK-LMJ	Makassar	Other	16-Nov-06
55	20-Oct-06	200606354	Accident	P2-HBG	102km N Port Moresby, Aerodrome	Other	19-Sep-06
56	22-Nov-06	200607054	Serious Incid.	UR-BXQ	Richmond, Aerodrome	NSW	22-Jun-07
57	28-Apr-05	200501912	Incident	VH-XUD	36km SE Marymia, (ALA)	WA	14-Mar-07
58	25-Aug-06	200604949	Incident	VH-VBN	120km N Brisbane, Aerodrome	QLD	28-Jun-07
59	03-Dec-05	200506294	Incident	VH-TQW	74km SE Melbourne, Aerodrome	VIC	08-Jun-07
60	23-Dec-05	200506834	Incident	VH-OAE	93km E Adelaide, VOR	SA	18-May-07
61	09-Jun-06	200603333	Accident	VH-CZE	980km NE Hilo, Aerodrome	Other	02-Apr-07

Aviation investigation and technical analysis reports released in 2006–07 continued...

Report number	Occurence date	Occurence number	Occurrence type	VH-TQW	Location	State	Date released
62	09-Dec-05	200506380	Incident	VH-EEQ	89km SE Mackay, VOR, ATW	QLD	03-Oct-06
63	23-Jun-06	200604222	Incident	VH-UZO/ VH-SBA	Orange, Aerodrome	NSW	07-Nov-06
64	03-Nov-05	200505536	Incident	VH-VQH/VH-VQV	Gold Coast, Aerodrome	QLD	24-May-07
65	01-Jun-06	200603140	Accident	VH-JDJ	2.4km N Bathurst Island, Aerodrome	NT	16-Mar-07
66	31-Aug-04	200403238	Incident	VH-SBJ	78km NNW Brisbane, VOR	QLD	19-Dec-06
67	07-Mar-05	200501000	Accident	VH-FIN	7km WSW Tamworth, Aerodrome	NSW	04-Oct-06
68	04-May-06	200602840	Serious Incid.	PK-YTQ	Soekarno-Hatta Jakarta Airport, Indonesia	Other	09-Nov-06
69	15-Mar-06	200601367	Incident	VH-MZM	Dubbo, Aerodrome	NSW	30-Nov-06
70	04-Mar-06	200601392	Tech Analysis	PK-LMW	Surabaya, Aerodrome, Indonesia	Other	16-Feb-07
71	15-Dec-06	200607627	Incident	VH-TJH	Adelaide, Aerodrome	SA	10-May-07
72	21-Apr-06	200602099	Incident	VH-VXS	Brisbane, Aerodrome	QLD	16-Feb-07
73	29-May-06	200603130	Incident	VH-OEE	New York, JFK Airport	Other	03-Apr-07
74	08-Jan-07	200700035	Incident	VH-VXG	Adelaide, Aerodrome	SA	29-Jun-07
75	10-Feb-05	200500860	Incident	VH-SBI	45km WNW Maleny, VOR	QLD	02-Apr-07
76	11-Oct-05	200505107	Serious Incid.	VH-BKS	76km N Brisbane, Aerodrome	QLD	03-May-07
77	26-Oct-05	200505311	Serious Incid.	HS-TNA	Melbourne, Aerodrome	VIC	18-Dec-06
78	03-Mar-06	200601291	Tech Analysis	VH-BKS	Canberra Head Office, Technical Analysis Laboratories	ACT	04-May-07
79	03-Oct-06	200605807	Incident	VH-OGJ	Melbourne, Aerodrome	VIC	26-Jun-07
80	10-Jan-07	200700080	Serious Incid.	VH-QPA	near Cairns Aerodrome	QLD	28-Jun-07

Appendix 4: Transport safety recommendations issued in 2006–07

This appendix provides detailed information on the status of safety recommendations and safety advisory notices issued by the Australian Transport Safety Bureau in 2006–07.

Rail

The ATSB completed nine final rail investigation reports in 2006–07 under the provisions of the TSI Act including 39 safety recommendations. There is no regulatory requirement for the rail industry to respond to these recommendations.

Marine

The ATSB completed fourteen marine reports in 2006–07 containing 38 safety safety recommendations. There is no regulatory requirement for the shipping industry to respond to these recommendations.

Aviation

Under existing Memoranda of Understanding (MoU), both the Civil Aviation Safety Authority and Airservices Australia have agreed to respond to the ATSB within 60 days of the data of issue of any safety recommendations. No other organisation are obliged to respond but a nominal 60-day due date is listed and any response received is published. On some occasions a response is made to a draft safety output. The situation may result in a response date being prior to the formal issue date.

In 2006–07, the ATSB issued 19 safety recommendations and received 18 responses. CASA and Airservices responded to all 17 recommendations issued to them. Three responses were classified closed-accepted and 14 were being monitored. The other response, from Bombadier, an aircraft manufacturer, was not classified as no response was required. The US Federal Aviation Administration did not respond to recommendation R20060017 and was not required to respond.

Rail safety recommendations issued in 2006–07

Rail safety recommendations	Date of issue
Collision-Rigid Tipper Truck/Quad Axle Trailer and Freight Train 4AM3 at Lismore, Vic on 25 May 2006- Issued 14 July 2006 **Australian Rail Track Corporation and VicRoads** **RR20060034** The Australian Transport Safety Bureau recommends that the Australian Rail Track Corporation and VicRoads review the level of short-term protection provided at the Lismore to Skipton Road level crossing, particularly noting the limited visibility of approaching trains to motorists at or approaching this crossing. The ATSB has noted that this crossing is scheduled for upgrade to active protection early in 2007.	*14-Jul-2006*
Collision between Freight Train 5MA5 and Passenger Train 206A at Eden Hills, SA on 30 September 2005- Issued 4 October 2006 **Atlas Speciality Metals** **RR20060035** The Australian Transport Safety Bureau recommends that Atlas Speciality Metals use appropriate tensile strapping to ensure load security during rail transit in accordance with the Pacific National Freight Loading Manual (or other applicable rail operator instructions). **Toll Express** **RR20060036** The Australian Transport Safety Bureau recommends that Toll Express ensure that tensile strapping on incoming freight from customers is suitable and effective in ensuring load security during rail transit in accordance with the Pacific National Freight Loading Manual (or other applicable rail operator instructions). **RR20060037** The Australian Transport Safety Bureau recommends that Toll Express promulgate the minimum requirements for tensile strapping and load securing, in accordance with the rail operators' standards, and/or guidelines, to their customers. **RR20060038** The Australian Transport Safety Bureau recommends that Toll Express consider the use of containers or wagons which may help to reduce the potential for an out-of-gauge collision due to a load shift during rail transit.	*04-Oct-2006*

Rail safety recommendations	Date of issue
RR20060039	
The Australian Transport Safety Bureau recommends that Toll Express ensure that all securing equipment used such as webbing straps are fit for purpose and protected to ensure load security during rail transit.	
Pacific National	
RR20060040	
The Australian Transport Safety Bureau recommends that Pacific National review their freight inspection procedures with a view to ensuring customers meet the minimum requirements for tensile strapping and load securing in accordance with the Pacific National Freight Loading Manual.	
The Australian Rail Track Corporation	
RR20060041	
The Australian Transport Safety Bureau recommends that the ARTC review their standards and procedures to mitigate the risk of infringement of the design track centre clearance.	
TransAdelaide	
RR20060042	
The Australian Transport Safety Bureau recommends that TransAdelaide review their standards and procedures to mitigate the risk of infringement of the design track centre clearance.	

Marine safety recommendations issued in 2006–07

Marine Safety Recommendations	Date of issue
*Collision between the bulk carrier **Global Peace** and tug **Tom Tough** at Gladstone, Qld on 24 January 2006* **MR20060029** Adsteam Harbour should review their current maintenance and reporting systems with a view to implementing procedures that consider the causes of failures and the likelihood and risks associated with similar failures in the future. **MR20060030** Adsteam Harbour should carry out an assessment of the risks associated with the engineer being in the engine room during various stages of towage operations, with a view to developing procedures and practices to ensure the running machinery is more actively monitored. **MR20060031** Adsteam Harbour should review the alarm and monitoring systems fitted on board *Tom Tough*, and similar tugs in their fleet, with a view to ensuring that the alerting of tug masters to critical alarms is adequate. MR20060032 All owners and operators of tugs should consider carrying out a risk analysis of their towage operations with a view to implementing a system of ongoing professional development and training in emergency procedures for their tug masters.	*06-Sep-2006*
*Grounding of the ship **Mellum** in the port of Thevenard, SA on 28 September 2004.* **MR20060035** Flinders Ports should review their training regime and pilotage procedures to ensure that all pilots are adequately trained in the principles and practices of bridge resource management (BRM) as soon as possible after starting pilotage training with particular emphasis on the pilot's role and the master/pilot information exchange.	*10-Nov-2006*
*A fatal accident aboard the LR **Probo Bear** alongside Groote Island, NT on 10 April 2006* **MR20060036** Prime Marine Management and *Probo Bear*'s masters should review mooring practices and procedures with a view to improving **MR20060037** Ship managers and masters should ensure that personnel supervising mooring operations are stationed such that they can clearly sight all operations that they are responsible for.	*14-Dec-2006*

Marine Safety Recommendations	Date of issue
*A fatal accident aboard the **Pacific Sun** at Sydney, NSW on 5 February 2006*	*22-Dec-2006*
MR20060033 Ship owners, operators and masters should ensure that safety harnesses and lanyards used by personnel when working aloft are appropriate for the purpose considering all aspects of the tasks to be performed.	
MR20060034 Ship owners, operators and masters should ensure that the procedures, permits and risk assessments for personnel working aloft identify all of the hazards and stipulate measures to mitigate all of the risks.	
*Engine room fire on board **Java Sea** in Cairns, Qld on 24 May 2005*	*20-Feb-2007*
MR20060038 Ship owners, managers and masters should ensure that operations, maintenance and emergency procedure manuals are provided on board their ships for all critical equipment so that responsible personnel can familiarise themselves with any hazards associated with the equipment.	
MR20060039 Ship owners, managers and masters of ships with ventilation openings in funnel casings which have similar closing arrangements to those on board *Java Sea* should assess their adequacy in consultation with the ship's classification society and Flag State administration.	
*Hawser failure & manoeuvring difficulties on **Dampier Spirit** at the Stag field north of Dampier, WA on 6 April 2006*	*20-Feb-2007*
MR20060040 Owners and operators of FSO and FPSO ships should provide unambiguous procedures and guidelines for the disconnection and manoeuvring of their ships during cyclones.	
MR20060041 Owners and operators of FSO and FPSO ships should ensure that mooring hawsers and associated equipment are inspected and replaced according to their service conditions and loading.	

Marine Safety Recommendations	Date of issue
*The grounding accident of the bulk carrier the **Crimson Mars** on 1 May 2006 at Bell Bay, Tas*	*16-Mar-2007*

MR20070001

Pilots and masters should ensure that they are able to read, or otherwise be able to check, the rudder angle when conning a ship. They should also ensure that the conventions governing helm orders are observed, particularly the use of 'midships' when changing rudder direction, and 'closing the loop' when communicating orders to a helmsman. The use of hand signals to enhance the communication of helm orders should also be considered.

TasPorts should consider reviewing their procedures with respect to contingency planning with a view to providing pilots with adequate support aimed at preventing groundings and ensuring that a pilot's response to grounding is effective and helps to mitigate the potential adverse consequences.

MR20070003

TasPorts should review their procedures to ensure that the use of mobile telephones by pilots, if at all permitted, does not interfere with the safe navigation of ships in pilotage areas.

MR20070004

TasPorts should consider revising the standard passage plan for Bell Bay, and its means of dissemination, to make it possible for ship's masters and mates to use it when preparing ship's passage plans.

MR20070005

ClassNK should review the conning positions identified on *Crimson Mars,* and other similar ships, with a view to ensuring that rudder angle indicators are readable from all conning positions.

MR20070006

The managers of *Crimson Mars* should review their safety management system with a view to ensuring that any response by ship's crews to an emergency is effective and safe.

Marine Safety Recommendations	Date of issue
*Grounding of the tug/supply ship **Massive Tide** on Rosemary Island, WA 29 on August 2006*	*02-Apr-2007*
MR20070007 Tidewater Marine should review the procedures and practices on board *Massive Tide*, and other ships in their fleet, to ensure that the watchkeepers comply with the instructions, relating to navigational practices, issued by the company and the ships master.	
MR20070008 Tidewater Marine should review the procedures and practices on board *Massive Tide*, and other ships in their fleet, to ensure that watchkeepers meet the requirements of STCW 95 and are fit for duty.	
*Grounding of the tanker **Desh Rakshak** off Port Phillip, Vic on 4 January 2006*	*02-Apr-2007*
MR20070009 Port Phillip Sea Pilots should review their training, procedures and practices to ensure that pilots implement all aspects of bridge resource management, to ensure that all bridge team members are aware of their responsibilities, and how the pilot expects the bridge team to interact.	
MR20070010 Port Phillip Sea Pilots should review their procedures and practices to ensure that pilots board ships at a location that ensures sufficient time is available for the pilot to adequately brief the crew before the ship reaches the port's entrance.	
MR20070011 Port Phillip Sea Pilots should review their procedures and practices to ensure that squat and the ship's movement in the prevailing conditions are adequately considered when its under keel clearance is calculated.	
MR20070012 The Shipping Corporation of India should review their training, procedures and practices to ensure that all aspects of bridge resource management are implemented on board their ships; and that all bridge team members are aware of their responsibilities, and how they are expected to interact with a pilot.	
MR20070013 The Shipping Corporation of India should review the procedures and practices on board their ships in relation to the use and monitoring of echo sounders.	

Marine Safety Recommendations	Date of issue
*Serious injury aboard the **Searoad Mersey** at Webb Dock, Melbourne, Vic on 22 September 2006*	*02-Apr-2007*
MR20070014 Suppliers of hoses and fittings for high-pressure oxygen installations should ensure that the equipment they supply is fit for purpose and manufactured according to appropriate standards.	
MR20070015 The Australian Maritime Safety Authority should consider reviewing Marine Orders Part 12, or issuing a Marine Notice, with the aim of highlighting the potential risks of high-pressure oxygen systems.	
MR20070016 Det Norske Veritas should consider reviewing its rules with the aim of providing more detailed guidance for high-pressure oxygen systems.	
MR20070017 Ship owners, managers and masters should ensure that equipment procured for fixed high-pressure oxygen installations is fit for purpose in accordance with the appropriate standard and that the system is adequately maintained.	
MR20070018 Parker Hannifin should review its Newsletter, 'Hose assemblies used with oxygen' and training procedures/practices in line with the international standard ISO 14113.	
*Accident aboard **Windeward Bound** south-east of Point Hicks, Vic on 3 June 2004*	*15-Jun-2007*
MR20070019 The vessel's engine room and accommodation ventilation arrangements did not comply with the relevant requirements with respect to their closing arrangements. The Australian Transport Safety Bureau recommends that Marine and Safety Tasmania takes action to address this safety issue.	
MR20070020 The vessel's battery locker ventilator and fuel tank air pipes were not fitted with adequate closing arrangements. The Australian Transport Safety Bureau recommends that the owners of *Windeward Bound* takes action to address this safety issue.	
MR20070021 The considerations, with respect to the vessel meeting the intact stability requirements, taken by Marine and Safety Tasmania, should have been made available to the Australian Maritime Safety Authority before the vessel was permitted to undertake an interstate voyage.	

Marine Safety Recommendations	Date of issue
The Australian Transport Safety Bureau recommends that the Australian Maritime Safety Authority takes action to address this safety issue. **MS20070001** The vessel was unable to transmit an AUSREP deviation report after the change of course to Jervis Bay during the afternoon of 4 June due to the fact that the generator was not operational and so the computer used to compile messages for the satellite communication system was not functioning. The Australian Transport Safety Bureau recommends that the ship owners, managers and masters should consider the implications of this safety issue and take action as appropriate.	
*Fatality aboard the **British Mallard** at Kwinana, WA on 27 January 2007*	*22-Jun-2007*
MS20070005 The ship's safety management system risk minimising strategies, including the permit to work system and the risk assessment process, were not implemented before the electrical technician started working on the elevator second deck landing door switches. The Australian Transport Safety Bureau advises ship owners, operators and masters to consider the implications of this safety issue and to take action when it is considered appropriate. **MS20070006** The electrical technician, the second engineer and the third engineer were either not aware of, or did not consider, all of the hazards associated with working in the ship's elevator shaft. The Australian Transport Safety Bureau advises ship owners, operators and masters to consider the implications of this safety issue and to take action when it is considered appropriate. **MR20070023** The ship's elevator instruction manuals did not provide the crew with sufficiently detailed and unambiguous safety guidance. The Australian Transport Safety Bureau recommends that the Hyundai Elevator Company takes action to address this safety issue.	

Marine Safety Recommendations	Date of issue
*Fire aboard the **L'Astrolabe** south of Tasmania on 12 November 2006*	*29-Jun-2007*

MR20070022

The ship's procedures for re-entry into the engine room after the operation of the FM-200 fire extinguishing system did not adequately consider the time required to cool the fire scene and did not provide the master with adequate guidance about when to safely re-enter the engine room, therefore, exposing the ship to the potential risk of re-ignition.

The practice of re-opening the fuel service tank quick closing valve after the fire, without first isolating individual fuel circuits, exposed the ship to the risk of another fuel leak and possible re-ignition.

The Australian Transport Safety Bureau recommends that Bourbon Offshore Surf takes action to address these safety issues.

MS20070002

The absence of a discharge valve on the main fuel pump necessitated the fitting of blanks in the fuel system so that the engine could be run using the stand-by pump, while keeping the main pump depressurised.

The Australian Transport Safety Bureau advises that the owners and operators of ships should consider the safety implications of this safety issue and take action when considered appropriate.

MS20070003

The fitting of gasket discs in an open ended cap to blank off a fuel pipe was ineffective for the task because the discs probably became looser due to the effect of pressure pulses within the fuel pipe, allowing fuel to spray into the engine room where it was ignited on the hot surfaces of the engine.

The Australian Transport Safety Bureau advises that the owners and operators of ships should consider the safety implications of this safety issue and take action when considered appropriate.

MS20070004

Leaving fire doors open between the engine room and the fire control station exposed the ship to the risk that its fire control systems could be rendered inoperable by an engine room fire.

The Australian Transport Safety Bureau advises that the owners, operators and masters of ships should consider the safety implications of this safety issue and take action when considered appropriate.

Marine Safety Recommendations	Date of issue
*Fires on board the accommodation platform **Safe Concordia** in Bass Strait on 12 and 18 September 2005*	*29-Jun-2007*

MR20070024

The endurance test, as required by the American Bureau of Shipping (ABS), was not successfully completed before ABS issued a certificate of class for the platform in March 2005. Consequently, unresolved faults remained in the propulsion electrical system that may have compromised the platform's DP-2 classification.

The Australian Transport Safety Bureau recommends that the American Bureau of Shipping (ABS) takes action to address this safety issue.

MR20070025

The American Bureau of Shipping (ABS) rules do not define Safe Concordia's column structure spaces, containing the propulsion electrical system, as 'Category A' machinery spaces. Therefore, the need for a fixed fire fighting extinguishing system and two means of access to the thruster machinery spaces have not been adequately addressed.

MS20070007

While suitable materials were used for the task of bridging out a major electrical component, the task was not adequately performed, resulting in a fire in the cabinet housing the electrical equipment.

The Australian Transport Safety Bureau advises that the owners and operators of platforms consider the safety implications of this safety issue and take action when considered appropriate.

MS20070008

The safety case submitted to the National Offshore Petroleum Safety Authority (NOPSA) did not take into account the problems within the propulsion electrical system that had occurred before the platform was deployed to the Yolla gas field in Bass Strait, Australia.

The Australian Transport Safety Bureau advises that the owners and operators of platforms should consider the safety implications of this safety issue and take action when considered appropriate.

Recommendation	Issue date	Receiving organisation	Response due/received	Status of response
R20060017	19-July-06	United States Federal Aviation Administration	Not required	
The Australian Transport Safety Bureau recommends that the United States Federal Aviation Administration consider revising Title 14 Code of the Federal Regulations, Part 23.1155, to require a positive means to prevent operation of the propeller in the beta mode while in flight (regardless of pilot action), unless the aircraft is certified for such use.				
R20060018	03-Oct-06	Airservices Australia	2 October 2006 Received 8 December 2006	Closed-Accepted
The Australian Transport Safety Bureau recommends that Asian Express Airlines Pty Ltd implement a periodic inspection routine, based on BFG SL 1714, of all main landing gear wheels that have undergone a hub bushing repair.				
R20060019	16-Dec-06	Civil Aviation Safety Authority	14 February 2007 Received 26 March 2007	Monitor
Safety issue: RNAV (GNSS) approach pilot workload and situational awareness Pilot workload was perceived as being higher, and reported losses of situational awareness were reported as more common, for the area navigation global navigation satellite system (RNAV (GNSS)) approach than all other approaches except the non-directional beacon (NDB) approach, which involved similar workload and situational awareness levels. This was especially a concern for pilots operating Category A and Category B aircraft. Further research into pilot workload and losses of situational awareness associated with RNAV (GNSS) approaches is warranted. The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority address this safety issue.				

Recommendation	Issue date	Receiving organisation	Response due/received	Status of response
R20060020	16-Dec-06	Airservices Australia	27 May 2007	Monitor

Safety issue: RNAV (GNSS) approach chart design and interpretability

The most common concern identified by respondents about the design of RNAV (GNSS) approaches was that the charts did not use references for distance to the missed approach point throughout the approach on the global positioning system (GPS) or flight management system (FMS) displays, and distance references on the approach charts were inadequate. Approach chart interpretability was assessed as more difficult for the RNAV (GNSS) approach than all other approaches by respondents from all aircraft performance categories. Respondents considered that the information presented on RNAV (GNSS) approach charts, including distance information, may not be presented in the most usable way, and consequently may lead to loss of situational awareness.

The Australian Transport Safety Bureau recommends that Airservices Australia address this safety issue.

R20060021	16-Dec-06	Airservices Australia	8 March 2007	Monitor

Safety issue: Sub-optimal RNAV (GNSS) approach design

The 21.5% of Australian area navigation global navigation satellite system (RNAV (GNSS)) approaches deviates from the optimum design parameters (short and irregular segments less than 5 NM and/or multiple steps within segments, and/or multiple minimum segment altitude steps) particularly approaches in the vicinity of high terrain. This was identified as a major concern by many pilots. A review to determine whether designs closer to the optimum approach profile could be developed, within the ICAO Pans-Ops limitations, was considered appropriate.

The Australian Transport Safety Bureau recommends that Airservices Australia address this safety issue.

R20060022	16-Dec-06	Airservices Australia	8 March 2007	Closed-accepted

Safety issue: RNAV (GNSS) approach late notice of air traffic control clearance

Late notice of clearance by air traffic control to conduct an RNAV (GNSS) approach was identified as the most common difficult external condition affecting an RNAV (GNSS) approach, particularly for high-capacity airline pilots. An examination of opportunities to improve training and/or procedures for air traffic controllers to help ensure timely approach clearances is warranted.

The Australian Transport Safety Bureau recommends that Airservices Australia, in conjunction with the Civil Aviation Safety Authority, address this safety issue.

Recommendation	Issue date	Receiving organisation	Response due/received	Status of response
R20060023	16-Dec-06	Civil Aviation Safety Authority	14 February 2007 Received 26 March 2007	Closed-accepted
Safety issue: RNAV (GNSS) approach late notice of air traffic control clearance Late notice of clearance by air traffic control to conduct an RNAV (GNSS) approach was identified as the most common difficult external condition affecting an RNAV (GNSS) approach, particularly for high-capacity airline pilots. An examination of opportunities to improve training and/or procedures for pilots to help ensure timely approach clearances is warranted. The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority, in conjunction with Airservices Australia, address this safety issue.				
R20070002	04-Apr-07	Civil Aviation Safety Authority	3 June 2007 Received 1 June 2007	Monitor
CASA did not provide sufficient guidance to its inspectors to enable them to effectively and consistently evaluate several key aspects of operator management systems. These aspects included evaluating organisational structure and staff resources, evaluating the suitability of key personnel, evaluating organisational change, and evaluating risk management processes. The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority undertake further work to address this safety issue.				
R20070003	04-Apr-07	Civil Aviation Safety Authority	3 June 2007 Received 1 June 2007	Monitor
CASA did not require operators to conduct structured and/or comprehensive risk assessments, or conduct such assessments itself, when evaluating applications for the initial issue or subsequent variation of an Air Operator's Certificate. The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority undertake further work to address this safety issue.				
R20070004	04-Apr-07	Civil Aviation Safety Authority	3 June 2007 Received 1 June 2007	Monitor
CASA did not have a systematic process for determining the relative risk levels of airline operators. This issue was discussed in the analysis section of the draft report but was not listed as a safety issue. However, it has now been included as a safety issue following assessment of comments on the draft report. The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority address this safety issue.				

Recommendation	Issue date	Receiving organisation	Response due/received	Status of response
R20070005	04-Apr-07	Civil Aviation Safety Authority	3 June 2007 Received 1 June 2007	Monitor
CASA's process for accepting an instrument approach did not involve a systematic risk assessment of pilot workload and other potential hazards, including activation of a ground proximity warning system. The ATSB recommends that the Civil Aviation Safety Authority address this safety issue.				
R20070006	04-Apr-07	Civil Aviation Safety Authority	3 June 2007 Received 1 June 2007	Monitor
CASA's guidance material provided to operators about the structure and content of an operations manual was not as comprehensive as that provided by ICAO in areas such as multi-crew procedures and stabilised approach criteria. The ATSB recommends that the Civil Aviation Safety Authority address this safety issue.				
R20060007	04-Apr-07	Civil Aviation Safety Authority	3 June 2007 Received 1 June 2007	Monitor
There was no regulatory requirement for instrument approach charts to include coloured contours to depict terrain. This was required by a standard in ICAO Annex 4 in certain situations. Australia had not notified a difference to the standard. The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority address this safety issue.				
R20060007	04-Apr-07	Civil Aviation Safety Authority	3 June 2007 Received 1 June 2007	Monitor
There was no regulatory requirement for instrument approach charts to include coloured contours to depict terrain. This was required by a standard in ICAO Annex 4 in certain situations. Australia had not notified a difference to the standard. The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority address this safety issue.				

Recommendation	Issue date	Receiving organisation	Response due/received	Status of response
R20070008	04-Apr-07	Civil Aviation Safety Authorityy	3 June 2007 Received 1 June 2007	Monitor
Based on the available evidence, the Lockhart River Runway 12 RNAV (GNSS) approach design resulted in mode 2A ground proximity warning system alerts and warnings when flown on the recommended profile or at the segment minimum safe altitudes. This safety issue was not listed in the draft report but was identified during assessment of comments on the draft report. CASA was formally advised of this safety issue on 20 March 2007. The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority address this safety issue.				
R20070009	04-Apr-07	Jeppeson Sanderson Inc.	Not required Received 31 May 2007	Monitor
There were several design aspects of the Jeppesen RNAV (GNSS) approach charts that could lead to pilot confusion or reduction in situational awareness. These included limited reference regarding the 'distance to run' to the missed approach point, mismatches in the vertical alignment of the plan-view and profile-view on charts such as that for the Lockhart River runway 12 approach, use of the same font size and type for waypoint names and 'NM' [nautical miles], and not depicting the offset in degrees between the final approach track and the runway centreline. The Australian Transport Safety Bureau recommends that Jeppesen Sanderson Inc. address this safety issue.				
R20070010	04-Apr-07	Jeppeson Sanderson Inc.	Not required Received 31 May 2007	Monitor

Recommendation	Issue date	Receiving organisation	Response due/received	Status of response
Jeppesen instrument approach charts depicted coloured contours on the plan-view of approach charts based on the maximum height of terrain relative to the airfield only, rather than also considering terrain that increases the final approach or missed approach procedure gradient to be steeper than the optimum. Jeppesen instrument approach charts did not depict the terrain profile on the profile-view although the segment minimum safe altitudes were depicted. The Australian Transport Safety Bureau recommends that Jeppesen Sanderson Inc. address this safety issue.				
R20070011	**04-Apr-07**	**Airservices Australia**	**3 June 2007** **Received 25 May 2007**	**Monitor**
Airservices Australia's instrument approach charts did not depict the terrain contours on the plan-view. They also did not depict the terrain profile on the profile-view, although the segment minimum safe altitudes were depicted. The Australian Transport Safety Bureau recommends that Airservices Australia address this safety issue.				
R20070012	**08-Jun-07**	**Bombardier Aerospace**	**Not required** **Received 13 June 2007**	-
There was inadequate pitot head maintenance guidance regarding the continuing airworthiness of the pitot head and associated electrical system. The ATSB recommends that Bombardier Aerospace address this safety issue.				

Appendix 5: ATSB investigations underway at 30 June 2007

Rail investigations underway at 30 June 2007

Occurrence date	Location	Description
04-Jan-06	Yerong Creek, NSW	Derailment of freight train 3AB6
28-Mar-06	Adelaide Railway Station, SA	Signal Passed At Danger - Adelaide Yard
12-Sep-06	Seymour, Vic	Derailment of freight train 2CM3
26-Oct-06	Separation St, North Geelong, Vic	Collision between freight train and 'Boom Lift' vehicle
01-Nov-06	near Tarcoola, SA	Derailment of freight train 3DA2K
02-Nov-06	Illabo, NSW	Level crossing collision
15-Nov-06	near Wingeel, Vic	Level crossing collision
12 Dec 06	Ban Ban Springs, NT	Level crossing collision
10-Mar-07	Back Creek, NSW	Level crossing collision
14-May-07	Kalgoorlie, WA	Level crossing collision
22-May-07	near Roopena, SA	Derailment of ballast train 3MR2
10-Jun-07	near Bates, SA	Derailment of freight train 6MP9

Marine investigations underway at 30 June 2007

Vessel	Incident date	Vessel type	Location	Description
Kota Pahlawan	16-Jun-06	Container	En route Singapore to Torres S, Qld	Dangerous cargo leakage on board *Kota Pahlawan*
Enterprise	10-Jul-06	Bulk carrier	Eastern Bass strait, Vic	Engine failure on board *MV Enterprise* in Bass Strait
Creciente	12-Sep-06	Bulk carrier	Port Hedland, WA	Grounding of the bulk carrier *Creciente*
Baltimar Boreas	09-Feb-07	General cargo	Off Newcastle, NSW	Engine room fire onboard *Baltimar Boreas*
Norma Jean/ barge ST61	18-Mar-07	Recreational boat/barge	Off Carnarvon, WA	Collision between recreational vessel *Norma Jean* and *barge ST61*
Shirane	02-Apr-07	Bulk carrier	Newcastle, NSW	Serious injury on board the bulk carrier *Shirane* at Newcastle, NSW
MSC Sonia	10-Apr-07	Container	Melbourne, Vic	Serious injury on board the container ship *MSC Sonia* at Melbourne, Vic
Silky Ocean/ Peter Crombie	23-Apr-07	Bulk carrier/ Fishing vessel	Off Cape Martin, SA	Collision between the Panamanian-registered bulk carrier *Silky Ocean* and the Australian fishing vessel *Peter Crombie*
Enterprise	10-May-07	Bulk carrier	Grassy Harbour, King Island, Tas	Grounding of *Enterprise* in Grassy Harbour, King Island, Tasmania
Ormiston/ Searoad Mersey	16-May-07	Bulk carrier/ RORO General cargo	South Channel Port Phillip Bay, Vic	Close quarters situation between *Ormiston* and *Searoad Mersey*
Pasha Bulker	08-Jun-07	Bulk carrier	Nobbys Beach, Newcastle, NSW	Grounding of *Pasha Bulker*, Nobbys Beach Newcastle, NSW

No.	Date	Occurrence No.	Occurrence Type	Investigation Level	Registration	Manufacturer	Model	Location
1	15-Feb-05	200500654	Incident	4	VH-TNX	de Havilland Canada	DHC-8-102	near Hamilton Island, Aerodrome, Qld
2	08-April-05	200501462	Tech Analysis	4	VH-WOU	Cessna Aircraft Company	207	Perth, WA
3	25-Aug-05	200504188	Incident	4	VH-TJX	Boeing Co	737-476	6km SSE Sydney, Aerodrome, NSW
4	23-Sept-05	200504768	Serious Incid.	3	VH-SEF	Fairchild Industries Inc	SA227-AC	6km N Gayndah, Non Directional Beacon, NSW
5	22-Oct-05	200505236	Accident	3	VH-NIT	Air Tractor Inc	AT-602	Ballidu, WA
6	02-Dec-05	200506266	Accident	3	VH-PYN	Piper Aircraft Corp	PA-31-350	28km N Condobolin, NSW
7	02-Jan-06	200600001	Accident	3	VH-UYB	Cessna Aircraft Company	U206	Willowbank, (ALA), Qld
8	19-Jan-06	200600256	Accident	3	VH-MNI	Beech Aircraft Corp	58	4km E McArthur River Mine, Aerodrome, NT
9	02-Feb-06	200600523	Accident	3	VH-MFI	Bell Helicopter Co	206B (III)	15km E Parkes, Aerodrome, NSW
10	05-Feb-06	200600563	Serious Incid.	3	VH-KLP	Cessna Aircraft Company	208	9km E Queenstown, Aerodrome, Tas
11	09-Feb-06	200601133	Tech Analysis	4				Canberra Head Office, Technical Analysis Laboratories
12	11-Feb-06	200601351	Incident	4	PK-KKE	Boeing Co	737-329	Ujung Pandang, Aerodrome

No.	Date	Occurrence No.	Occurrence Type	Investigation Level	Registration	Manufacturer	Model	Location
13	15-Feb-06	200600837	Serious Incid.	4	VH-OTV	de Havilland Canada	DHC-3	Lombadina, (ALA)
14	16-Feb-06	200600851	Accident	3	VH-FVF	WYTWORNIA SPRZEYU KOMUNI	Dromader M18A	20km SSW Cootamundra, Aerodrome, NSW
15	19-Feb-06	200602839	Serious Incid.	4	PK-YTH	Boeing Co	737-204	Balikpapan-Sepinggan Airport, Indonesia
16	21-Feb-06	200600979	Accident	3	VH-HBS	Robinson Helicopter Co	R44	10km W Gunpowder, (ALA), NT
17	28-Feb-06	200601076	Incident	4	PK-GZJ/ VH-NXH	Boeing Co/ Boeing Co	737-204/ 717-200	39km NNW EROPA, (IFR)
18	19-Mar-06	200601453	Incident	4	VH-QPB	Airbus	A330-303	Brisbane, Aerodrome, QLD
19	31-Mar-06	200601640	Accident	3	VH-BST	Amateur Built Aircraft	Lancair 320	4km ENE Archerfield, Aerodrome, Qld
20	15-June-06	200603438	Serious Incid.	4	VH-SEF	Fairchild Industries Inc	SA227-AC	Maroochydore-Sunshine Coast, Aerodrome, Qld
21	03-July-06	200603722	Tech Analysis	3				Canberra Head Office
22	02-Aug-06	200604439	Incident	4	VH-NXE	Boeing Co	717-200	Alice Springs, Aerodrome, NT
23	08-Aug-06	200604514	Accident	4	VH-WNR	Cessna Aircraft Company	182P	5km W Archerfield, Aerodrome,Qld

No.	Date	Occurrence No.	Occurrence Type	Investigation Level	Registration	Manufacturer	Model	Location
24	11-Aug-06	200604626	Incident	4	DQ-FJK	Boeing Co	747	Sydney, Aerodrome, NSW
25	27-Aug-06	200604967	Incident	4	VH-PRX	Saab Aircraft AB	SF-340B	Sydney, Aerodrome, NSW
26	29-Aug-06	200605039	Serious Incid.	4	VH-NJE	British Aerospace Plc	BAe 146-100	80km WNW Ravensthorpe, (ALA), WA
27	01-Sept-06	200605133	Accident	3	VH-RIL	Cessna Aircraft Company	172L	Mount Vernon, (ALA), NSW
28	06-Sept-06	200605274	Incident	4	VH-NXI	Boeing Co	717-200	185km S Karratha, VOR, WA
29	07-Sept-06	200605307	Incident	4	VH-NXI	Boeing Co	717-200	80km SSE POMOT, (IFR)
30	16-Sept-06	200605473	Incident	4	VH-QPJ	Airbus	A330-303	Perth, Aerodrome, WA
31	18-Sept-06	200605505	Serious Incid.	4	9M-MRM	Boeing Co	777-2H6ER	74km WNW Brisbane, Aerodrome, Qld
32	20-Sept-06	200605561	Incident	4	VH-RXE	Saab Aircraft AB	SF-340B	Sydney, Aerodrome, NSW
33	24-Sept-06	200605620	Incident	4	VH-TJI	Boeing Co	737-476	7km W LARAB, (IFR)
34	05-Oct-06	200605843	Accident	3	VH-AKY	British Aircraft Corp	167	20km NE Bathurst, Aerodrome, NSW
35	11-Oct-06	200605999	Incident	4	VH-ZXE	Boeing Co	767-336	Darwin, Aerodrome, NT

No.	Date	Occurrence No.	Occurrence Type	Investigation Level	Registration	Manufacturer	Model	Location
36	19-Oct-06	200606223	Incident	4	VH-TQY	de Havilland Canada	DHC-8-315	Sydney, Aerodrome, NSW
37	31-Oct-06	200606510	Accident	4	VH-KTR	Bell Helicopter Co	206B (III)	28km NE Coolah, NSW
38	31-Oct-06	200606530	Accident	3	VH-ZGZ	Piper Aircraft Corp	PA-31-350	9km SE Raglan, NSW
39	01-Nov-06	200606542	Accident	4	VH-UBX	Cessna Aircraft Company	207	Townsville, Aerodrome, Qld
40	02-Nov-06	200606570	Accident	4	VH-AAL	Bell Helicopter Co	206B	Palmers Island,
41	15-Nov-06	200606874	Incident	4	VH-VYK	Boeing Co	737-838	Brisbane, Aerodrome, Qld
42	27-Nov-06	200607202	Serious Incid.	4	VH-XDB	Beech Aircraft Corp	200	93km N Perth, Aerodrome, WA
43	29-Nov-06	200608049	Accident	4				Fiji
44	02-Dec-06	200607300	Serious Incid.	4	VH-BTD	Piper Aircraft Corp	PA-31	52km N Cairns, Aerodrome, Qld
45	09-Dec-06	200607478	Accident	3	VH-CJZ	Air Tractor Inc	AT-802A	56km E Collarenebri, NSW
46	16-Dec-06	200607628	Incident	4	VH-UYA	Saab Aircraft AB	SF-340B	Mount Isa, Aerodrome, Qld
47	20-Dec-06	200607687	Accident	4	VH-LFK	Kawasaki Heavy Industries	47G3B-KH4	9km NE Mount Gambier, SA

No.	Date	Occurrence No.	Occurrence Type	Investigation Level	Registration	Manufacturer	Model	Location
48	24-Dec-06	200607801	Accident	3	VH-ALO	Auster Aircraft Ltd	J1B	Nelson, Aerodrome, Vic
49	29-Dec-06	200607815	Incident	4	VH-FNP	Embraer-Empresa Brasileira de Aeronautica	EMB-110P2	Kununurra, Aerodrome, WA
50	05-Jan-07	200700231	Incident	4	VH-TBB/ VH-TQZ	Piper Aircraft Corp/ de Havilland Canada	PA-28R-201 / DHC-8-315	Port Macquarie, Aerodrome, NSW
51	07-Jan-07	200700054	Tech Analysis	4	Unknown	Unknown	Ultralight	30km NW Goulburn, Aerodrome, NSW
52	11-Jan-07	200700065	Serious Incid.	4	ZK-0JB	Airbus	A320	28km NW Sydney, Aerodrome, NSW
53	01-Feb-07	200700304	Accident	4	VH-BCT/ VH-WDS	Cessna Aircraft Company/Piper Aircraft Corp	188/PA-28R-180	Leongatha, Aerodrome, WA
54	02-Feb-07	200700357	Accident	3	VH-HRT	Bell Helicopter Co	407	28km WSW Warialda, NSW
55	03-Feb-07	200700356	Incident	4	VH-OJM	Boeing Co	747-438	57km NNE Sydney, Aerodrome, NSW
56	04-Feb-07	200700358	Accident	3	VH-DIC	Piper Aircraft Corp	PA-30	15km SE Gold Coast, Aerodrome, Qld

No.	Date	Occurrence No.	Occurrence Type	Investigation Level	Registration	Manufacturer	Model	Location
57	05-Feb-07	200700361	Accident	3	VH-HYY	Cirrus Design Corporation	SR22	Cecil Park, NSW
58	05-Feb-07	200700368	Incident	4	VH-EBY	Boeing Co	747-338	37km WNW Danks, (IFR)
59	06-Feb-07	200700510	Serious Incid.	4	VH-MLG	Beech Aircraft Corp	300	150km SE Alice Springs, Aerodrome, NT
60	13-Feb-07	200700765	Serious Incid.	4	VH-SQF	Beech Aircraft Corp	58	Busselton, Aerodrome, WA
61	14-Feb-07	200700766	Incident	4	VH-BMX/ VH-DTX	Cessna Aircraft Company / Cessna Aircraft Company	182T / 210L	28km SW Camden, NSW
62	23-Feb-07	200701033	Accident	3	VH-ZGH	Vans Aircraft	RV-4	Clyde North, Vic
63	26-Feb-07	200701109	Serious Incid.	4	VH-HPB	Fairchild Industries Inc	SA227-DC	45km E Tamworth, Aerodrome, NSW
64	15-Mar-07	200701625	Incident	4	VH-HPI	Robinson Helicopter Co	R22 BETA	Mareeba, Aerodrome, Qld
65	30-Mar-07	200702213	Tech Analysis	4				93km N Christchurch, Aerodrome, NZ
66	31-Mar-07	200701910	Incident	4	VH-OGN	Boeing Co	767-338	Ivanhoe (ALA), N M 74Km, NSW
67	02-April-07	200701935	Serious Incid.	4	VH-AJP	Israel Aircraft Industries Ltd	1124	56km S NUTTA, (IFR)

No.	Date	Occurrence No.	Occurrence Type	Investigation Level	Registration	Manufacturer	Model	Location
68	04-April-07	200701982	Incident	4	B-HLW/ VH-VON	Airbus / Boeing Co	A330-343X / 737-8FE	22km SW Sydney, Aerodrome, NSW
69	09-April-07	200702171	Accident	4	VH-SGT	Beech Aircraft Corp	200	Perth, Aerodrome, WA
70	11-April-07	200702219	Incident	4	VH-TQY	de Havilland Canada	DHC-8-315	9km NE Wagga Wagga, Aerodrome, NSW
71	15-April-07	AO-2007-001	Occurrence	3	VH-OJR	Boeing Co.	747-438	Sydney Aerodrome, NSW
72	19-April-07	AO-2007-002	Occurrence	4	VH-AZJ/ VH-TFF	Piper Aircraft Corp/Cessna Aircraft Company	PA-31-350/ 210N	Rager (IFR), NT
73	25-April-07	AO-2007-004	Occurrence	4	VH-FGW/ VH-YJD	Cessna Aircraft Company - Dornier Werke GMBH	T210M / DO 228-202 K	Kimmi (IFR), 83Km NW M, Qld
74	04-May-07	AO-2007-005	Occurrence	4	N7088S	Raytheon Aircraft Company	390 Premier 1	Townsville Aerodrome, Qld
75	08-May-07	AO-2007-003	Occurrence	4	VH-OGI/ VH-OLL	Boeing Co./ S.A.A.B. Aircraft Co	767-338/ 340B	Sydney Aerodrome, 243° M 19Km, NSW
76	17-May-07	AO-2007-006	Occurrence	4	24-4422/ VH-ILS/ VH-TQP	Aeroprakt/ Beech Aircraft Corp/ De Havilland Canada	Foxbat A22/D55/ DHC-8-102	Port Macquarie Aerodrome, NSW

Aviation investigations underway at 30 June 2007 *continued...*

No.	Date	Occurrence No.	Occurrence Type	Investigation Level	Registration	Manufacturer	Model	Location
77	23-May-07	AO-2007-007	Occurrence	4	VH-PYD	Piper Aircraft Corp	PA-32	Warraber Is (ALA), SW M 28Km, Qld
78	24-May-07	AO-2007-008	Occurrence	4	VH-IWO	Raytheon Aircraft Company	B200	Turet (IFR), SW M 94Km, WA
79	26-May-07	AO-2007-009	Occurrence	3	VH-FTT	Piper Aircraft Corp	PA-28RT-201	Esperance Aerodrome, W M 2Km, WA
80	31-May-07	AI-2007-010	Safety Issue	4				Avionics system events - Lockhart River Runway 12 RNAV (GNSS) Approach
81	31-May-07	AO-2007-011	Occurrence	4	VH-XCB	Beech Aircraft Corp	B200	Ballarat Aerodrome, 125° M 7Km, Vic
82	12-June-07	AE-2007-012	External	3				Adam Air B737 accident Sulawesi, Republic of Indonesia
83	13-June-07	AO-2007-013	Occurrence	4	VH-JWM	Bell Helicopter Co.	206B	Hamilton Island Aerodrome, 084° M 91Km, Qld
84	15-June-07	AE-2007-015	External	3				Runway excursion accident - Yogyakarta, Indonesia - PK-GZC (B737-497) - 07 March 2007
85	20-June-07	AO-2007-014	Occurrence	4	VH-NRT	Cessna Aircraft Company	208	Broome Aerodrome, NE M 28Km, WA

Aviation investigations underway at 30 June 2007

No.	Date	Occurrence No.	Occurrence Type	Investigation Level	Registration	Manufacturer	Model	Location
86	26-June-07	AO-2007-017	Occurrence	4	VH-XUE	Embraer	EMB 120ER	Jundee Aerodrome, WA
87	27-June-07	AE-2007-016	External	4				First of Type CVR validation - Augusta Westland A109E - VH-NPY

Appendix 6: Accident procedures and categorisation

Rail

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

Decision Guidelines for Accident/Incident Categorisation

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

1. The potential safety value that may be gained by conducting an investigation
2. On board fatalities and/or serious passenger injuries
3. The public profile of the occurrence
4. The extent of resources available and projected to be available; and, in the event of conflicting priorities
5. Any risks associated with not investigating
6. 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 categorise 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 Deputy Director and/or Director and Executive Director. Each investigation will be categorised on a scale of 1-5 (see below).

Following the initial assessment of a rail transport safety matter a decision will be made whether or not to conduct a field investigation. Unless otherwise agreed by the Executive Director, all occurrences will initially be categorised 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 Deputy Director level or above after discussion with the Director and/or 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. Where the ATSB reviews an investigation undertaken by another credible body (eg 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 categorisation 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 categorise some events which do not neatly fit these categories 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 five 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 five fatalities (except where it is primarily a road accident), serious injuries and property damage.
- An *accident* involving one or more trains with serious injuries and property damage (except where it is primarily a road accident) where there was a significant risk of fatalities or serious injuries (on-train or off-train), substantial property damage and a substantial commitment of investigative resources is likely to significantly mitigate the possibility of future accidents.

- A *serious incident* involving one or more trains and/or failure of a safety management system where there was a significant risk of multiple fatalities and serious injuries and a substantial commitment of investigative resources is likely to significantly mitigate future passenger train accidents.
- An *accident* involving one or more trains at an active level crossing where an investigation is likely to significantly mitigate future accidents.
- Occurrences indicating a trend that may involve serious safety deficiencies.

Level 4

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

Level 5

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

Note: Fatalities do not include suicides or train surfers.

Marine

The *Transport Safety Investigation Act 2003* 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 Categorisation

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 categorising 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 in the event of conflicting priorities and the extent of any investigation backlog
7. Any risks associated with not investigating
8. 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 categorise 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 Deputy Director and/or Director and Executive Director. Each investigation will be categorised on a scale of 1-5 (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 categorised 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 Deputy Director level or above after discussion with the Director and/or 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'[1]

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 the additional information indicated in Annex 3.

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

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

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

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

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

Level 1

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

Level 2

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

Level 3

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

Level 4

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

When a decision has been made to investigate, marine investigations are initially categorised as Level 4. Following any filed investigation, the level of investigation will be assessed for the relative benefits to the maritime community and the general public. Any decision to upgrade or downgrade will be made on the recommendation of the Deputy Director in consultation with the Director and/or the Executive Director.

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.

Aviation

Procedures

The *Transport Safety Investigation Act 2003* forms the basis of procedures followed by the Bureau. The ATSB uses the categories 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 Categorisation

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 categorising 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,
5. Any risks associated with not investigating
6. 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 Deputy Director and Executive Director. Each investigation will be categorised 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 Deputy 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 categorisation 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 categorise some events which do not neatly fit these categories or where the circumstances, potential safety value and available resources suggest that they should be assigned a different level.

Level 1

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

- A *serious incident* (as defined by ICAO see Attachments A & B) involving one or more High-Capacity Air Transport (scheduled and non-scheduled) passenger aircraft
  - *where there was a significant risk of fatalities or serious injuries and a substantial commitment of investigative resources is likely to significantly mitigate future High-Capacity Air Transport (scheduled and non-scheduled) accidents.*

Level 2

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

Level 3

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

Level 4

- An *accident* involving a foreign aircraft covered by *Article 26* of the Chicago Convention that is not being investigated as level 1, 2, or 3.
- An *accident* (as defined by ICAO, see Attachment A) involving one or more charter or general aviation aircraft (other than sport aviation) *without fatalities*
  - *where a limited commitment of investigative resources could significantly mitigate future aviation accidents.*
- An *accident* or *serious incident* (as defined by ICAO, see Attachments A & B) involving Australian designed and manufactured aircraft types on the Australian Register with international safety implications not being investigated as level 1, 2, or 3.

- An *accident* or *serious incident* (as defined by ICAO, see Attachments A & B) involving one or more High- or Low-Capacity Air Transport aircraft not being investigated as level 1, 2, or 3.
- A *serious incident* (as defined by ICAO, see Attachments A & B) involving one or more non Air Transport aircraft
  - *where a limited commitment of investigative resources could significantly mitigate future accidents.*

Level 5

An *accident* (including with *fatalities*) or *serious incident* involving a sport aviation aircraft unless foreign and required to be investigated under *Article 26* of the Chicago Convention.

- An *accident* involving aircraft *without fatalities*
  - *where the potential safety lessons do not, after initial review, justify the commitment of investigative resources. Basic incident data will be filed for statistical purposes*.
- A *serious incident* or *incident* involving aircraft
  - *where the potential safety lessons do not, after initial review, justify the commitment of investigative resources. Basic incident data will be filed for statistical purposes*.

Appendix 7: Australian Rail Occurrence Data

Source: Rail Safety Regulators Panel (RSRP)
Also refer to Annual Review Table 6

Deaths

		Qld	NT	SA	WA	Vic	Tas	NSW	Australia
2001	Jan-June	2	0	4	0	2	0	20	28
	July-Dec	3	0	1	2	8	0	14	28
2002	Jan-June	2	0	1	1	5	0	21	30
	July-Dec	1	1	5	1	10	0	11	29
2003	Jan-June	2	0	2	2	4	0	16	26
	July-Dec	2	0	3	0	6	0	11	22
2004	Jan-June	0	0	0	1	7	0	12	20
	July-Dec	2	1	7	0	5	0	12	27
2005	Jan-June	1	0	2	0	6	0	5	14
	July-Dec	6	0	3	0	9	0	6	24
2006	Jan-June	5	0	2	2	7	0	5	21
	July-Dec	4	0	2	0	7	1	5	19

Serious Injuries

		Qld	NT	SA	WA	Vic	Tas	NSW	Australia
2001	Jan-June	18	0	3	8	15	0	na	44
	July-Dec	9	0	4	10	16	0	na	39
2002	Jan-June	8	0	5	5	15	0	na	33
	July-Dec	6	0	34	13	11	0	na	64
2003	Jan-June	6	0	0	4	13	0	na	23
	July-Dec	5	1	1	2	17	1	na	27
2004	Jan-June	4	0	3	4	7	0	na	18
	July-Dec	37	0	14	11	2	0	na	64
2005	Jan-June	4	1	8	0	12	0	na	25
	July-Dec	3	0	2	0	39	0	na	44
2006	Jan-June	3	0	1	2	35	0	na	41
	July-Dec	3	4	0	5	74	0	na	86

Derailments

- running line			Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
Counts	2001	Jan-June	25	1	19	7	12	7	41	112
		July-Dec	26	0	13	9	6	3	33	90
	2002	Jan-June	29	0	18	16	9	8	50	130
		July-Dec	27	0	15	20	13	7	44	126
	2003	Jan-June	26	3	12	11	8	4	31	95
		July-Dec	14	2	9	12	9	3	22	71
	2004	Jan-June	17	2	12	8	14	6	33	92
		July-Dec	20	2	8	10	9	3	37	89
	2005	Jan-June	15	1	11	8	16	2	24	77
		July-Dec	11	0	10	8	8	3	28	68
	2006	Jan-June	14	0	7	6	7	3	15	52
		July-Dec	13	2	5	11	13	3	21	68
Normalised Counts per million train km	2001	Jan-June	1.30	12.99	2.42	0.90	0.65	15.22	1.26	1.30
		July-Dec	1.29	0.00	1.52	1.03	0.33	6.52	1.02	1.01
	2002	Jan-June	1.50	0.00	2.15	1.60	0.48	17.39	1.56	1.46
		July-Dec	1.36	0.00	1.68	2.11	0.68	15.22	1.33	1.38
	2003	Jan-June	1.38	33.71	1.48	1.13	0.43	8.33	0.97	1.08
		July-Dec	0.71	21.28	1.12	1.13	0.47	6.00	0.68	0.78
	2004	Jan-June	0.89	3.05	1.43	0.74	0.74	10.91	1.01	1.01
		July-Dec	0.99	3.77	0.92	0.84	0.47	5.45	1.15	0.96
	2005	Jan-June	0.78	1.79	1.25	0.69	0.84	3.45	0.79	0.85
		July-Dec	0.54	0.00	1.15	0.64	0.42	5.17	0.96	0.75
	2006	Jan-June	0.76	0.00	0.79	0.51	0.37	5.28	0.53	0.59
		July-Dec	0.64	2.90	0.58	0.86	0.68	6.55	0.72	0.75

Collisions - running line										
Collision with train			**Qld**	**NT**	**SA**	**WA**	**Vic**	**Tas**	**NSW**	**Aust.**
Counts	2001	Jan-June	0	0	0	1	2	0	3	6
		July-Dec	1	0	1	0	0	0	3	5
	2002	Jan-June	3	0	1	1	1	0	3	9
		July-Dec	3	0	0	0	0	0	3	6
	2003	Jan-June	3	0	1	1	2	0	1	8
		July-Dec	4	0	0	0	2	0	3	9
	2004	Jan-June	0	0	0	0	1	1	3	5
		July-Dec	1	0	0	0	0	0	0	1
	2005	Jan-June	4	0	1	3	1	1	2	12
		July-Dec	2	0	0	1	2	0	2	7
	2006	Jan-June	0	0	0	0	2	0	2	4
		July-Dec	2	0	0	2	0	0	4	8
Normalised Counts per million train km	2001	Jan-June	0.00	0.00	0.00	0.13	0.11	0.00	0.09	0.07
		July-Dec	0.05	0.00	0.12	0.00	0.00	0.00	0.09	0.06
	2002	Jan-June	0.16	0.00	0.12	0.10	0.05	0.00	0.09	0.10
		July-Dec	0.15	0.00	0.00	0.00	0.00	0.00	0.09	0.07
	2003	Jan-June	0.16	0.00	0.12	0.10	0.11	0.00	0.03	0.09
		July-Dec	0.20	0.00	0.00	0.00	0.10	0.00	0.09	0.10
	2004	Jan-June	0.00	0.00	0.00	0.00	0.05	1.82	0.09	0.05
		July-Dec	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	2005	Jan-June	0.21	0.00	0.11	0.26	0.05	1.72	0.07	0.13
		July-Dec	0.10	0.00	0.00	0.08	0.10	0.00	0.07	0.08
	2006	Jan-June	0.00	0.00	0.00	0.00	0.10	0.00	0.07	0.05
		July-Dec	0.10	0.00	0.00	0.16	0.00	0.00	0.14	0.09

Collision with rollingstock

			Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
Counts	2001	Jan-June	1	0	0	0	0	0	0	1
		July-Dec	5	1	0	0	1	0	0	7
	2002	Jan-June	1	0	0	0	0	0	1	2
		July-Dec	1	0	0	1	2	0	1	5
	2003	Jan-June	0	0	0	0	0	0	0	0
		July-Dec	1	0	0	0	2	0	0	3
	2004	Jan-June	1	0	0	0	3	0	0	4
		July-Dec	2	0	0	1	4	1	0	8
	2005	Jan-June	2	1	0	1	2	0	0	6
		July-Dec	1	0	1	0	4	0	0	6
	2006	Jan-June	0	0	0	1	9	0	0	10
		July-Dec	1	0	0	0	2	0	1	4
Normalised Counts per million train km	2001	Jan-June	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.01
		July-Dec	0.25	12.50	0.00	0.00	0.05	0.00	0.00	0.08
	2002	Jan-June	0.05	0.00	0.00	0.00	0.00	0.00	0.03	0.02
		July-Dec	0.05	0.00	0.00	0.11	0.10	0.00	0.03	0.05
	2003	Jan-June	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		July-Dec	0.05	0.00	0.00	0.00	0.10	0.00	0.00	0.03
	2004	Jan-June	0.05	0.00	0.00	0.00	0.16	0.00	0.00	0.04
		July-Dec	0.10	0.00	0.00	0.08	0.21	1.82	0.00	0.09
	2005	Jan-June	0.10	1.79	0.00	0.09	0.10	0.00	0.00	0.07
		July-Dec	0.05	0.00	0.11	0.00	0.21	0.00	0.00	0.07
	2006	Jan-June	0.00	0.00	0.00	0.08	0.47	0.00	0.00	0.11
		July-Dec	0.05	0.00	0.00	0.00	0.10	0.00	0.03	0.03

Collision with person

			Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
Counts	2001	Jan-June	4	0	0	1	2	0	17	24
		July-Dec	3	0	2	3	9	0	22	39
	2002	Jan-June	5	0	2	0	5	0	24	36
		July-Dec	5	0	1	2	8	0	16	32
	2003	Jan-June	3	0	0	0	6	0	12	21
		July-Dec	6	1	1	0	7	0	16	31
	2004	Jan-June	3	0	1	1	3	0	15	23
		July-Dec	5	1	0	2	6	0	17	31
	2005	Jan-June	0	1	2	0	10	0	10	23
		July-Dec	5	0	3	0	8	0	11	27
	2006	Jan-June	6	0	1	1	8	0	8	24
		July-Dec	2	0	2	2	7	0	9	22
Normalised Counts per million train km	2001	Jan-June	0.21	0.00	0.00	0.13	0.11	0.00	0.52	0.28
		July-Dec	0.15	0.00	0.23	0.34	0.49	0.00	0.68	0.44
	2002	Jan-June	0.26	0.00	0.24	0.00	0.27	0.00	0.75	0.41
		July-Dec	0.25	0.00	0.11	0.21	0.42	0.00	0.48	0.35
	2003	Jan-June	0.16	0.00	0.00	0.00	0.32	0.00	0.38	0.24
		July-Dec	0.30	10.64	0.12	0.00	0.37	0.00	0.49	0.34
	2004	Jan-June	0.16	0.00	0.12	0.09	0.16	0.00	0.46	0.25
		July-Dec	0.25	1.88	0.00	0.17	0.32	0.00	0.53	0.33
	2005	Jan-June	0.00	1.79	0.23	0.00	0.52	0.00	0.33	0.25
		July-Dec	0.24	0.00	0.34	0.00	0.42	0.00	0.38	0.30
	2006	Jan-June	0.33	0.00	0.11	0.08	0.42	0.00	0.28	0.27
		July-Dec	0.10	0.00	0.23	0.16	0.37	0.00	0.31	0.24

Collision with infrastructure

			Qld	NT	SA	WA	Vic	Tas	NSW	Aust
Counts	2001	Jan-June	3	0	1	2	1	0	11	18
		July-Dec	10	0	3	2	2	0	10	27
	2002	Jan-June	6	0	3	1	0	0	10	20
		July-Dec	8	0	1	1	0	1	11	22
	2003	Jan-June	4	0	0	0	7	0	20	31
		July-Dec	7	0	0	0	14	0	15	36
	2004	Jan-June	3	0	3	9	11	0	8	34
		July-Dec	10	0	0	8	14	1	17	50
	2005	Jan-June	3	0	1	1	12	0	21	38
		July-Dec	3	0	3	2	28	0	29	65
	2006	Jan-June	2	0	2	3	16	0	21	44
		July-Dec	3	0	1	5	21	0	31	61
Normalised Counts per million train km	2001	Jan-June	0.16	0.00	0.13	0.26	0.05	0.00	0.34	0.21
		July-Dec	0.50	0.00	0.35	0.23	0.11	0.00	0.31	0.30
	2002	Jan-June	0.31	0.00	0.36	0.10	0.00	0.00	0.31	0.23
		July-Dec	0.40	0.00	0.11	0.11	0.00	2.17	0.33	0.24
	2003	Jan-June	0.21	0.00	0.00	0.00	0.37	0.00	0.63	0.35
		July-Dec	0.35	0.00	0.00	0.00	0.73	0.00	0.46	0.40
	2004	Jan-June	0.16	0.00	0.36	0.83	0.58	0.00	0.25	0.37
		July-Dec	0.49	0.00	0.00	0.67	0.74	1.82	0.53	0.54
	2005	Jan-June	0.16	0.00	0.11	0.09	0.63	0.00	0.69	0.42
		July-Dec	0.15	0.00	0.34	0.16	1.47	0.00	1.00	0.71
	2006	Jan-June	0.11	0.00	0.22	0.25	0.84	0.00	0.74	0.50
		July-Dec	0.15	0.00	0.12	0.39	1.10	0.00	1.07	0.67

Collision with road vehicle

			Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
Counts	2001	Jan-June	1	1	13	2	2	0	0	19
		July-Dec	4	0	12	0	1	0	0	17
	2002	Jan-June	0	0	7	1	0	0	1	9
		July-Dec	0	0	14	3	3	0	2	22
	2003	Jan-June	0	0	5	0	0	0	1	6
		July-Dec	1	0	7	4	1	0	0	13
	2004	Jan-June	3	2	5	2	3	0	1	16
		July-Dec	3	0	3	1	4	3	0	14
	2005	Jan-June	1	0	2	2	4	0	0	9
		July-Dec	4	0	0	0	2	0	1	7
	2006	Jan-June	1	0	2	0	0	0	0	3
		July-Dec	2	0	4	1	3	0	3	13
Normalised Counts per million train km	2001	Jan-June	0.05	12.99	1.66	0.26	0.11	0.00	0.00	0.22
		July-Dec	0.20	0.00	1.40	0.00	0.05	0.00	0.00	0.19
	2002	Jan-June	0.00	0.00	0.84	0.10	0.00	0.00	0.03	0.10
		July-Dec	0.00	0.00	1.57	0.32	0.16	0.00	0.06	0.24
	2003	Jan-June	0.00	0.00	0.62	0.00	0.00	0.00	0.03	0.07
		July-Dec	0.05	0.00	0.87	0.38	0.05	0.00	0.00	0.14
	2004	Jan-June	0.16	3.05	0.60	0.18	0.16	0.00	0.03	0.18
		July-Dec	0.15	0.00	0.34	0.08	0.21	5.45	0.00	0.15
	2005	Jan-June	0.05	0.00	0.23	0.17	0.21	0.00	0.00	0.10
		July-Dec	0.20	0.00	0.00	0.00	0.10	0.00	0.03	0.08
	2006	Jan-June	0.05	0.00	0.22	0.00	0.00	0.00	0.00	0.03
		July-Dec	0.10	0.00	0.46	0.08	0.16	0.00	0.10	0.14

Level crossing occurrences

Collision with road vehicle			Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
Counts	2001	Jan-June	8	0	8	1	25	1	9	52
		July-Dec	14	0	9	0	9	0	6	32
	2002	Jan-June	9	0	5	5	18	1	11	49
		July-Dec	12	1	6	0	16	2	6	43
	2003	Jan-June	11	0	4	2	10	2	2	31
		July-Dec	9	0	7	1	27	1	5	50
	2004	Jan-June	2	1	6	1	22	1	4	37
		July-Dec	11	0	5	1	7	2	7	33
	2005	Jan-June	13	0	3	2	11	3	4	36
		July-Dec	7	0	5	4	15	2	2	35
	2006	Jan-June	9	0	3	1	13	3	8	37
		July-Dec	15	2	7	3	14	2	2	45
Normalised Counts per million train km	2001	Jan-June	0.42	0.00	1.02	0.13	1.35	2.17	0.28	0.60
		July-Dec	0.69	0.00	1.05	0.00	0.49	0.00	0.18	0.36
	2002	Jan-June	0.47	0.00	0.60	0.50	0.96	2.17	0.34	0.55
		July-Dec	0.61	10.87	0.67	0.00	0.83	4.35	0.18	0.47
	2003	Jan-June	0.59	0.00	0.49	0.21	0.53	4.17	0.06	0.35
		July-Dec	0.45	0.00	0.87	0.09	1.42	2.00	0.15	0.55
	2004	Jan-June	0.10	1.52	0.71	0.09	1.17	1.82	0.12	0.41
		July-Dec	0.54	0.00	0.57	0.08	0.37	3.64	0.22	0.35
	2005	Jan-June	0.67	0.00	0.34	0.17	0.58	5.17	0.13	0.40
		July-Dec	0.34	0.00	0.57	0.32	0.79	3.45	0.07	0.38
	2006	Jan-June	0.49	0.00	0.34	0.08	0.68	5.28	0.28	0.42
		July-Dec	0.74	2.90	0.81	0.23	0.73	4.37	0.07	0.49

Collision with person

			Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
Counts	2001	Jan-June	1	0	3	0	2	0	1	7
		July-Dec	2	0	0	1	5	0	0	8
	2002	Jan-June	0	0	2	0	3	0	0	5
		July-Dec	1	0	1	2	4	0	0	8
	2003	Jan-June	1	0	1	0	1	0	0	3
		July-Dec	1	0	3	0	3	1	2	10
	2004	Jan-June	0	0	1	0	2	0	1	4
		July-Dec	2	0	1	0	1	0	0	4
	2005	Jan-June	0	0	2	0	3	0	0	5
		July-Dec	0	0	0	0	2	0	0	2
	2006	Jan-June	0	0	1	0	4	0	0	5
		July-Dec	2	0	1	0	1	0	1	5
Normalised Counts per million train km	2001	Jan-June	0.05	0.00	0.38	0.00	0.11	0.00	0.03	0.08
		July-Dec	0.10	0.00	0.00	0.11	0.27	0.00	0.00	0.09
	2002	Jan-June	0.00	0.00	0.24	0.00	0.16	0.00	0.00	0.06
		July-Dec	0.05	0.00	0.11	0.21	0.21	0.00	0.00	0.09
	2003	Jan-June	0.05	0.00	0.12	0.00	0.05	0.00	0.00	0.03
		July-Dec	0.05	0.00	0.37	0.00	0.16	2.00	0.06	0.11
	2004	Jan-June	0.00	0.00	0.12	0.00	0.11	0.00	0.03	0.04
		July-Dec	0.10	0.00	0.11	0.00	0.05	0.00	0.00	0.04
	2005	Jan-June	0.00	0.00	0.23	0.00	0.16	0.00	0.00	0.06
		July-Dec	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.02
	2006	Jan-June	0.00	0.00	0.11	0.00	0.21	0.00	0.00	0.06
		July-Dec	0.10	0.00	0.12	0.00	0.05	0.00	0.03	0.05

Signals Passed at Danger

Driver misjudged, completely missed while running and starting against signal			Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
Counts	2001	Jan-June	85	na	11	12	10	na	48	166
		July-Dec	96	na	15	8	22	na	80	221
	2002	Jan-June	62	na	12	7	23	na	46	150
		July-Dec	64	na	9	10	19	na	51	153
	2003	Jan-June	52	na	7	9	16	na	45	129
		July-Dec	57	na	20	11	16	na	88	192
	2004	Jan-June	63	na	9	21	16	na	128	237
		July-Dec	63	na	12	30	19	na	106	230
	2005	Jan-June	48	na	9	18	19	na	101	195
		July-Dec	62	na	14	25	28	na	111	240
	2006	Jan-June	61	na	12	23	24	na	96	216
		July-Dec	53	na	8	15	24	na	98	198
Signal restored as train approached			Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
Counts	2001	Jan-June	126	na	15	33	51	na	5	230
		July-Dec	131	na	13	32	81	na	9	266
	2002	Jan-June	147	na	18	28	61	na	10	264
		July-Dec	137	na	18	21	75	na	9	260
	2003	Jan-June	126	na	11	64	69	na	12	282
		July-Dec	134	na	17	43	97	na	52	343
	2004	Jan-June	156	na	21	41	77	na	112	407
		July-Dec	161	na	20	34	56	na	112	383
	2005	Jan-June	120	na	21	56	55	na	101	353
		July-Dec	153	na	19	35	47	na	109	363
	2006	Jan-June	151	na	18	41	55	na	107	372
		July-Dec	142	na	2	47	52	na	63	306

Loading irregularity			Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
Counts	2001	Jan-June	133	0	7	10	5	0	32	187
		July-Dec	141	0	5	17	1	0	20	184
	2002	Jan-June	160	1	11	8	5	1	40	226
		July-Dec	180	0	11	10	1	0	43	245
	2003	Jan-June	133	1	9	9	4	0	22	178
		July-Dec	120	0	20	6	3	0	51	200
	2004	Jan-June	133	0	29	13	5	0	59	239
		July-Dec	127	0	19	25	8	0	99	278
	2005	Jan-June	84	2	28	17	18	3	80	232
		July-Dec	69	7	35	37	15	5	94	262
	2006	Jan-June	53	6	38	53	18	3	83	254
		July-Dec	105	6	43	40	22	2	96	314
Normalised Counts per million freight train km	2001	Jan-June	10.60	0.00	2.05	2.23	1.54	0.00	3.28	5.50
		July-Dec	10.82	0.00	1.36	3.62	0.34	0.00	2.09	5.34
	2002	Jan-June	12.91	16.13	3.33	1.31	1.70	2.22	4.29	6.54
		July-Dec	14.22	0.00	3.11	1.58	0.35	0.00	4.30	6.83
	2003	Jan-June	11.29	15.87	3.03	1.49	1.57	0.00	2.43	5.41
		July-Dec	9.49	0.00	6.70	0.89	1.13	0.00	5.33	5.69
	2004	Jan-June	11.00	0.00	8.46	1.83	1.89	0.00	6.05	6.62
		July-Dec	9.58	0.00	4.91	3.29	3.14	0.00	9.47	9.37
	2005	Jan-June	6.67	4.65	6.97	2.30	6.50	5.66	7.79	6.08
		July-Dec	5.10	15.91	9.09	4.65	5.42	9.43	10.12	6.88
	2006	Jan-June	4.55	13.95	8.96	7.48	6.50	5.77	8.75	6.88
		July-Dec	7.88	11.54	11.03	5.09	7.94	4.65	9.63	7.57

Track/Civil infrastructure irregularity

			Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
Counts	2001	Jan-June	108	0	73	23	12	0	171	387
		July-Dec	181	0	76	57	5	0	125	444
	2002	Jan-June	176	1	111	60	55	0	218	621
		July-Dec	242	5	128	118	66	0	266	825
	2003	Jan-June	158	0	155	116	67	0	238	734
		July-Dec	150	2	132	178	72	0	220	754
	2004	Jan-June	165	4	208	182	69	0	237	865
		July-Dec	227	7	161	119	65	0	159	738
	2005	Jan-June	144	5	70	122	36	0	162	539
		July-Dec	159	6	72	86	26	6	190	545
	2006	Jan-June	81	5	95	110	50	7	193	541
		July-Dec	99	12	87	68	48	12	149	475
Normalised Counts per thousand track km	2001	Jan-June	11.26	0.00	14.90	3.19	2.18	0.00	16.71	10.03
		July-Dec	18.87	0.00	15.51	7.90	0.91	0.00	12.21	11.50
	2002	Jan-June	18.34	3.58	22.65	7.14	10.00	0.00	21.30	15.61
		July-Dec	25.17	17.92	26.12	14.05	12.00	0.00	25.99	20.73
	2003	Jan-June	16.19	0.00	31.66	15.16	12.19	0.00	23.26	18.55
		July-Dec	15.39	3.13	26.96	23.26	13.10	0.00	21.50	19.07
	2004	Jan-June	16.31	2.31	42.66	23.79	12.55	0.00	23.16	21.11
		July-Dec	22.40	4.04	33.02	15.56	11.82	0.00	15.54	18.00
	2005	Jan-June	14.20	2.87	14.60	15.86	5.42	0.00	15.83	12.82
		July-Dec	15.87	3.45	15.07	11.18	3.91	7.43	18.57	13.00
	2006	Jan-June	7.47	2.87	19.90	14.01	7.52	10.29	18.86	12.65
		July-Dec	9.12	6.89	18.24	8.66	7.22	17.65	14.56	11.10

Rail Industry Activity Data

Total train kilometres

(millions)		Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
2001	Jan-June	19.200	0.077	7.849	7.801	18.509	0.460	32.420	86.316
	July-Dec	20.190	0.080	8.572	8.698	18.322	0.460	32.470	88.792
2002	Jan-June	19.310	0.088	8.373	9.985	18.661	0.460	32.000	88.877
	July-Dec	19.790	0.092	8.905	9.489	19.243	0.460	33.090	91.069
2003	Jan-June	18.800	0.089	8.120	9.707	18.711	0.480	31.890	87.797
	July-Dec	19.820	0.094	8.002	10.635	19.078	0.500	32.490	90.619
2004	Jan-June	19.090	0.656	8.396	10.881	18.813	0.550	32.620	91.006
	July-Dec	20.250	0.531	8.740	11.917	18.977	0.550	32.090	93.055
2005	Jan-June	19.300	0.560	8.790	11.650	19.090	0.580	31.210	91.180
	July-Dec	20.480	0.560	8.710	12.570	19.090	0.580	29.780	91.770
2006	Jan-June	18.360	0.570	8.890	11.800	19.090	0.570	29.130	88.410
	July-Dec	20.260	0.690	8.630	12.830	19.090	0.460	29.810	91.770

Total passenger train kilometres

(millions)		Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
2001	Jan-June	6.650	0.026	4.441	3.308	15.259	0.010	22.650	52.344
	July-Dec	7.160	0.026	4.892	4.002	15.337	0.010	22.920	54.347
2002	Jan-June	6.920	0.026	5.074	3.876	15.728	0.010	22.670	54.304
	July-Dec	7.130	0.027	5.363	3.153	16.409	0.010	23.080	55.172
2003	Jan-June	7.020	0.026	5.153	3.657	16.160	0.030	22.830	54.876
	July-Dec	7.170	0.025	5.017	3.884	16.426	0.040	22.920	55.482
2004	Jan-June	7.000	0.089	4.970	3.785	16.160	0.050	22.880	54.934
	July-Dec	6.990	0.100	4.867	4.311	16.426	0.050	21.640	54.384
2005	Jan-June	6.700	0.130	4.770	4.260	16.320	0.050	20.940	53.170
	July-Dec	6.950	0.120	4.870	4.620	16.320	0.050	20.490	53.420
2006	Jan-June	6.710	0.140	4.640	4.700	16.320	0.050	19.640	52.200
	July-Dec	6.930	0.170	4.730	4.970	16.320	0.030	20.440	53.590

Total freight train kilometres

(millions)		Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
2001	Jan-June	12.550	0.051	3.408	4.493	3.250	0.450	9.770	33.972
	July-Dec	13.030	0.054	3.680	4.696	2.985	0.450	9.550	34.445
2002	Jan-June	12.390	0.062	3.299	6.109	2.933	0.450	9.330	34.573
	July-Dec	12.660	0.065	3.542	6.336	2.834	0.450	10.010	35.897
2003	Jan-June	11.780	0.063	2.967	6.050	2.550	0.450	9.060	32.920
	July-Dec	12.650	0.069	2.985	6.751	2.652	0.460	9.570	35.137
2004	Jan-June	12.090	0.567	3.426	7.096	2.652	0.500	9.750	36.081
	July-Dec	13.260	0.431	3.873	7.606	2.550	0.500	10.450	29.670
2005	Jan-June	12.600	0.430	4.020	7.390	2.770	0.530	10.270	38.010
	July-Dec	13.530	0.440	3.850	7.950	2.770	0.530	9.290	38.360
2006	Jan-June	11.650	0.430	4.240	7.090	2.770	0.520	9.490	36.190
	July-Dec	13.330	0.520	3.900	7.860	2.770	0.430	9.970	38.170

Total train kilometres

		Qld	NT	SA	WA	Vic	Tas	NSW	Aust.
2001	Jan-June	9,593	279	4,899	7,218	5,498	880	10,234	38,601
	July-Dec	9,593	279	4,899	7,218	5,498	880	10,234	38,601
2002	Jan-June	9,598	279	4,900	8,398	5,498	880	10,234	39,787
	July-Dec	9,614	279	4,900	8,398	5,498	880	10,234	39,803
2003	Jan-June	9,757	640	4,896	7,654	5,498	880	10,234	39,559
	July-Dec	9,746	640	4,896	7,654	5,498	880	10,234	39,548
2004	Jan-June	10,115	1,732	4,876	7,650	5,498	880	10,234	40,985
	July-Dec	10,134	1,732	4,876	7,650	5,498	880	10,234	41,004
2005	Jan-June	10,139	1,732	4,796	7,691	6,648	807	10,234	42,056
	July-Dec	10,017	1,741	4,777	7,691	6,648	807	10,234	41,915
2006	Jan-June	10,838	1,741	4,773	7,849	6,648	680	10,234	42,763
	July-Dec	10,851	1,742	4,770	7,855	6,648	680	10,234	42,780

Explanatory notes

National

Supported by a contribution from the ATSB, the Rail Safety Regulators' Panel completed a national data quality review in December 2006 to identify if there were any differences in how rail safety occurrence data was categorised. The draft findings from the data audit show there are marked differences in the

methods of safety occurrence reporting and data capture between regulators and between accredited rail organisations. Hence, differences in particular safety occurrence categories between some jurisdictions, although normalised, may be the result of different reporting practices.

The data provided EXCLUDE tram and monorail data.

Victoria

1. The Victorian Department of Infrastructure required Australian Rail Organisations to report all incidents from 28 January 2003. Subsequently, the number of incidents increased from Feb 2003 to date.
2. Normalising Data are estimates based on 2004 figures.

New South Wales

1. Pre-2005 data was collected under a different rail safety incident classification scheme and have been recoded to align with ON–S1 (Revision 1 August 2004).
2. *Serious Injury Data:* Data are currently reported under a broader definition of serious injury than ON-S1 and are not comparable with other jurisdictions.
3. *Track and Civil Irregularity:* includes notifications of suspected track defects (for example, as reported by train drivers) and is not limited to the current ON-S1 definition which restricts track defect reports to those where it was confirmed a train accident was likely.
4. *Running Line Collisions* are not formal categories under the current ON–S1. The data are based on a draft definition draft (ON–S1 April 2007).
5. Rise in SPADS (2003–04 due to change in one major operator's detection and reporting processes).
6. *Total Track Kilometres* is based on 2005–06 figure.

Queensland

1. Data for *Loading Irregularity* 2005 and 2006 has been updated to include the new sub-category 'Loose Load Fastening' introduced in the 2001 to 2004 data set.
2. Maintenance issues detected and corrected as part of a normal maintenance programme has not been included in 'Track/Civil Infrastructure Irregularity' as per the current ON–S1 definition.

Northern Territory

1. Numbers include occurrences for the construction period of the Alice Springs – Darwin railway.

Appendix 8: 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 programme
- 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
- 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

Australian Government

Australian Transport Safety Bureau

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Department of Transport and Regional Services

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