Australian Government

Australian Transport Safety Bureau

2006

Annual Review

Safe Transport

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Contents

Executive Director's message

The 2005–06 financial year continued to have a substantial building element for the ATSB as rail investigation further matured and aviation investigators were trained and prepared for 2006–07 implementation of a new aviation safety database with associated project and risk management.

The Bureau is continuing its commitment to training its investigators through the Diploma of Transport Safety Investigation. In 2005–06, ten staff completed the Transport Safety Investigation (TSI) Diploma and a further 25 were progressing through the coursework and mentoring.

In addition to releasing 93 final aviation investigation reports, ten aviation safety research reports and eight grant reports, substantial work occurred on the fifteen-fatality Lockhart River accident investigation, including the issuing of a number of safety recommendations.

In marine, 13 investigation reports were released including a major report into the loss of the Department of Immigration and Multicultural Affairs vessel *Malu Sara* in Torres Strait which resulted in five fatalities. The ATSB also continued an education campaign within the fishing industry on commercial fishing vessel safety.

The ATSB's rail safety investigation team released 11 final reports under the TSI Act. In October 2005 the Queensland Minister of Transport released the final report of the joint Queensland Transport/ATSB investigation into the Tilt Train accident which occurred north of Bundaberg in November 2004, and in February 2006 the Victorian Minister for Transport released the final ATSB report on the Benalla level crossing fatal accident.

The ATSB continued to support Ministers with road safety advice and coordinated input with other jurisdictions. In 2005–06 we released 22 road safety research and statistical publications including an *Indigenous Road Safety Update*. Preparations were also made for a national indigenous road safety forum later in 2006.

There were two areas of particular disappointment in 2005–06. First, there was little progress on a road safety education trial for novice drivers in partnership with NSW and Victorian governments and industry bodies primarily because of finance, risk and governance issues with Victoria.

Second, rail regulators advised the ATSB that even the very basic safety data that had been provided for several years was not accurate or comparable and broader data promised under an April 2005 memorandum of understanding would be significantly delayed. Obtaining quality rail safety data from jurisdictions has been

a goal of the ATSB since 1999. The ATSB provided $80,000 late in 2005–06 to rail regulators to support an audit to seek to resolve data issues and provide a basis to make real progress for the future.

On 1 March 2006 I became the Chairman of the International Transportation Safety Association (ITSA), which includes a dozen of the major independent transport safety investigation bodies from around the world. The annual ITSA meeting was held in Canberra later that month and was a very helpful forum for exchanging information and enabling learning from sharing the good (and less good) experiences of colleagues.

A number of valued staff members retired during the year or prior to publication of this Review. I wish to express my particular appreciation for the long term contribution to marine and rail safety by Captain Kit Filor PSM who has been the ATSB's Deputy Director of Surface Transport Investigation since July 1999 and previously the Inspector of Marine Accidents from January 1991. Kit has made an enormous contribution in Australia and internationally.

I am grateful to the Minister for Transport and Regional Services, the Hon. Warren Truss MP, the Minister for Local Government, Territories and Roads, the Hon. Jim Lloyd, MP, and to the Secretary of the Department of Transport and Regional Services, Mr Mike Taylor for their support throughout the year.

Kym Bills

The ATSB's mission

Objective

Safe transport.

Our mission

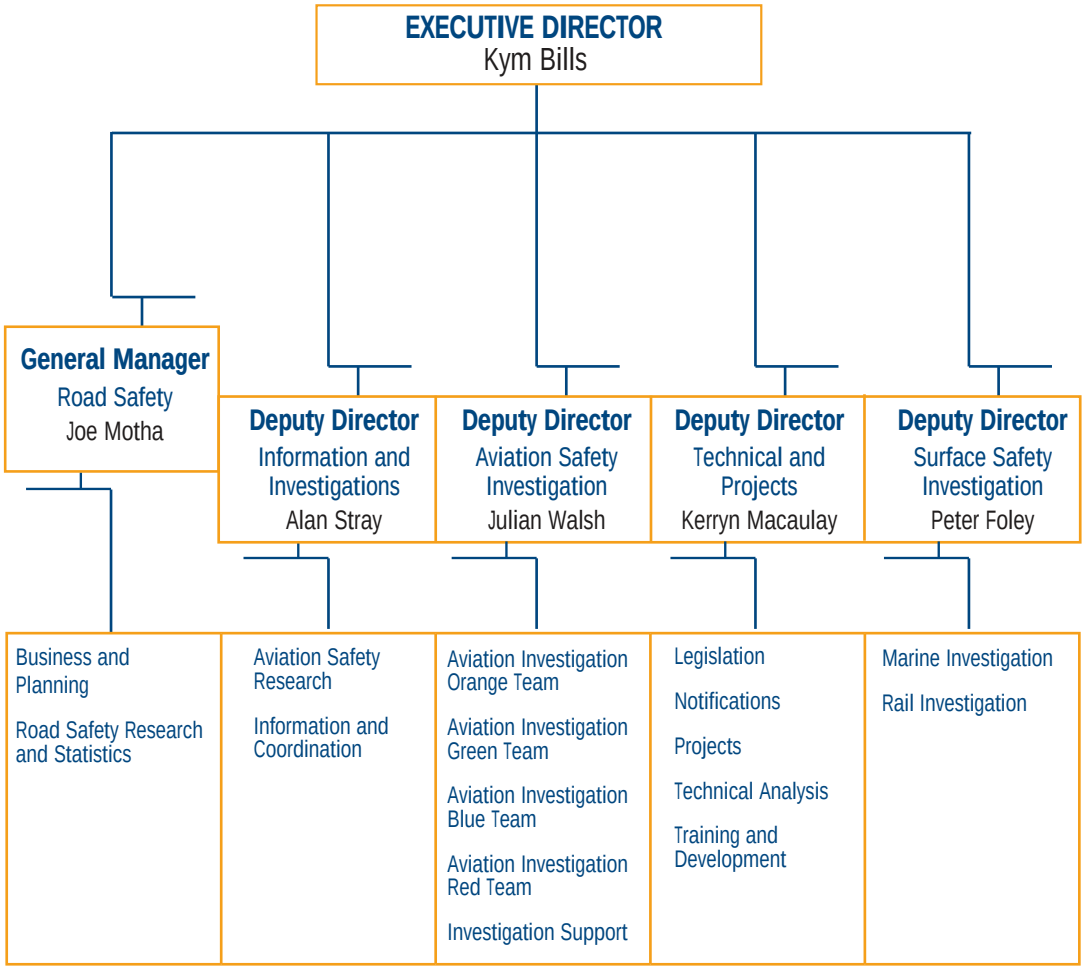
The Australian Transport Safety Bureau contributes to the wellbeing of all Australians by maintaining and improving transport safety and public confidence through excellence in:

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

Government outcome

The ATSB's objective and mission is directed towards the Australian Government outcome for the portfolio of 'Fostering an efficient, sustainable, competitive, safe and secure transport system.'

ATSB organisation chart



Executive profiles

Mr Kym Bills

Kym Bills was appointed Executive Director of the newly formed Australian Transport Safety Bureau on 1 July 1999. Prior to his current position with the ATSB, Mr Bills was First Assistant Secretary of the Department's Maritime Division from 1994. He was also a Director of the Government-owned 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. In 2005 Mr Bills was offline for several months as secretary to the review of airport security and policing led by the Rt Hon Sir John Wheeler.

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 full time. He is a fellow of a number of professional bodies.

Mr Joe Motha

Joe Motha is the General Manager of 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 in its various forms, Mr Motha researched various transport issues including transport safety, accident costing, valuation of life and injury in transport accidents, and transport-related environmental issues. His individual and team-based work has resulted in 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.

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. His public service experience also includes periods with the Australian Taxation Office, the former Inter-State Commission and the former Department of Primary Industry. Mr Motha also has overseas experience in industry, shipping and commerce.

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

Captain Kit Filor, PSM

Kit Filor was the Deputy Director of Surface Safety Investigation responsible for marine and rail safety investigations until mid-August 2006.

After a career at sea on tankers and as master on cross-channel ferries in the UK, Captain Filor and his family emigrated to Australia, where he took up a position as a Commonwealth marine surveyor in Devonport in 1982. After two years, he moved to Canberra to the Ship Operations Section in the Marine Safety Division. He became increasingly involved in marine casualty investigation.

Captain Filor was appointed Inspector of Marine Accidents on 1 January 1991 when the Marine Incident Investigation Unit was formed as an independent investigation body separate from the regulator (which became the Australian Maritime Safety Authority).

Captain Filor was instrumental in formulating the International Maritime Organization (IMO) Code for the Investigation of Marine Casualties and Incidents. He has re-written the IMO Model Course for the Investigation of Marine Accidents and Incidents and is a regular lecturer at the International Maritime Academy in Trieste, Italy and at forums in the Asia-Pacific. He is a founder member of the Marine Accident Investigators' International Forum.

In 1996, he was awarded the Public Service Medal in the Queen's Birthday Honours for services to marine safety. Captain Filor also holds a Diploma of Transport Safety Investigation. He formally retired from the Public Service on 1 September 2006.

Mr Alan Stray

Alan Stray is the 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 and domestic liaison with government and industry and also providing executive assistance to the Executive Director including review and quality assurance of high profile reports. 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. In recent years, he has negotiated, on behalf of the Bureau, memorandums of understanding with government and aviation agencies in France, the Asia-Pacific and the Russian Federation and has conducted training courses for investigators and transport safety professionals in South-East Asia. In January 2005 he was awarded an 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.

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 unit 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 assisted in developing a capacity to investigate rail accidents and incidents and was appointed as the first Team Leader to the Rail Safety Unit. Kerryn completed a three year project to develop and implement Commonwealth multi-modal legislation, which culminated in the introduction of the *Transport Safety Investigation Act 2003* and which enabled the ATSB to investigate accidents and serious incidents on the interstate rail system in addition to the investigation of accidents and incidents in the aviation and marine transport modes. Kerryn also assisted the Bureau to become a Registered Training Organisation and to develop a Diploma of Transport Safety Investigation, which enables the Bureau to more adequately meet its unique training requirements. Kerryn is a trained teacher and holds a Diploma of Transport Safety Investigation. In October 2003, she 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 expected to complete an Executive Masters Degree in Public Administration with the Australian and New Zealand School of Government at the end of 2006.

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 Achievement Medallion for his leadership and ethics in major aviation safety investigations and analysis.

Mr Peter Foley

Peter Foley was appointed Deputy Director of Surface Safety Investigation with effect from 14 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.

Since 2003 Peter has been the Team Leader of the Marine Investigation Unit. He holds professional marine engineering qualifications, degrees in both marine and mechanical engineering, and a graduate diploma in business management.

Modal overviews

Road

Role

The ATSB aims to 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 safety activities and results

During 2005–06 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.

Over the first four years of the National Road Safety Strategy, significant progress was achieved in reducing the national road death rate from the benchmark rate of 9.3 deaths per 100,000 population (based on 1999 figures). However, 2005 was a disappointing year for road safety, with the total number of road deaths increasing by 3.5 per cent. At 30 June 2006, the fatality rate per 100 000 population stood at 8.1, compared with a pro rata rate of 7.0 required to meet the National Road Safety Strategy target of no more than 5.6 deaths per 100 000 people by December 2010.

These results provided the context for a comprehensive review of national road safety progress and priorities that was initiated by the ATSB in early 2006. The Bureau convened two workshops involving jurisdictional representatives and a specially commissioned group of Australian and international experts. The findings of the review will inform the development of the National Road Safety Action Plan for 2007 and 2008 ahead of ATC consideration in October.

The Bureau released four commissioned road safety research reports, one research grant report and 17 statistical publications, including well-publicised reports on community attitudes to road safety and driveway deaths of child pedestrians.

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 the yearly number of road fatalities per 100 000 population by 40 per cent—from 9.3 in 1999 to no more than 5.6 in 2010.

The second and third Action Plans covered calendar years 2003 and 2004, and 2005 and 2006. During the first half of 2006, the ATSB initiated a comprehensive review of national road safety progress and priorities, and commenced work on the development of the National Road Safety Action Plan for 2007 and 2008.

The ATSB and the National Road Safety Strategy Panel monitor and report on progress under the National Strategy. During 2005–06 the ATSB:

- convened and chaired two panel meetings
- coordinated the preparation of a progress report for the ATC
- initiated a comprehensive review of the National Strategy framework and coordinated the development of the Action Plan for 2007 and 2008.

Novice driver education

The ATSB is coordinating the Australian Government contribution to a trial education programme for young drivers in partnership with the NSW and Victorian Governments. 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 project steering committee is developing a ‘best-practice’ programme with the assistance of a specially appointed group of Australian and overseas experts. The main elements of the curriculum have been established, and a professional curriculum developer is being engaged to finalise the programme. It will feature ‘insight’ and other learning processes, facilitated group discussion of safety issues, and an on-road mentoring session.

The trial is expected to involve 14 000 course participants in NSW and Victoria (7 000 in each state), with a similar number of novices selected for a control group. It will be one of the largest and most rigorous studies ever undertaken in the area of post-licence driver education, and is likely to attract considerable overseas interest.

As a result of issues with Victoria, little progress was made in 2005–06. At this stage, the trial is expected to commence in each state in late 2007 after completion of a pilot phase, and it will run over the following 12 months. The Committee is commissioning a specialist organisation to design and conduct a comprehensive evaluation.

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 ATC, 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 Safety Task Force.

Research Coordination Advisory Group (RCAG)

The Research Coordination Advisory Group assists in arranging the 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 once a year in conjunction with the conference.

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. 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 development and implementation 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 twice 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 2005–06 the Committee met in November and March.

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 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

This ongoing Task force, chaired by the National Transport Commission, met on 20 July 2005 to facilitate implementation of the National Heavy Vehicle Safety Strategy, and monitor progress.

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 indigenous issues. Members include representatives from federal, state and territory organisations. Available statistics indicate that the indigenous road death rate may be about three times that of the non-indigenous population.

In 2005–06, the ATSB chaired a meeting of the Working Group by teleconference, in November 2005. The ATSB also commenced preparations for a national Indigenous Road Safety Forum and a meeting of the Working Group, to be held from 23–25 October 2006 in Broome. The ATSB is arranging the event in partnership with the Western Australian Office of Road Safety, in the Department of the Premier and Cabinet.

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, New Zealand and Fiji. 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 2005–06 the ATSB attended meetings in Wellington (November 2005) and Canberra (April 2006).

National road safety statistics

The ATSB disseminates national statistics and reports on persons killed and injured in road crashes. Important publications include the 12 monthly reports which analyse Australia's road crash deaths, an annual summary of road deaths, and an annual publication comparing Australia's road safety outcomes with those in other OECD countries.

ATSB statistical reports for 2005–06

In 2005–06 the ATSB released and published on its website 17 road safety statistics publications, including the 14 road death statistical reports mentioned above. A special-issue statistical report *Driveway deaths of child pedestrians* analysed child pedestrian deaths due to driveway collisions.

Statistical collections updated during 2005–06 include *Road Fatalities Australia: 2005 Statistical Summary* and *International Road Safety Comparisons: The 2004 Report*. Both of these reports are available on the ATSB website.

Road safety research programme

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.

Most 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 in key safety messages. Research managed by the Bureau during 2005–06 included projects on: community attitudes to road safety; the role of human error in crashes; the road safety content of motor vehicle advertisements; the effects of road texture on stopping distances; and indigenous road safety.

The ATSB disseminates commissioned research reports through its website using a 'Consultant's Report' (CR) number sequence. During the year the ATSB released four road safety research reports including a content analysis of Australian motor vehicle advertising, a pilot study of the effects of macrotexture on stopping distance and the two described below.

Community Attitudes Survey (CR 227)

The ATSB's 2005 survey of community attitudes to road safety was the eighteenth in the long running survey programme, the main purposes of which 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 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.

A few of the findings of this wide-ranging survey were:

- 98 per cent community approval for Random Breath Testing and 85 per cent for mandatory carrying of licences
- 83 per cent agreed that speed limits are generally set at reasonable levels
- 77 per cent believed that 50 km/h limits on local residential streets reflect the right speeds for these areas
- strong support for speed enforcement activities to continue at existing levels (47 per cent) or to increase (42 per cent)
- 74 per cent admitting to driving 10 km/h or more over the speed limit on at least some occasions, with over one-quarter believing '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 84 per cent of drivers who were mobile phone users, 47 per cent at least occasionally used a mobile phone to answer (43 per cent) or make (24 per cent) calls, or to read (16 per cent) or send (8 per cent) text messages (SMS) while driving.

Australian Indigenous Road Safety: 2005 Update (CR 225)

The aim of this project was to update the indigenous road safety scoping study that was undertaken in 2003. The work involved a new literature review and consultation process to investigate the current state of indigenous road safety in Australia. The literature review identified data sources and limitations, such as difficulties in defining 'indigenous status' and estimating base populations. The review also highlighted indigenous road safety trends in Australia, focusing specifically on known risk factors. The consulatation process identified initiatives that have been, or are being, undertaken to address indigenous road safety

issues (including community development, licensing, alcohol, restraint wearing, and vehicle purchasing). The findings are fully documented in the report, along with eleven recommendations for further research and other priority activities.

Research grants

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. Appendix 2 lists road safety research grants awarded, and reports published, in 2005–06.

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 2005–06, 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)
- heavy vehicle reform evaluation study (NTC).

Public education

The ATSB continued to produce and distribute a wide range of road safety materials for use by road safety agencies, educational institutions, training organisations and individual members of the community. Topics included: first aid, child safety, drink driving, learner drivers, motorcycle safety, speed, fatigue and vehicle safety.

During 2005–06, the ATSB revised its *Key Facts for New Drivers*, a very popular resource kit designed for both novice drivers and training providers.

The ATSB also worked with Tourism Australia and other state and territory tourism and road safety agencies on the development of a multi-language brochure for tourists. This collaboration jointly produced a *Travel Safely in Australia* map that provides simple road safety tips to visitors to Australia in eight languages including French, German, Korean, Chinese, Italian, Japanese, Spanish and English.

Other road safety contributions

The ATSB provides occasional discretionary grants and sponsorships when funds are available for worthwhile road safety activities that support the Australian Government's road safety policy objectives. During 2005–06, the Bureau contributed to:

- the Australian Road Assessment Program (AusRAP)
- the Amy Gillett Foundation
- the Australasian College of Road Safety National Conference on Pedestrian and Cyclist Safety.

Rail

Role

The ATSB conducts rail safety investigations on the Defined Interstate Rail Network (DIRN) under 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 invitation 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 Base, from data supplied by the various state and territory rail regulators.

Key safety activities and results

In 2005–06, the ATSB initiated nine rail safety investigations on the DIRN under the TSI Act 2003 and released 11 final ATSB investigation reports containing a total of 83 safety recommendations to rail safety stakeholders. The reports related to six derailments, three safeworking irregularities, a shunting fatality, and a collision between a train and a road/rail vehicle. The median completion time for the 11 TSI investigations was 479 days.

During the year the ATSB completed a joint investigation with the Queensland Department of Transport into the derailment of the Queensland Rail Tilt Train north of Bundaberg in November 2004. In October 2005 the Queensland Minister for Transport and Main Roads released the final report.

In February 2006 the Victorian Minister for Transport released the final report of the ATSB investigation into the October 2002 Benalla rail level crossing accident. The ATSB submitted its report to the Victorian Government in September 2004.

The ATSB sought to coordinate the development of a national rail occurrence database in cooperation with State and NT rail regulators. Despite the signing of a memorandum of understanding in April 2005 undertaking to provide broader safety data, in February 2006 the chair of the regulators group advised that even the limited data hitherto provided was likely to be misleading. Data on a number of key safety indicators from 2001 to 2003 were removed from the ATSB website. In June 2006 the ATSB on behalf of the Government contributed $80,000 towards the cost of a full audit of state and NT data with a view to resolving the issues and recommending a solid basis for the future.

Key investigation reports published during 2005–06

Glenalta derailment

At approximately 1006 on 21 November 2004, freight train 7MP5 derailed in the Adelaide Hills near Glenalta. Train 7MP5 consisted of four locomotives leading

72 freight platforms and wagons and was travelling from Melbourne to Adelaide on the Defined Interstate Rail Network (DIRN). The total train length was 1474 m, with approximately 2960 tonnes trailing the locomotives.

The derailment occurred over a 3.7 km section of standard gauge track between Belair and Glenalta, located approximately 23 to 19 kilometres from Adelaide respectively. Except for the standard gauge crossing loop located at Belair where the track is relatively straight with only a slight down gradient, the remainder of the rail corridor to Glenalta is on a steep 1:45 gradient with a series of 190–350 m radius curves. Immediately adjacent to the DIRN is Adelaide's broad gauge metropolitan passenger rail network.

Freight train 7MP5 had negotiated a 240 m radius left hand curve that leads immediately into the Belair crossing loop at 42 km/hr, 8 km/hr below the posted speed limit. Access to the crossing loop was via a right hand turn-out, however the straight ahead main line route had been selected over the facing points. The point of derailment occurred at the turn-out, where markings indicated that a wheel (probably from a bogie about 140 metres behind the driver's position) had ridden over the check-rail allowing the opposite wheel to travel up the wrong side of the Vee.

Freight train 7MP5 continued for approximately 3.7 km, progressively derailing other bogies. At Glenalta the derailing bogies struck a concrete pedestrian crossing panel and the bitumen road edge of a level crossing causing the freight wagons to jack-knife. The impact at the level crossing alerted the locomotive drivers who immediately applied braking, finally stopping the locomotives and four platforms of the first 5-unit wagon, approximately 200 m beyond the Glenalta station. The brakes on the remaining wagons applied automatically due to loss of brake air pressure. However, the gradient and momentum prevented the wagons from stopping before colliding (jack-knifing) with the wagons coupled immediately behind the locomotives. A total of 10 platforms and wagons were derailed, with five obstructing the passenger track and four coming to rest down an embankment into private residential properties.

No person was injured, but the potential for injury was high. The accident occurred adjacent to Adelaide's operational metropolitan rail network with derailed vehicles causing significant damage to publicly accessible rail infrastructure such as pedestrian crossings, a passenger platform and a road level crossing. In addition, had metropolitan passenger trains been in the vicinity at the time of derailment, the risk of potential injury would have increased significantly.

The investigation determined that the most likely direct cause for the derailment of 7MP5 was significant wheel unloading as a wheel made contact with a check-rail at the entrance to the Belair crossing loop.

The investigation determined that a number of factors combined to contribute to this particular derailment. Any one factor in its own right is unlikely to have resulted in a derailment, but the four factors acting together greatly increased the likelihood of derailment.

The ATSB made a number of recommendations relating to:

- procedures for train loading, marshalling and handling
- functionality of software management tools
- review of rollingstock design and performance acceptance requirements
- review of civil infrastructure design and maintenance requirements
- review of documented standards
- implementation and monitoring of safety actions.

Murarrie Signal Passed At Danger (SPAD)

At 1931:55 on 28 June 2004 train Y245 passed signal MR5 displaying a stop aspect at Murarrie. Train Y245 was a freight train that had departed from the Brisbane port of Fisherman Islands 18 minutes earlier and was en route to northern Queensland. The train was crewed by a Maryborough-based driver who had signed on duty at Fisherman Islands at 1845 after having 'rested' in the traincrew quarters since 0645 that morning.

The driver had passed a caution signal on the dual gauge line before seeing signal MR5 about 200 metres away displaying a stop aspect. At that point, the driver initiated a brake application. At 1931:55 the train subsequently passed this signal (at 35kph) and at 1931:57 a SPAD alarm sounded at the Mayne Control Centre. At 1932:12 train Y245 stopped 81.8 metres past signal MR5. One second later at 1932:13, a train controller radioed an emergency call to Y245 to stop.

During this time another train, train 6835, bound for Fisherman Islands was crossing from the dual gauge line to the suburban line. Train 6835 cleared the crossover at 1932:37, 42 seconds after train Y245 passed signal MR5 at stop. There were no other signals between MR5 and the crossover from the dual gauge line to the suburban line.

The investigation determined that the train controller controlling this section of track at the Mayne Control Centre was absent from his workstation at the time train Y245 passed signal MR5 at stop. This absence contributed to the 16-second delay in the train control centre broadcasting the emergency stop order. An adjacent train controller had to acknowledge and deal with the SPAD alarm.

The investigation determined that train Y245 was being driven as if all signals controlling its path were displaying proceed aspects. It was determined that the

train was being driven in this manner due to the driver's attention being diverted from the primary task of driving the train to an incidental task, stated to be the retrieval of a radio hand-set that had fallen to the cab floor.

Four months after the incident, the driver of train Y245 died on 26 October 2004 following a severe coronary episode. This and his previous involvement in SPAD incidents (where loss of concentration was cited as a causal factor) led to the examination of the driver's state of health. This in turn led to an examination of the medical standards applicable to Queensland Rail (QR) drivers. The investigation found that, while it was unlikely that partial incapacitation was a factor in the SPAD at signal MR5, the possibility could not be ruled out.

The investigation also found the previous internal QR reports (those provided) into the driver's other SPAD incidents focused on the active factors in lieu of latent or systemic factors. Additionally once returned to full driving duties, there was little evidence that the driver was subject to any additional monitoring or supervision.

Safety actions recommended as a result of the investigation include :

- placing a greater emphasis on the identification of systemic and latent issues during the internal investigation process
- greater monitoring and evaluation by the operator of employees who have been involved in SPADs
- a review of practices and procedures at the Mayne Control Centre
- a review of QR medical standards.

Koolyanobbing and Booraan derailments

At 1500 on 30 January 2005, Pacific National freight train 6MP4 derailed at Koolyanobbing, approximately 200 kilometres west of Kalgoorlie, Western Australia. Freight train 6MP4 consisted of two locomotives leading 48 freight wagons, was 4 108 tonnes in total train weight and 1 685 metres in length. A total of 23 wagons (a train length of 803 metres) derailed, with the main wreckage located over a turn-out and a road level crossing.

On the same day at 1605, Pacific National freight train 6SP5 derailed near Booraan, approximately 360 kilometres west of Kalgoorlie. Freight train 6SP5 consisted of two locomotives leading 46 freight wagons, was 3 739 tonnes in total train weight and 1 740 metres in length. A total of 19 wagons (a train length of 605 metres) derailed, with the main wreckage located to the east of a road level crossing.

Both freight trains had been travelling to Perth on the Defined Interstate Rail Network (DIRN), 6MP4 having started its journey in Melbourne and 6SP5 in Sydney. Both derailments occurred on a very hot day on the section of DIRN managed by WestNet Rail.

No serious injuries were sustained due to either derailment.

The investigation determined that the most probable cause for each derailment was track misalignments in the form of track buckles on a very hot day. The investigation also determined that a number of factors combined to contribute to each derailment.

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

Investigations in progress at 30 June 2006

As at 30 June 2006 the ATSB had eight rail accident investigations ongoing. The Bureau is also assisting the NSW Office of Transport Safety Investigation with an investigation under NSW legislation. At 30 June none of the TSI Act investigations were more than one year old. The TSI Act investigations include:

- a fatal collision at an active level crossing in Horsham, Victoria, on 11 August 2005
- a minor collision between a suburban passenger train and freight protruding from a passing train at Eden Hills, South Australia, on 30 September 2005
- the derailment of a freight train at Yerong Creek, NSW, on 4 January 2006
- the failure of an axle on the power car of an interstate passenger train at Harden, NSW, on 9 February 2006. The ATSB released an interim report regarding the accident on 15 March 2006
- a safeworking irregularity incident 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 fatal collision at a passive level crossing near Lismore, Victoria, on 25 May 2006
- a derailment at Benalla, Victoria, on 2 June 2006
- a fatal collision at an active level crossing near Albury, NSW, on 5 June 2006.

ATSB rail safety recommendations released and safety actions taken during 2005–06

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.

During 2005–06 the ATSB issued 83 rail safety recommendations. The recommendations broadly relate to:

- medical standards for safety critical workers
- track 'fitness for purpose', inspection and maintenance
- safeworking procedures, particularly communication
- rolling stock performance
- loading and marshalling of wagons
- shunting procedures

These systemic investigation reports have provided information to the rail industry to improve rail safety and in particular led to the upgrading of health standard requirements for rail safety critical workers.

Rail safety recommendations were also issued under State legislation. In October 2005 the Queensland Minister for Transport and Main Roads issued six safety recommendations with the final report of the joint Queensland Transport/ATSB investigation into the November 2004 Tilt Train accident north of Bundaberg. In February 2006 the Victorian government released the ATSB final report on the October 2002 Benalla Rail level crossing accident including 18 safety recommendations.

The Tilt Train investigation recommendations included on the vigilance systems, advance warning systems, risks of a co-driver vacating the co-driver position, emergency communications and train evacuation. The Benalla investigation recommendations related to level crossing safety particularly in relation to B-double trucks.

Participation in rail safety forums

During 2005–06, the ATSB participated in several rail safety forums. Participation helps the Bureau communicate the safety message, maintain its industry contacts, and stay informed on relevant policy and technical issues. These forums included:

- The Ausrail Plus 2005 Conference in Sydney in November 2005
- The Rail Safety Conference 2006 in Sydney in February 2006

- The Railway Communications Forum 2006 in Sydney in March 2006

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

As requested by the SCOT Rail Group, the ATSB sought regulator views on the development of a confidential national safety reporting scheme. Regulators and some industry representatives did not support such a scheme.

Training for rail industry personnel

During 2005–06 four rail industry staff, representing track access providers and rail accreditation authorities, completed an ATSB human factors training course in Canberra, three in November 2005 and one in May 2006.

Marine

Role

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 contributing to accidents and incidents.

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, incidents and potential 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 incident into the marine database.

Every investigation results 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 sends copies of each report to Australia's maritime community and educational institutions, to marine administrations in Australia and overseas, and to overseas maritime colleges and universities. All reports are available for download from the ATSB's website.

Key safety activities and results

While the ATSB was funded for approximately 10 new marine investigations in 2005–06 the marine investigation unit initiated 11 new investigations. The Bureau released 13 marine investigation reports, two of these in a shortened report format. The released reports had a median completion time of 234 days, 138 days less than in 2004–05. The reports included a total of 40 safety recommendations to marine safety stakeholders. At 30 June 2006 the ATSB continued with ten marine accident investigations.

Two of the reports released in 2005–06 dealt with multiple incidents. Thus the 13 reports released contain findings relating to 15 separate incidents. The

15 incidents comprised: two groundings, two collisions involving ships and small vessels, a collision involving two ships, the loss of a small vessel which resulted in five fatalities, an engine room fire, two incidents involving machinery damage which left the ship disabled at sea, two serious injuries and two fatalities involving crew members on board bulk carriers, a man overboard fatality and a lifeboat accident that resulted in two fatalities.

In addition to the safety investigation activities, the marine investigation unit continued with 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 ships and fishing vessels. To date, the Bureau has held meetings with fishermen in several ports in Queensland, the Northern Territory, New South Wales and Western Australia.

All 13 ATSB marine reports released in 2005–06 are listed at Appendix 3, the 10 ongoing marine investigations are listed at Appendix 5 and the 40 2005–06 ATSB marine recommendations are listed in Appendix 4.

Key investigation reports published during 2005–06

Lowlands Grace – lifeboat accident

On 6 October 2004, *Lowlands Grace* arrived at the anchorage 11.7 miles north of Hunt Point, Port Hedland, in Western Australia.

At 1500 local time on 7 October, the ship's crew mustered at the port lifeboat station for a lifeboat drill. The port lifeboat was lowered to the boat deck and four of the crew were selected to act as the boat's crew under the command of the third mate.

After the crew had entered the lifeboat and were seated with their seat belts fastened, the third mate operated the remote davit winch brake cable inside the lifeboat to start lowering the boat. When the boat had descended about two to three metres, the third mate released the brake release cable and the boat came to a stop with a jerk. At this point the crew on deck heard a 'bang' and then saw the lifeboat's stern start to fall, now detached from its fall.

The boat continued to swing forward, and rotate around the forward hook, until it had described an arc of between 200 and 220 degrees. The forward hook then released the forward fall and the lifeboat, still upside down, fell to the sea approximately 16 metres below. All five of the crew in the lifeboat were injured in the fall with two dying from their injuries.

The report concludes that the momentary shock load, when the third mate halted the lowering, caused the after hook's wasted keel stays to fail thereby

releasing the stern of the lifeboat. The failure of the foredeck while the lifeboat was swinging led to the end of the operating cable for the forward hook being damaged which in turn contributed to the subsequent failure of the forward hook.

The ship's planned maintenance procedures with respect to the on-load release systems fitted to the lifeboats were deficient as was the survey regime.

The report also concludes that the suspension rings fitted to the lifeboat davit falls were incorrectly sized and subjected the forward hook to greatly increased opening forces while the lifeboat was swinging and the design of the on-load release system is also implicated in the failure of the forward hook as the system of locking the hook became particularly prone to spontaneous release when the operating cable was damaged.

Malu Sara – foundered

On the afternoon of 14 October 2005, the six metre Department of Immigration and Multicultural Affairs (DIMA) vessel, *Malu Sara,* was returning from Saibai Island, at the northern extreme of Torres Strait, to its home community on Badu Island. There were five people on board: two male DIMA crew, two adult females and a four year old girl. The weather for the passage south was less than ideal with moderate south-easterly winds and seas, but more critically, a sea mist or haze which reduced visibility to about four miles.

By mid afternoon, *Malu Sara* was lost. During the succeeding hours, DIMA staff and the Water Police on Thursday Island attempted to guide *Malu Sara* to safety. By the early hours of 15 October, it appeared that *Malu Sara* was safely anchored in a sheltered position. However, at 0215, the vessel's skipper reported that the boat was taking water and was sinking.

Despite an extensive search over six days no trace of the vessel or four of its five occupants was found. One body was recovered by Indonesian fishermen about 50 miles west of *Malu Sara's* last known position.

The investigation found that a number of factors were directly causal in the tragic loss of *Malu Sara*. In essence, the vessel was not seaworthy.

The investigation revealed causal factors relating to the design and construction of the vessel including that it did not meet basic safety standards with respect to reserve buoyancy, stability or cockpit drainage. The lack of some critical equipment, most notably a navigation chart, and the skipper's lack of training in some critical aspects of the vessel's equipment were also factors. It was also likely that the skipper's level of fatigue on the day contributed to his disorientation and some poor decision making.

Marine safety actions linked to ATSB marine reports and recommendations

Significant safety actions have been taken by various parties as a result of the loss of *Malu Sara*. DIMA immediately suspended their marine operations in Torres Strait and have since conducted an extensive review of their operations in the region. The review has led to changes in their procurement and contract management procedures and a change in the management structure of their north Queensland operations.

The Australian Maritime Safety Authority has reviewed and strengthened the safety requirements for all Commonwealth vessels. They will also be implementing a Torres Strait Maritime Safety Strategy, together with Maritime Safety Queensland, aimed at strengthening the maritime safety culture in the region.

Standards Australia have undertaken a review of AS 1799 (Small Pleasure Boats Code) with a view to making the Code more consistent with the standards for commercial vessels. Maritime Safety Queensland has conducted a review of the ships in current Queensland survey built by the same builder.

The manufacturers of the on-load release mechanism fitted to the lifeboats on board *Lowlands Grace* have advised the ATSB that they are reviewing the mechanism's design.

Protection and Indemnity Clubs also issued a number of safety bulletins based on ATSB report recommendations.

Participation in marine safety forums

Marine Accident Investigators' International Forum (MAIIF)

The Marine Accident Investigators' International Forum (MAIIF) was established in Canada in 1992. The fourteenth meeting of MAIIF was held in Port Vila, Vanuatu, from 29 August to 2 September 2005. Delegates representing 29 countries attended the meeting.

Delegates presented 20 papers referring to research or case studies during the five days and these formed the basis of discussion for the various agenda items. The meeting focused on, but was not confined to, four major issues:

- The future direction of MAIIF
- The Code for the investigation of marine casualties and incidents
- Fishing vessel safety
- Accidents involving pilotage.

Other issues discussed included fatigue, fires on board ships, groundings, voyage data recordings, work at the ILO (International Labour Organization) and explosions involving petroleum, chemicals and reduced iron.

Flag State Implementation (FSI) Sub-Committee

The ATSB participated at the fourteenth meeting of the International Maritime Organization (IMO) Flag State Implementation Sub-Committee in London from 5–15 June 2006. Seventy two administrations and 25 organisations with observer status attended.

The Director of the IMO Maritime Safety Division opened the meeting. His opening statement covered a diverse range of issues from the maritime needs of Africa, fires on board cruise ships, the poor (mandatory) reporting under the Prevention on Marine Pollution Convention (MARPOL) and the voluntary audit of administrations.

Following the opening statement, the Sub-Committee elected Mrs T Krilic from Croatia as its new Chair as the previous chairman and vice-chairman had stood down.

The primary issue for the ATSB was that of the proposed International Code for the Investigation of Marine Casualties and Incidents. The aim of the working party chaired by Australia was to pursue the incorporation of a mandatory code into the International Convention for the Safety of Life at Sea (SOLAS).

The ATSB also had a significant interest in the agenda item on the Analysis of Marine Accident Reports, as two ATSB officers are on the panel of expert analysts.

Maritime conferences, training and presentations

From 30 January to 2 February 2006 two members of the marine investigation unit attended the Pacific 2006 International Maritime Conference in Sydney. One of the representatives presented a paper at this conference titled ‘Beyond TNT Altrans, Reflections on 20 years of Marine Casualty Investigation in Australia’.

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
- the MAIIF meeting in Vanuatu
- a number of Advanced Marine Pilot training programmes
- Chinese fishing and marine delegates
- the Japanese Marine Accident Inquiry Agency
- the European Maritime Safety Agency
- the Secretariat of the Pacific Community.

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 *Transport Safety Investigation Act 2003* 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 co-operatively with organisations, such as the Civil Aviation Safety Authority (CASA), 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 safety activities and results

In 2005–06, the ATSB received approximately 12 500 aviation notifications of which 7 471 were categorised as reportable occurences, 122 aviation accidents

and 7 349 aviation incidents, and entered into the database. The Bureau commenced 84 new occurrence investigations and continued its commitment to investigator training through the Diploma of Transport Safety Investigation.

During 2005–06, the ATSB released 93 aviation investigation and technical reports with a median time from occurrence date to report release of 379 days, up from 247 days last year. This result, which exceeded the target of 365 days reflects the significant diversion of resources for training new investigators, for the development of the Safety Investigation Information Management System (SIIMS) and for the Lockhart River investigation. There will also be substantial SIIMS training and Lockhart River resource demands in 2006–07 after which improvements in timeliness are expected. Uncompleted investigation reports dropped slightly from 86 at the end of 2004–05 to 81 at 30 June 2006. The number of investigations more than 12 months old increased from 14 to 18.

Significant aviation safety investigation reports released during 2005–06 included:

VH-YKL Robinson R44 helicopter fatal accident north-west of Kununurra, WA

VH-CTT Piper PA-34-200 fatal accident at Bankstown aerodrome, NSW

VH-OHA Robinson R22 helicopter fatal accident near Camden, NSW

VH-LST Aero Commander 500-S fatal accident north-west of Hobart, Tas.

VH-JWX Robinson R44 helicopter fatal accident near Roma, Qld

HB-LRW Cessna 421C fatal accident at El Questro, WA

VH-TNP Piper PA-31T fatal accident near Benalla, Vic.

VH-CSH Bell 206B fatal helicopter accident near Dunedoo, NSW

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

VH-KJD Beechcraft B300 serious aircraft incident near Theodore, Qld

VH-OAO Piper PA-31-350 fatal aircraft accident near Mount Hotham, Vic.

At the beginning of 2005 –06 the ATSB continued to investigate 81 occurrences and technical safety matters including:

VH-TFU Fairchild Metro 23 fatal accident near Lockhart River, Qld

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

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

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

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

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

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

VH-MNI Beech B58 fatal accident near McArthur River Mine, NT

VH-ZNZ Lancair 360 at Bankstown Aerodrome, NSW

VH-BST Lancair 320 near Archerfield aerodrome, Qld

VH-LQH Beech King Air 90 fatal Toowoomba accident - reopened investigation, and

a major technical study of a range of failures in high-powered reciprocating engines.

A full list of ATSB aviation investigations underway at the beginning of 2006–07 is at Appendix 5.

Occurrence investigations

	Financial year									
Occurrence type	96–97	97–98	98–99	99–00	00–01	01–02	02–03	03–04	04–05	05–06[p]
Accident	253	244	227	203	214	179	155	152	158	122
Serious incident	0	0	1	12	8	7	10	9	27	24
Incident	3707	3985	5683	5253	5880	5455	5829	4394	5776	7325
Total notified occurrences	3960	4229	5911	5468	6102	5641	5994	4555	5961	7471

P – Provisional data only

Note: Occurrences 'notified' are those assessed by the ATSB to meet accident and incident definitions for the purpose of entry to the OASIS database. The legal basis for this assessment changed from 1 July 2003.

Occurrences reported since 1996–97 under Part 2A of the *Air Navigation Act 1920* and since 1 July 2003 under the TSI Act 2003 increased from 3960 reported in 1996–97 to 7471 occurrences reported to the ATSB in 2005–06 (see table 20), an increase of 18 per cent on the 2000–01 peak of 6102. An increase may be the result of an improving safety reporting culture rather than any worsening of safety. The decline in 1999–00 was partly the result of the avgas fuel contamination that grounded thousands of small aircraft in late 1999 and early 2000. The decline from 2000–01 to 2002–03 was due in part to a decline in tourism and aviation activity as a result of the effects of the terrorist attacks in the US on September 2001 and in Bali, Indonesia on 12 October 2002; the cessation of Ansett's operations; and the impact of the SARS virus. The increases from 2004–05 are likely the result of greater industry awareness of reporting requirements under the 2003 TSI Act and Regulations.

Key aviation safety investigation reports published in 2005–06

Final report on the fatal Robinson R22 helicopter accident near Camden, NSW

On 20 June 2003, a Robinson R22 helicopter, registered VH-OHA, crashed near Camden, NSW, during a training flight from Bankstown airport. The instructor and student pilot onboard were fatally injured. Examination of the accident site and helicopter wreckage confirmed that one main rotor blade had failed in-flight. Examination of the helicopter and its systems did not reveal any other abnormality that would have contributed to the loss of the main rotor blade.

An examination of the main rotor blade in the ATSB laboratories revealed that it had failed as a result of fatigue crack growth in the blade root fitting. The fatigue crack initiated as a result of localised pitting corrosion in the counterbore of the inboard bolthole. The examination also revealed that while the fatigue failure was in a similar position to two previous main rotor blade failure accidents in Australia, in OHA's case, there was an area of adhesive disbonding between the main rotor blade skin and blade root fitting.

The investigation found no evidence to support suggestions that the fatigue crack was the result of under-recording of time in service. The material failure analysis found that the disbonding present on the failed main rotor blade was also present in a number of other main rotor blades that were examined. As a result, the ATSB issued a safety recommendation to the US Federal Aviation Administration (FAA) and to the Robinson Helicopter Company, seeking that they conduct further testing on main rotor blade root fittings to evaluate the extent of adhesive disbonding in the blade root fitting. This examination was conducted on a total of 51 main rotor blades that had between zero and 2,200 hours time in service. Results of the examination revealed that adhesive disbonding between the spar and root fitting was present in all blades and that the extent of the disbonding was variable.

On 18 March 2004, the FAA issued an Emergency Airworthiness Directive (AD) to operators and owners of R22 helicopters worldwide, which revised the calendar life of the main rotor blades. On 22 March 2004, CASA issued amendment 10 to AD/R22/31 in response to the FAA AD.

The manufacturer has issued a safety letter and a service bulletin relating to revised retirement lives for main rotor blades, and has introduced a redesigned main rotor blade into service. The manufacturer indicated that it intends to publish safety alerts and notices on its internet website as an additional means of bringing safety related information to the notice of owners, operators and maintenance organisations.

The R22 maintenance manual has also been amended by the manufacturer as a result of this investigation. The main rotor blade tracking and balancing section now contains information that alerts maintenance personnel to the fact that a main rotor blade vibration may be the result of a developing crack.

Safety action taken by CASA as a result of this accident was to amend an existing airworthiness directive to take into account the findings from the examination of the blade and to introduce additional amendments to the directive when updated information became available from the manufacturer. On 20 December 2005, CASA issued Australian Unique Airworthiness Directive AD/R22/53, mandating the retirement of all A016-2 rotor blades by 1 April 2006.

The European Aviation Safety Agency issued an airworthiness directive on 5 July 2005 mandating compliance with the Robinson service bulletin.

Fatal Piper Cheyenne accident near Benalla, Vic.

On 7 February 2006, the ATSB issued its final report into the July 2004 crash of a Piper PA- 31T Cheyenne aircraft, registered VH-TNP, in heavily timbered hilly terrain about 35 km south-east of Benalla aerodrome in Victoria. The aircraft, which was on a private Instrument Flight Rules flight from Bankstown to Benalla, was destroyed on impact and the pilot and five passengers received fatal injuries. The aircraft did not follow the usual course taken by the pilot, but diverted south along the east coast past Jervis Bay before tracking directly to Benalla. The aircraft was fitted with a Global Positioning System (GPS) navigation system and the flight was being monitored by Air Traffic Control until it left radar coverage near Benalla. After tracking south of Jervis Bay, the pilot requested and was cleared to track direct to BLAED, the northern waypoint of the Benalla GPS approach. During that part of the flight, the aircraft diverged between 3.5 and 4 degrees left of track, with the pilot apparently unaware of the tracking error.

During the flight, the air traffic control system's Route Adherence Monitoring (RAM) system triggered alerts to indicate that the aircraft was deviating from its cleared route, but controllers did not question the pilot about the aircraft's position. The investigation found that the instructions to controllers relating to RAM alerts were ambiguous and that the sector controller involved assumed that the pilot was intentionally tracking to the southern waypoint and so did not warn him that he was off-course.

The ATSB's final investigation report documents substantial safety action by Airservices Australia. Those actions sought to ensure that in the future, air traffic controllers confirm the intentions of the pilots of aircraft that trigger 'RAM' alerts. The ATSB has also urged pilots not to rely on a single source of navigation information and to pay careful attention to the use of automated flight systems.

However, the ATSB was unable to determine why the pilot descended the aircraft into terrain when nearly 30 km off-course. Neither mis-selection of the aircraft's

navigation and autoflight systems, nor a receiver fault could satisfactorily explain the flight path and descent. The report noted that the amended track did not pass over any ground-based navigation aids, making cross-referencing of the GPS position difficult. Adverse weather and cloud obscured terrain that could have alerted the pilot to the aircraft's erroneous position. Impact damage and the subsequent fire had destroyed the aircraft's avionics and instruments.

In an attempt to glean some information from the navigation receiver, the ATSB sent the damaged GPS data card to the Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile (BEA) in France for examination in their laboratory. Unfortunately, damage to the card meant that no useful data could be extracted.

Tests carried out in a special GPS simulator, with a similar GPS receiver to that in the accident aircraft, found that the GPS satellite signals would have provided the receiver with accurate navigation data and that electronic interference was unlikely to produce a sustained GPS error. Although the information stored in the data card of the aircraft's GPS receiver was not current, the investigation found that the integrity of the information transfer process to the data card was faultless and that the Benalla Runway 26L GPS approach coordinates had not been changed from when the procedure was first published.

In light of technological advances, the ATSB has recommended that the Civil Aviation Safety Authority review the requirements for the carriage of on-board recorders that could assist future investigations to establish the factors associated with significant accidents, improve safety and assist relatives with closure.

In March 2006, after a review of a number of 'Controlled Flight Into Terrain' (CFIT) accidents in recent years, the ATSB issued a related recommendation to CASA to review the requirements for Terrain Awareness Warning Systems (TAWS) equipment for certain Australian turbine-powered aircraft below 5 700 kg and also for certain turbine powered helicopters. CASA accepted the recommendation on 31 May 2006 and the ATSB is monitoring CASA's follow up actions. (See page 46 for further details)

ATSB final report on the Mount Hotham fatal accident

On 11 May 2006, the ATSB released its Final Investigation Report on the fatal aviation accident near Mount Hotham airport on 8 July 2005 that claimed the lives of the pilot and two passengers on board. The accident involved a Piper PA31-350 Chieftain aircraft, registered VH-OAO, which was being operated on a charter flight.

While taxiing at Essendon, the pilot requested and was granted an amended airways clearance to Wangaratta, due to the adverse weather conditions at Mount Hotham. The aircraft departed Essendon at 1629 Eastern Standard Time. At 1647 the pilot changed his destination to Mount Hotham. At 1648,

the pilot contacted Flightwatch and requested that the operator telephone the Mount Hotham Airport and advise an anticipated arrival time of 1719. The airport manager, who was also an accredited meteorological observer, told the Flightwatch operator that in the existing weather conditions the aircraft would be unable to land.

At 1714, the pilot reported to air traffic control that the aircraft was overhead Mount Hotham and requested a change of flight category from visual flight rules (VFR) to instrument flight rules (IFR) in order to conduct a Runway 29 Area Navigation, Global Navigation Satellite System (RWY 29 RNAV GNSS) approach via the initial approach fix HOTEA.

At 1725, the pilot broadcast on the Mount Hotham Mandatory Broadcast Zone frequency that the aircraft was on final approach for runway 29 and requested that the runway lights be switched on. No further transmissions were received from the aircraft. The Chieftain was subsequently found 3 days later on a tree covered ridge, approximately 5 km south-east of the aerodrome at an elevation of 4 600 ft above mean sea level. The aircraft had broken into several large sections and an intense post-impact fire had consumed most of the cabin.

The ATSB reported that extreme weather and unsafe pilot attitudes and practices led to this 'Controlled Flight Into Terrain' (CFIT) accident. The weather conditions included sleet and snow showers, and were conducive to visual illusions associated with a 'flat light'[1] phenomenon. The aircraft was not equipped for flight in icing conditions. The ATSB, in its final report, was unable to determine why the pilot, after acknowledging that the weather was unsuitable, persisted with his attempt to land at Mt Hotham in accordance with neither the VFR nor proposed IFR procedures. However, it is possible that overconfidence as a result of previously avoiding accidents despite risk-taking and commercial and/or family pressures, influenced the pilot's decision making.

Civil Aviation Safety Authority (CASA) Field Office staff had held concerns about aspects of the operator's performance for some time. As a result, CASA staff continued to monitor the operator. However, formal surveillance of the operator in the 2 years prior to the accident had not identified any significant operational issues that would have warranted CASA taking action against the operator. In that situation, the safety of the flight was reliant on the safety culture of the operator, and ultimately depended on the operational decision-making of the pilot in command.

As a result of this investigation, the ATSB recommended that CASA publish educational material to promote greater awareness of the flat light phenomenon for pilots operating in susceptible areas. On 9 June and 21 August 2006 CASA published two articles in *Flight Safety Australia* which promoted awareness of

1 Flat light', also known as sector or partial white-out, is an optical illusion caused by the diffused lighting that occurs under a cloudy sky, particularly when the ground is snow covered. In this accident, daylight was also fading at the time of the accident.

the flat light phenomenon. The ATSB also recommended that CASA review its surveillance methods, which may include cooperation with Airservices Australia, for the detection of patterns of unsafe practices and non-compliance with regulatory requirements. CASA advised the ATSB that it recently completed a review of its surveillance methods, particularly in the General Aviation environment. This has resulted in some changes to planning methodology, some modifications to surveillance activities and increased use of risk based methodology. Procedures are also being established to improve the communication channels between CASA and Airservices Australia, to facilitate the provision between the organisations of relevant information. The ATSB has classified the responses to these two recommendations as closed-accepted.

The ATSB hopes that pilots with local knowledge that habitually take unnecessary risks will learn from this accident and not pay the ultimate price paid by the pilot and passengers of this aircraft.

ATSB aviation safety recommendations released and safety actions taken during 2005–06

The ATSB strongly prefers to encourage positive safety actions and to report those actions 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 2005–06, the ATSB issued 18 recommendations and four safety advisory notices. Also, forty five aviation occurrence investigations resulted in 129 separately identified safety actions by industry and regulators and a further 13 by the ATSB.

Aviation safety recommendations 2005–06

The ATSB issued 18 aviation recommendations and four safety advisory notices during 2005–06 relating to important issues including:

- Implementation of a formal periodic inspection routine based on BF Goodrich Service Letter (SL) 1714 of all main landing gear wheels that have undergone a hub bushing repair.
- The need for CASA to alert Kawasaki BK 117 B-2 helicopter operators to a discrepancy with respect to the procedures for adjusting the collective pitch settings in the maintenance manual.
- The continuing airworthiness of 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 to alert operators and review).

- M7 Aerospace Pty Ltd reviewing and amending its Fairchild SA-227 series maintenance manual to ensure that notes on operational tests with regard to stabiliser movement versus trim switch position are referenced in all relevant sections of the manual.
- The adequacy of current legislation and regulations to assess the safety benefits of the fitment of autopilots to all Australian registered aircraft undertaking scheduled air transport operations with a view to fitment of autopilots.
- The need to review and clarify the legal requirements concerning the qualifications for two-crew (pilot) operation during the conduct of instrument approaches in air transport operations.
- The carriage of on-board recording devices in Australian registered aircraft as a consequence of technological developments.
- Development of proposals to amend the provisions of Part III B of the *Civil Aviation Act 1988* to take account of the need to enable approved maintenance organisations to replay in-flight Cockpit Voice Recorder data for legitimate maintenance and testing purposes.
- Review of maintenance requirements for cockpit voice recording systems and flight data recording systems against international standards such as EUROCAE ED-112 and ICAO Annex 6 with the aim of improving their reliability and increasing the availability of data to investigators.
- The review of the Manual of Air Traffic Services (MATS) 4.5.2.2 to ensure that separation between aircraft, established by the use of visual observation of aircraft position and projected flight paths, is more clearly defined and consistently applied.
- The need to ensure that controllers are aware of the importance of the separation assurance provisions of MATS 4.1.1.4, particularly in the application of procedural separation.
- 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 FAR 91.223 with the aim of reducing the potential for Controlled Flight Into Terrain (CFIT) accidents (also for turbine-powered helicopters certified to carry six or more passenger seats).
- Surveillance methods for the detection of patterns of unsafe practices and non compliance with regulatory requirements, which may involve cooperation between CASA and Airservices.
- Publishing of educational material to promote greater awareness of the flat light phenomenon for pilots operating in susceptible areas.

A detailed list of the ATSB's aviation recommendations is at Appendix 4.

Full details of aviation safety recommendations and responses are listed on the ATSB website at www.atsb.gov.au.

Details of key 2005–06 ATSB air safety recommendations included:

VH-TFU Fairchild Metro 23 fatal accident near Lockhart River on 7 May 2004 – Qualifications of two-pilot crew (R20060002) and the fitment of autopilots (R20060003)

R20060002 issued on 24 January 2006

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority review and clarify the legal requirements concerning the qualifications for two-crew (pilot) operations during the conduct of instrument approaches in air transport operations. The review should assess the safety benefit arising from ensuring that when an instrument approach is conducted in an aircraft required to be operated by a two-person flight crew, both flight crew members are qualified to conduct the type of approach being carried out.

CASA response summary 6 April 2006 Closed-Accepted

The Civil Aviation Safety Authority advised the ATSB on 3 April 2006 that it has amended Civil Aviation Order 40.2.1, Instrument Ratings, to clarify the requirement for all instrument rating holders to hold an endorsement for any navigation aid being used to navigate an aircraft (including instrument approaches of which they are a crew member. The amendment does, however, provide an exemption for co-pilot crew members who do not hold an endorsement but have received equivalent training and demonstrated proficiency in the use of the navigation aid while participating in an operator's cyclic training and proficiency programme. The amendment became effective on 25 March 2006.

ATSB note

The wording of Civil Aviation Order 40.2.1 paragraph 13.3.4 prior to the amendment of 25 March 2006:

For the purposes of regulation 5.16, it is a condition of each instrument rating that the holder of the rating must use only the types of navigation aids or procedures endorsed in the holder's personal log book when exercising the authority given by the rating.

The amended wording of CAO 40.2.1 paragraph 13.3.4 is:

For regulation 5.16, it is a condition of each instrument rating that the holder may act as pilot in command or co-pilot of an aircraft being flown under the IFR only if each navigation aid or procedure that is used to navigate the aircraft during flight has been endorsed in his or her personal log book.

R20060003 issued on 24 January 2006

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority review the adequacy of current legislation and regulations:

- to assess the safety benefit that could be achieved from the fitment of a serviceable autopilot to all aircraft currently on the Australian civil aircraft register, engaged on scheduled air transport operations with a view to ensuring that all aircraft placed on the Australian civil aircraft register after a specified date and intended to be engaged on scheduled air transport operations are equipped with a serviceable autopilot.

Civil Aviation Safety Authority response summary 16 August 2006 Monitor

CASA has conducted a preliminary review of Civil Aviation Order (CAO) 20.18 and examined the history of changes as they relate to fitment of autopilot equipment. The relevant current provisions in CAO 20.18 have existed since about 1960 and are consistent with current provisions of the US Federal Aviation Administration (FAA) and the European Joint Aviation Authorities (JAA).

A review of CASA data to identify the 'population' of RPT Operators and aircraft that are affected revealed a total of 52 aircraft, 80 per cent of which are the Metro SA227. Some feedback indicates that the standard autopilot approved for this aircraft type is widely known within the aviation industry to be unreliable old technology and expensive. This may account for the fact that few Metro SA227 aircraft are fitted with autopilots. All Australian aircraft operating in high capacity regular public transport operations have approved autopilots fitted.

CASA will consult industry through the Standards Consultative Committee (SCC) before deriving a conclusion on the matter.

Furthermore, CASA has extracted relevant Crew Resource Management/training and Human Factors material out of draft Civil Aviation Safety Regulation Part 121A and is developing a Civil Aviation Advisory Publication. This material is currently with CASA senior managers for comment

‘Controlled Flight Into Terrain’ (CFIT) accidents, including the fatal accident involving Piper Cheyenne, VH-TNP near Benalla on 28 July 2004 (R20060008) — Terrain Awareness Warning Systems

R20060008 issued on 9 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 kgs, against international standards such as ICAO Annex 6 and regulations such as FAR 91.223, with the aim of reducing the potential for 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 summary *31 May 2006* *Monitor*

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 kgs, 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; and
- the lead time required prior to fitment.

The ATSB has classified the CASA response status as Monitor.

2005–06 action on aviation recommendations from 2004–05

Follow-up action on retread tyres (R20040093)

Australian Transport Safety Bureau

On 23 December 2004 the Australian Transport Safety Bureau issued safety recommendation R20040093. That recommendation stated:

The Australian Transport Safety Bureau recommends that Australian operators of Boeing 737-800 series aircraft review the practice of fitting retread tyres of R4 (fourth retread) or above, until their serviceability limitations can be identified.

In response to the safety recommendation, the ATSB was advised that the following actions were taken:

- The operator of VH-VOH limited their in-service retread level to R3 on the 737-800 series fleet.
- The other operator with 737-800 series aircraft performed a visual inspection of all in-service tyres and instigated a more stringent inspection of the tyres by maintenance and flight crews as part of the pre-flight checks.
- The retread facility limited the maximum retread level for the H44.5x16.5-21 28 PR tyre to R3.

Aircraft manufacturer

The aircraft manufacturer noted a worldwide increase in 737 tyre failures, particularly in the 737NG (600, 700, 800, 900 and BBJ series). As a result, they conducted a study of the failures and released a Flight Team Digest in January 2005. Although their study found that no particular root cause for the failures was apparent, they were able to make some recommendations to improve the operation of the tyres. These recommendations included: Inflate tires to the high end of the allowable ranges shown in AMM [Aircraft Maintenance Manual] 12-15-51; Check inflation pressures frequently, remove leaking tyres immediately; retreaders to perform the more complete bead-to-bead Non Destructive Testing (NDT) checks (holography/shearography) on tyres.

On 28 June 2005, the Boeing Commercial Airplane Company released Service Letter 737-SL-32-128-A 'Tire Retreading Recommendations' to 737-600/-700/-800/-900/BBJ operators. This Service Letter provided guidance on retreading Non Destructive Inspection (NDI), retread limits and frequent and thorough pressure checks.

Operator of VH-VOH

On 1 June 2005, the aircraft operator released a General Engineering Notice (GEN) regarding tyre pressure checking and discrepancy recording. This GEN was associated with a change to the daily Task Card and provided more detailed guidance on the pressure maintenance of the tyres in the fleet and actions to be taken when a tyre pressure is found to be low.

Tyre retread facility

On 9 September 2005, the Australian tyre retread facility included in their CASA approved Process Specification, bead-to-bead shearography inspections on all 737NG main gear tyres of retread level R3, and above.

United States Federal Aviation Administration

On 9 March 2006, the United States Federal Aviation Administration advised the Australian Transport Safety Bureau that they are currently reviewing and revising

Technical Standard Order TSO-C62 and Advisory Circular AC 145-4. The changes to AC 145-4 are to include the recommendation for a reliability program and the increased use of shearography at increasing retread levels.

2005–06 action on 2003–04 recommendations on alcohol and drug use in aviation

Aviation safety recommendations 20040039 and 20040040 from the ATSB's VH-MAR Hamilton Island accident investigation were issued in 2003–04 and resulted in a May 2005 DOTARS/CASA Report on the Safety Benefits of Introducing Drug and Alcohol Testing for Safety-Sensitive Personnel in the Aviation Industry.

In May 2006 the Minister accepted this report and approved its recommendations to introduce drug and alcohol testing for safety sensitive personnel in aviation. The accepted recommendations include a provision to expand the ATSB's TSI Act powers to enable medical examinations and drug and alcohol testing to occur after accidents and incidents. The necessary legislative amendments are currently in progress.

Aviation safety actions 2005–06

In 2005–06 the ATSB's aviation safety stakeholders undertook 129 separately identified safety actions linked to 45 ATSB aviation investigations in addition to actions on recommendations. The ATSB also undertook 13 separate safety actions relating to these aviation investigations in addition to recommendation action.

These stakeholder safety actions identified by occurrence report number include:

- An operator issued a Maintenance Alert for PA-31 and PA-42 series aircraft on lubrication of the main and nose landing gear down-lock actuating mechanisms. CASA issued an equivalent All Operators Letter to operators of PA-31 and PA-42 plus Airworthiness Bulletin (AWB) 32-005, applicable to PA-31 and PA-42 series aircraft, recommending inspection and lubrication of the down-lock latch and pivot bolt in accordance with Part 1 of Piper Service Letter 755 (200503694).
- An aircraft operator advised that it would align all documents defining the aircraft marshalling process at airports to comply with the International Civil Aviation Organization standard and issue relevant instructions to staff to ensure compliance. The Civil Aviation Safety Authority advised that it would ensure that the term 'reverse bay' is discontinued and that all operators use standard marshalling signals in accordance with CAO 20.3 (200500788).
- CASA issued an aircraft maintenance direction to an operator to conduct a formal fuel indication system inspection and calibration check and to

develop maintenance control manual procedures for recording fuel related maintenance activities. The operator introduced new fuel indication and maintenance control procedures (200504768).

- On the issue of incorrect fitment of tail rotor control pedals, CASA conducted a survey of Bell 47 helicopter operators and requested an immediate inspection by all operators for compliance with AD/Bell 47/69. CASA subsequently issued AD/Bell 47/69 Amdt 1, that became effective on 30 September 2004 requiring all variants of the Bell Helicopter 47 series to be inspected for compliance within 10 hours after the effective date of the directive and every 12 months thereafter (200401217).
- The manufacturer of DASH 8 aircraft issued In-Service Activity Report (ISAR) 2004-07-2760 to raise operator awareness of the roll spoiler actuator failure mechanism. Transport Canada, the relevant certification authority investigated the issues associated with actuator failure and agreed with the manufacturer's advice that no additional action was warranted. The ATSB issued Safety Advisory Notice SAN20050012 notifying operators of DASH 8 aircraft fitted with part number A44700 –007 and/or A44700 –009 roll spoiler actuator components, of the increased risk of the cracking and/or rupture failure of the actuator cylinder section as the actuators accumulate service (200303861).
- An operator reviewed their procedures and flight proficiency checks on operations in icing conditions. The operator introduced a comprehensive new simulator programme in September 2005,which simulates an engine failure at high altitude in severe icing conditions. The manufacturer visited the Australian operators and informed them about winter operations in icing (200402415).
- A helicopter manufacturer advised that it was converting to new 406 MHz capable Emergency Locator Transmitters (ELTs) and would crimp the antenna connector for the new installation. The style of crimping used by the helicopter manufacturer has been tested and could typically withstand in excess of 100 lb tension. The helicopter manufacturer believed that those actions would prevent failures of the type that occurred to the ELT installation in the occurrence helicopter (200403351).

Other safety actions are separately identified in reports 200304546, 200500302, 200304589, 200403825, 200402215, 200403201, 200401904, 200500222,200602399, 200400610, 200402819, 200305448, 200501392, 200402839, 200501628, 200500145, 200501905, 200403006, 200500285, 200502400, 200405118, 200500382, 200505028, 200500167, 200504077, 200500355, 200506650, 200600633, 200600396, 200405511, 200405064, 200600160.

Highlighted safety actions

VH-VQA Boeing 717-200 High capacity air transport engine failure 22km SSE Melbourne Aerodrome — Safety actions on High Pressure Turbine Blades (200402948)

Engine manufacturer safety actions

Following this and several other similar failures worldwide, the engine manufacturer re-designed the Stage-1 High Pressure Turbine (HPT 1) blades and prioritised the removal of the remaining affected blades from the world fleet. Significant design changes were made to the HPT 1, Life Improvement Package (LIP) blade's internal cooling passage fillet radius to reduce the stress concentrations in that area. The vapour aluminised coating is also no longer applied to the blade's internal passages.

The manufacturer instigated a blade replacement program with the highest cycle usage engines in the world fleet, totalling 94 units, to be returned to the factory for blade replacement first, with the remaining engines being completed in highest cycle order.

The probability of a double in flight shut-down (DIFSD) event occurring, where an aircraft was fitted with two BR700-715 engines with time in service approximating the time at which the HPT 1 blade problems were occurring, was analysed. That analysis identified that the possibility of a DIFSD existed. To mitigate the immediate risk, the manufacturer required that operators with aircraft with both engines affected, remove the higher cycle count engine and replace it with an unaffected engine.

The manufacturer issued BR 700 Propulsion System, Service Bulletin (SB), SB-BR700-72-900361. That SB introduced an on-wing, ultrasonic inspection of the HPT 1 LIP blades for in-service engines.

Operator safety actions

Once the mode of failure for the engine was known, the operator independently checked their fleet to determine if any of their aircraft had both engines with time in service approximating the time at which the failures were occurring in the world fleet. One engine change was carried out following that check.

9M-MRG Boeing 777 flight from Perth to Kuala Lumpur 36 km s Donga (IFR). Safety actions on the Standby Air data and Altitude Reference Unit (SAARU) and Air Data Inertial Reference Unit (ADIRU).

Aircraft manufacturer

As a result of the occurrence, the aircraft manufacturer issued a Multi Operators Message on 9 August 2005, recommending to all B777 operators that the aircraft should not be flown with an unserviceable SAARU.

On 22 November 2005, Service Bulletin 777-340138 was issued advising operators that a new version of the ADIRU software was available, OPS-08, and could be installed as an alternative method of compliance to AD 2005-18-51.

The manufacturer advised the ATSB, that it will conduct an audit of the ADIRU to validate the design and review all issues raised as a result of the investigation.

Aircraft operator

The aircraft operator has issued circulars to its B777 crews advising them to check the ADIRU for any accelerometer faults prior to despatch. If an accelerometer has failed, then the crew are to ensure that the SAARU is serviceable, and that the autopilot is not engaged below 500 ft. The operator has also advised the ATSB that they will include several exercises on jet upset recovery and unreliable airspeed scenarios in recurrent B777 simulator training.

The operator has further advised that they have complied with Flight Crew Operations Manual bulletins issued by the manufacturer and have installed OPS-08 in accordance with B777 Service Bulletin 777-34A0138.

Federal Aviation Administration (FAA)

On 29 August 2005, the US FAA issued Emergency Airworthiness Directive AD 2005-18-51, requiring operators to revert to ADIRU OPS-03, in accordance with Boeing Alert Service Bulletin 777-34A0137, dated 26 August 2005. The Limitations section of the B777 Flight Manual was to be amended with copies of B777 Operational Manual Bulletins, which alerted flight crews to the potential of erroneous heading information possible with OPS-03.

The investigation is continuing.

VH-TNP Piper Cheyenne fatal aviation accident 35 km south east of Benalla aerodrome - Airservices safety actions into the air traffic system aspects of the accident (200402797)

Recommendation R20060004

The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority (CASA), review the requirements for the carriage of on-board recording devices in Australian registered aircraft as a consequence of technological developments.

ATSB safety action

As a result of this occurrence, the Australian Transport Safety Bureau again emphasises to all operators, the importance of constant awareness to avoid controlled flight into terrain (CFIT). The United States Flight Safety Foundation has produced tools for use in aviation to reduce the risk of controlled flight into terrain. Although primarily directed at commercial operations, this information

is useful guidance to all pilots operating in an Instrument Flight Rules (IFR) environment. These products are available from the Flight Safety Foundation at the following website: http://flightsafety.org/cfit2.html

Airservices Australia safety action

Airservices Australia conducted an internal investigation into the air traffic system aspects of the Benalla accident. The resulting investigation report made recommendations that related to The Australian Advanced Air Traffic System (TAAATS) alerts refresher training, human factors awareness training, enhancements to TAAATS software, and greater clarity of instructions related to aircraft track deviation and route adherence monitoring (RAM) alerts. On 31 March 2005, Airservices Australia issued National Instruction NI 06/2005 Aircraft Track Deviations and RAM Alerts, to all air traffic service units. Included in that instruction were amendments to the Manual of Air Traffic Services (MATS) that clarified controllers' actions in respect of aircraft track deviations.

An amendment to the MATS stated:

> When ATC becomes aware of an aircraft diversion that has not been previously approved or advised, subsequent tracking intentions must be obtained from the pilot prior to modifying the FDR route.

During August 2005, Airservices Australia reviewed the recommendations and assessed the various stages of implementation of the recommendations.

The first recommendation related to TAAATS alerts refresher training and specified the development of refresher training modules for controllers that addressed the management of TAAATS alerts and alarms. Airservices advised that as of 1 October 2005, the majority of controllers had completed the refresher training module.

A recommendation for human factors awareness training resulted in the development of an information bulletin that was circulated amongst controllers in August 2005. That bulletin contained information relating to confirmation and expectation biases and used actual occurrences as examples to illustrate their application to ATS.

Development and implementation of a specific graphic tool that readily displays on a controller's air situation display an aircraft's cleared route as recorded in the flight data record was also recommended. The software for that enhancement was undergoing development with implementation scheduled for early 2006.

The other recommendations related to aircraft deviations from planned or cleared routes. The review found that the Manual of Air Traffic Services (MATS) should be changed to provide improved definition of air traffic control requirements, in accordance with those recommendations, by removing any ambiguity in the controller's instructions relating to RAM alerts and clarification of controller responsibilities to general radar surveillance and aircraft deviations. Subsequent to the issue of National Instruction NI 06/2005, MATS was amended on 9 June 2005.

A recommendation that specific phraseology be developed for pilots commencing a Global Positioning System Non-Precision Approach (GPS NPA) was considered and, after consultation with CASA, was rejected.

Safety promotion

Along with CASA, 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 2005–06)
- contributing articles to aviation journals
- maintaining safety programmes such as the Aviation Self Reporting Scheme (ASRS).

Presentations at 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, investigators spoke to:

- aero clubs and flying training schools
- aerial agriculture conferences
- airport fire fighters
- ambulance services
- aviation safety investigators conferences
- Australian International Pilots Association
- Australian Federation of Air Pilots
- Australian Defence Force Academy
- Australian Owners and Pilots Association
- Bureau of Meteorology
- flight safety and other industry forums

- Guild of Air Pilots and Air Navigators
- helicopter operators and conferences
- Indonesian National Transportation Safety Committee course
- Royal Australian Navy
- Singapore Civil Aviation Authority
- tertiary institutions.

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

In 2005–06, ATSB aviation and technical staff attended:

- 5th Asia Pacific Congress of Aerospace Medicine, Gold Coast, September 2005
- ICAO-IATA Line Operations Safety Audits and Treat and Error Management conference, Kuala Lumpur, September 2005
- ICAO/NTSB Regional Accident Investigation workshop, Bangkok, September 2005
- International Society of Air Safety Investigators 2005 seminar, Fort Worth Texas, September 2005
- Safeskies Conference, Canberra, September 2005
- International Transportation Safety Association, Canberra, March 2006 — 5 ATSB presentations
- Directors General of Civil Aviation meeting, Montreal, Canada, March 2006 — 1 ATSB presentation
- ICAO Flight Recorder Symposium, Ottawa Canada, April 2006 — 1 ATSB presentation
- Australia/New Zealand Society of Air Safety Investigators Conference, Melbourne, May 2006 — 2 ATSB presentations
- CASA Pilot Safety workshops, six 2005–06 workshops, — 2 ATSB presentations at each workshop.

Ministerial directions and discontinued investigations

During 2005–06 there were no Ministerial directions and the ATSB discontinued three preliminary investigation and downgraded the incidents to a category five occurrence. These incidents involved:

- A SAAB SF-340B aircraft registered VH-TRX departed Dubbo, NSW encountered ice and turbulence at FL156 so they descended the aircraft to FL130. Given earlier serious icing incidents in this aircraft type, the ATSB commenced a category 4 investigation to determine if safety was compromised. Following a comprehensive assessment of available information, no safety issues were found to have been involved and appropriate procedures were followed by the crew (200504540).
- The DHC-8-315 was conducting a scheduled regular public transport passenger flight from Williamtown, NSW to Brisbane, QLD, under the instrument flight rules. During cruise at FL250, the crew noticed that the co-pilot's Air Speed Indicator (ASI) had failed. A descent to FL130 was initiated and at that flight level, the co-pilot's ASI slowly returned to normal. The flight continued to Brisbane. This investigation was discontinued and investigation of this occurrence was incorporated into a similar occurrence investigation (200403238).
- During the cruise stage of a flight near Tumut, NSW, the pilot in command noticed a loss of right engine manifold pressure and the oil pressure dropped to zero. The pilot shut down the right engine and declared a MAYDAY. The aircraft subsequently landed at Tumut. The investigation of this occurrence (200402291) has been discontinued. The failure mechanisms of this and other engines are being reviewed as part of a broader engine study (200305443).

Coronial Inquests

During 2005–06 the ATSB briefed coroners on investigations into eight different fatal aviation accidents.

During the week commencing Monday 25 July 2005, the ATSB provided evidence to the Queensland Coronial hearing at Mackay into the fatal VH-HTD Emergency Medical Services helicopter accident at Cape Hillsborough, Queensland in October 2003. One investigator gave evidence at the coronial inquest and two investigators gave evidence by telephone. In November 2005 three ATSB investigators provided evidence to the coronial inquest in Brisbane into the fatal VH-LQH accident near Toowoomba in November 2001. In December 2005 three ATSB investigators briefed the NSW Coroner at Newcastle and Wagga Wagga on

the fatal VH-NXC accident near Jerilderie, NSW, and three ATSB investigators gave evidence to the Queensland coronial inquest into the VH-MAR fatal accident at Hamilton Island which occurred in September 2002.

Also in December 2005, two investigators provided a briefing to the Tasmanian State Coroner on the circumstances surrounding the fatal accident involving an Aero-Commander 500S (Shrike) aircraft, registered VH-LST, near Launceston on 19 February 2004. The coroner incorporated the ATSB's report into the 'Record of Investigation into Death' and findings brought down on 19 December 2005 without holding an inquest.

On Monday 5 June 2006, four ATSB investigators briefed the NSW Deputy State Coroner on two accidents involving VH-BKM near Tenterfield, and VH-ZXZ at Narrandera.

International cooperation

As aviation is an international endeavour, aircraft accidents and incidents, regardless of location, are of direct interest to the global industry.

International Civil Aviation Organization (ICAO) standards and recommended practices in Annex 13 to the Chicago Convention apply to international and Australian civil aviation operations.

Unless a difference is filed with ICAO, investigations of aircraft accidents and serious incidents must comply with Annex 13 to the Convention on International Civil Aviation – the convention that gave birth to ICAO. Australia has incorporated the provisions of Annex 13 into the *Transport Safety Investigation Act 2003*, and filed several differences.

The ATSB is a corporate member of the international Flight Safety Foundation (FSF), one of the world's most influential private aviation safety organisations. The FSF has developed accident prevention programmes with the International Civil Aviation Organization, the International Air Transport Association and the US Federal Aviation Administration.

The ATSB is also a member of the International Society of Air Safety Investigators (ISASI) and the International Transportation Safety Association (ITSA). The Executive Director of the ATSB became Chairman of ITSA from March 2006 and ITSA held its meeting at the ATSB's Canberra headquarters later in March 2006.

The ATSB's technical analysis expertise in replay and analysis of flight data recorders and cockpit voice recorders assisted Indonesian and New Zealand investigations.

The Indonesian investigations involved two runway excursions, a runway overrun and a runway collapse and navigation system problems while the New Zealand investigation involved a fatal accident.

The ATSB provided a one-week training course for Transport Safety Investigators in Jakarta in June 2006.

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
Aviation, Space and Environmental Medicine, Vol. 76, no.6	Pilot Behaviour in the Face of Adverse Weather: A New Look at an Old Problem
Human Factors and Aerospace Safety, 5(2):109-135.	A context for error: using conversation analysis to represent and analyse recorded voice data
Helicopter Safety July–August 2005 Flight Safety Foundation, Alexandria, VA.	Spatial disorientation Cited in EMS Loss-of-Control Accident
Helicopter Safety September–October 2005 Flight Safety Foundation, Alexandria, VA.	Investigation of R44 Accident Focuses on Weight and Balance
Flight Safety Digest, 24 (10): 1-17. October. Flight Safety Foundation, Alexandria, VA.	Analysis of crew conversations provides insights for accident investigation.

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 program 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 aviation safety research reports in 2005–06.

- *Interpretation of measured alcohol levels in fatal aviation accident victims*
- *MBZ Report: An examination of airspace-related occurrences in Mandatory Broadcast Zones*
- *Dangerous Distraction: An examination of accidents and incidents involving pilot distraction in Australia between 1997 and 2004*
- *Analysis of fatality trends involving civil aviation aircraft in Australian airspace between 1990 and 2005*
- *Wire-strike accidents in general aviation: Data analysis 1994 to 2004*
- *Destination weather assurance: Risks associated with the Australian operational rules for weather alternate minima*
- *Depressurisation Accidents and Incidents Involving Australian Civil Aircraft — 1 January 1975 to 31 March 2006*
- *Communication in context: A conversation analysis tool for examining recorded voice data in investigations of aviation occurrences*
- *A layman's introduction to human factors in aircraft accident and incident investigation*
- *Accidents and incidents involving alcohol and drugs in Australian civil aviation — 1 January 1975 to 31 March 2006*

Examples of ATSB aviation research reports include:

Fatal accidents and fatalities involving civil aviation aircraft in Australian airspace between 1990 and 2005

The research paper examined fatal accidents and fatalities involving civil aviation aircraft in Australian airspace between 1990 and 2005. The purpose of the paper was to provide accurate data to industry and the public by identifying key trends and characteristics. Specifically, the objectives of the paper were to (1)

identify trends for fatal accidents and fatalities from 1990 to 2005, (2) examine the number of fatal accidents from 1990 to 2005 by pilot licence type, type of operation, level of proficiency, and aircraft weight, and (3) examine the number of fatalities from 1990 to 2005 by pilot licence type, type of operation, level of proficiency and aircraft weight. The ATSB aviation database was searched to identify all fatal accidents involving civil aviation aircraft operating in Australian airspace from 1 January 1990 to 31 December 2005. It was found that the number of reported fatal accidents and fatalities declined significantly between 1990 and 2005, with the highest number of fatal accidents and fatalities in 1990. The number of fatal accidents and fatalities reported in 2005 was below the annual average calculated for the 16-year period. Fatal accidents associated with both professional and non-professional pilots declined significantly between 1990 and 2005. In relation to type of operation, the findings show that both commerical and non-commerical operations experienced a significant decrease in the number of fatal accidents between 1990 and 2005. For commercial operations, 2004 was the lowest for the 16-year period for both fatal accidents and fatalities. An elevated fatality rate for 2005 was primarily because of a fatal accident at Lockhart River in Queensland, which involved 15 fatalities. The fatal accident and fatality rates for commercial and non-commercial operations in Australian airspace have been very low.

Weather conditions at destinations

Civil aviation safety is based on managing the safety of knowledge of things that can affect the safety of flight. One of these sets of knowledge is confidence that the facilities at the destination will be good enough to give confidence of a safe landing. Weather at the destination can affect the safety of a landing. Detailed historical records are kept of weather observations and weather forecasts. This study has analysed the level of statistical confidence that has been achieved with destination weather forecasts under various conditions. It has also looked at other mechanisms that are or could be used to reduce the risk in addition to the existing methods.

In addition to the aviation safety research program, the ATSB managed a program of grants to promote innovative worthwhile research into aviation safety; expand and consolidate the aviation safety knowledge base; and increase the pool of effective aviation safety researchers by encouraging established engineers, human factors practitioners, recent postgraduates, and commercial and community-based organisations to undertake research in the aviation safety field. Funding under the grants scheme was based on a competitive tendering process. The list of successful grants is listed in Appendix 2.

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 2005–06 output of 70 technical reports and projects included 13 stand-alone investigations, specialist support studies and technical support to international agencies. The 2005–06 work included:

- recovery and analysis of video and audio from equipment on-board a Cessna U206B parachuting aircraft (VH-UYB) involved in an accident after take-off from Willowbank, Qld on 2 January 2006
- investigation, analysis and safety recommendations relating to the fracture of a main landing gear wheel from a Boeing 727 freight aircraft
- analysis and graphical presentation of the radar track information from a Piper PA-31T aircraft (VH-TNP) that collided with terrain near Benalla, Vic. on 28 July 2004
- independent review of gyrocopter hub bar failures for the Charleville, Qld Coroner
- assisting the Indonesian NTSC with their investigations of three incidents/accidents involving regular passenger transport aircraft.

During 2005–06, the capability of the section was boosted by the successful recruitment of an additional materials failure specialist and a graduate materials engineer. The section's active industry involvement included the presentation of working papers to the ICAO Flight Recorder Panel meeting and the 2006 ANZSASI annual conference and seminar.

At the commencement of the 2006–07 financial year, 68 technical investigations including 20 stand-alone investigations were underway across the section, including:

- full metallurgical failure analysis of a number of cracked axles from the NSW XPT passenger train following a derailment near Harden, NSW on 9 February 2006
- study of electrical discharge damage found within the failed engine of a Cessna 208 float plane (VH-KLP) that force-landed on Lake Burbury, TAS on 5 February 2006
- examination of Fight Data Recorder (FDR) and Cockpit Voice Recorder (CVR) information from Boeing 737 aircraft (VH-VBI and VH-VBC) that sustained pressurisation difficulties during regular passenger transport flights on 9 November and 2 December 2005
- assisting the Recreational Aviation Association with their investigation of two fatal micro-light aircraft accidents involving structural failures.

In addition, assistance to international parties is ongoing, as is the input to technical development forums and governing bodies.

Notifications and confidential reporting

Notifications

The notifications team is primarily responsible for receipting and categorizing 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 Category 5 occurrence details into the aviation database.

The ATSB receives approximately 12 500 aviation notifications of which 7 471 were categorised and entered into the database. Many of the remaining reports are identified as duplicates, having been received from other sources and matched accordingly, while others are assessed as not satisfying the definitional requirements of a transport safety matter.

The aviation database is the primary application used to record information relating to investigations and statistical data for Category 1 to 5 aviation occurrences. The notifications team is responsible for the management of:

- system security and integrity
- training for all users
- active participation in the continual development, enhancement and redesign of the 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 reported aviation safety notifications regardless of categorization status.

Confidential reporting

Confidential reporting involves managing a marine confidential reporting scheme and the voluntary reporting Aviation Self Reporting Scheme (ASRS). For inquiries about the confidential marine reporting scheme (CMRS) or the aviation self reporting scheme, contact the program manager toll-free on 1800 020505, or via email to cmrs@atsb.gov.au or asrs@atsb.gov.au respectively.

From 1 July 2005 to 30 June 2006, the ATSB processed 13 reports through the Confidential Marine Reporting Scheme. During the same period, the Bureau processed seven reports through the Aviation Self Reporting Scheme and a further three reports were received but were assessed as ineligible.

Legislation

The ATSB's legislation responsibilities involve implementing and amending legislation critical to the Bureau's operations, including the *Transport Safety Investigation Act 2003* and the development of supporting memoranda of understanding with ATSB stakeholders.

Transport Safety Investigation Act

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

ATSB staff members receive training on the interpretation and application of the TSI Act. Staff members are also required to consult the ATSB's Policy and Procedures Manual 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.

As at 30 June 2006, the TSI Act legislation applies to all the uncompleted ATSB investigations as they all commenced after the TSI Act came into effect on 1 July 2003.

Aviation confidential reporting legislation

In January 2005, the then Minister for Transport and Regional Services agreed to regulations being made under the *Air Navigation Act 1920* to provide for a confidential reporting scheme for the aviation industry. Subject to the approval

of the current Minister prior to Executive Council, the draft regulations are close to being finalised as a result of consultation with the industry and the ATSB is awaiting drafting resources.

Memoranda of understanding

Adding to the existing Memoranda of Understanding (MoU) with industry and Government agencies, in 2005–06 the ATSB signed a MoU with our french aviation equivalent, Le Bureau d' Enquetes et d' Analyses pour la sécurité de l'aviation civile. MoUs that the ATSB has signed are available on the ATSB website.

Training and development

The ATSB, as a Registered Training Organisation, has issued an additional 10 Transport Safety Investigation Diplomas to investigators in 2005–06, with a further 25 in progress.

Diploma of Transport Safety Investigation core training courses for 2005–06 included:

- Investigation analysis
- Basic and advanced OH&S (including blood borne pathogens)
- TSI Act 2003
- Coronial witnesses
- Media awareness and releases
- Aircraft accident fundamentals (delivered onsite by Cranfield University, UK)
- Human factors
- Negotiation skills
- Cognitive interviewing
- Critical incident stress debriefing
- Working in the Australian Public Service.

The ATSB now has its TSI Diploma training and philosophy firmly embedded and is effectively addressing its base operational readiness training. The Bureau's training focus has recently turned to formulating an advanced training and development strategy designed to support investigation functions in a more complex/high risk environment such as a major public transport accident investigation. This strategy incorporates a combination of learning methods including training courses, knowledge sharing, coaching/mentoring and targeted tertiary studies.

Advanced training and professional development courses for 2005–06 included:

- Strategic media management (trial)
- Parliamentary processes
- Preparation for Senates Estimates and other Parliamentary inquiries
- Digital photography (trial)
- Cultural intelligence
- Remote first aid (trial)
- Advanced technical investigative skills (in development).

Knowledge sharing focus for 2005–06

In recognizing the importance of knowledge sharing, the ATSB is developing a knowledge management strategy derived from the Australian Standard on Knowledge Management (AS 5037). Through a greater understanding of the Bureau's knowledge 'ecosystem' and the subsequent implementation of management enablers including shared practices and business intelligence systems, it is expected that improved organisational outcomes will ensue. Incorporated within this strategy is the adoption of a more structured and formalised approach to coaching and mentoring.

ATSB support of relevant tertiary education opportunities for 2005–06 included:

- Master of Education (Adult Education and Training)
- Master of Public Administration (ANZ School of Government)
- Advanced Diploma of Engineering (Aerospace)
- Graduate Diploma in Legal Studies
- Bachelor of Social Science (Emergency Management)
- Bachelor of Aviation
- Master of Business (Management)
- Graduate Diploma in Languages (Mandarin Chinese)
- Graduate Certificate in Aviation Management
- Master of Technical Management (Aviation Human Factors).

Projects

Technical and Projects Branch's projects responsibilities involve the replacement of the aviation occurrence database (Occurrence Analysis Safety Information System – OASIS) through the Safety Investigation Information Management System (SIIMS) Project.

The ATSB's SIIMS project to replace the current aviation occurrence database, received Government funding in 2004–05 of $7.9m (including capital, expense and depreciation components) spanning three financial years between 2005 and 2008. When implemented, the new system will increase the efficiency of management of information and resources, make safety investigation reports more robust and objectively defensible and improve communication of safety information to industry and the public.

Stage two of the SIIMS project is well underway and includes the following main activities:

- development of a new aviation occurrence database, including new taxonomies for coding occurrences and safety factors
- review and improvement of all safety investigation documentation including policies, procedures, guidelines and checklists
- commencement of a large data migration task including some manual recoding of occurrence types and safety factors
- development of a variety of investigation work tools including evidence management and tracking, report workflow and document management
- development of training material for the introduction and ongoing use of SIIMS
- training and implementation of an improved ATSB investigation analysis methodology and supporting tools

Stage two is expected to be completed by December 2006 with all aviation investigators being trained and using SIIMS by that time, subject to ongoing availability of skilled IT developers.

Stage three will see the continuation of the data migration task in addition to the following main activities:

- necessary improvements identified following stage two implementation
- application of the new safety factors taxonomy to the rail and marine investigation databases
- training for rail and marine investigators in the use of SIIMS
- training and implementation of an investigation project management tool across all investigation modes

Information and Coordination

Role

The Information and Coordination section plays a central role within the ATSB in releasing transport safety investigation and research reports, 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 alerts and managing issues likely to provoke national media interest
- providing safety information to stakeholders and the community
- release of ATSB investigation reports
- designing and publishing safety investigation and education materials
- development of materials in support of larger public communication events and launches
- editorial responsibilities for the ATSB Supplement in Flight Safety Australia and industry publications
- graphic standards and style
- responding to Freedom of Information requests and legal issues
- managing the ATSB's website.

Coordination

The ATSB'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 a day, seven days a week).

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

VH-TFU Lockhart River fatal accident Interim Factual Report

VH-TFU Lockhart River fatal accident ATSB recommendations

ATSB Research Report on Fatal Accidents and Fatalities from 1990–2005

VH-UYB fatal parachute centre accident near Willowbank, Qld

VH-UYB fatal parachute centre accident near Willowbank, Qld Preliminary Report

VH-ZNZ fatal Lancair accident at Bankstown, NSW

VH-BST fatal aircraft accident near Coopers Plains, Qld

VH-PYN fatal aircraft accident near Condoblin Preliminary Report

Loss of the DIMIA vessel *Malu Sara* in Torres Strait, Queensland.

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 role in transport safety.

Information requests

During 2005–06, the ATSB responded to an estimated 6 000 requests for safety information. Responses ranged from giving verbal advice on safety-related issues to distributing reports, statistical monographs and road safety public education materials.

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

The Bureau updated and reprinted road safety resources as required: for example, the *Key Facts for New Drivers* kit. A new edition was also released for the *Civil and Military Aircraft Accident Procedures for Police Officers and Emergency Services Personnel*. The ATSB also managed the production of an ATSB corporate DVD to promote the role of the ATSB and its activities.

Release of ATSB investigation reports

Once approved by the ATSB Executive Director, information staff disseminate ATSB investigation reports to the Minister, Departmental Executive, regulatory authorities, directly involved parties, safety stakeholders, the industry and members of the public.

Freedom of information

The ATSB started 2005–06 with three Freedom of Information requests (FOIs) on hand and received nine FOIs during the financial year. The Bureau completed seven FOIs; three within 30 days and four between 30 and 60 days. Two FOIs

were withdrawn. At 30 June 2006 two FOIs were on hand, including one large request requiring a staged release process. The first part of the staged release was completed on 8 June 2006. The ATSB also attended to seven subpoenas within specified timeframes. The ATSB's FOI decisions were subject to two Internal Reviews in 2005–06. Both internal reviews granted further access to information and both were completed within 30 days.

The ATSB was not involved in any 2005–06 hearings of Courts or the Administrative Appeals Tribunal (AAT), or 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.

In November 2005, a redesigned website using the Department's content management system (CMS) was launched. The CMS provides the Bureau's website with a consistent structure and layout across modes, extra search capabilities and greater capacity for growth in the future. The ATSB's publishing staff now upload reports and documents to the web, providing greater workload flexibility. The Bureau regularly updates, evaluates and improves its website to provide the transport industry with a broad range of transport safety material.

Users 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, 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-related articles of interest.

Users can request copies of road safety education material and teaching resources including the *Road Safety Research Library* (a 3-CD set), or order online other ATSB safety information products such as the *Ride On* motorcycle safety Video and DVD and the *Safe Transport* DVD.

The site's notification forms for Accident and Incidents, Aviation Bird and Animal Strikes and the Aviation Self Reporting Scheme provide a secure option for reporting aviation 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 2005–06, the site attracted approximately 14.756 million hits and by 30 June 2006 was averaging over 56 000 hits per day. The number of hits increases markedly following the release of high-profile information or reports, particularly in aviation and road safety.

Safe Transport DVD

A *Safe Transport* DVD was compiled and produced with the assistance of Motto Media and Communications, to explain the role of the ATSB to those who may need to know (e.g. as a result of an accident in which a loved-one died.)

Most of the Bureau's educational materials are available free of charge, and can be ordered online or in many cases downloaded from its website.

Transport safety performance statistics

Cross modal safety comparisons

Table 1 compares the relative risk of fatal injury to passengers using 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 land transport, while motorcycling is the least safe of all forms of transport.

Table 1: Relative risk of fatal injury by Australian transport mode

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	28.0
Rail	0.2
Marine[2]	0.0

Source: ATSB, ABS: using latest available data.

Multimodal trends (fatalities)

Table 2 shows the number of deaths in each of the major transport modes from 1995 to 2005. 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 one percentage point increase in deaths relative to 2004.

2 Marine public transport via ferries

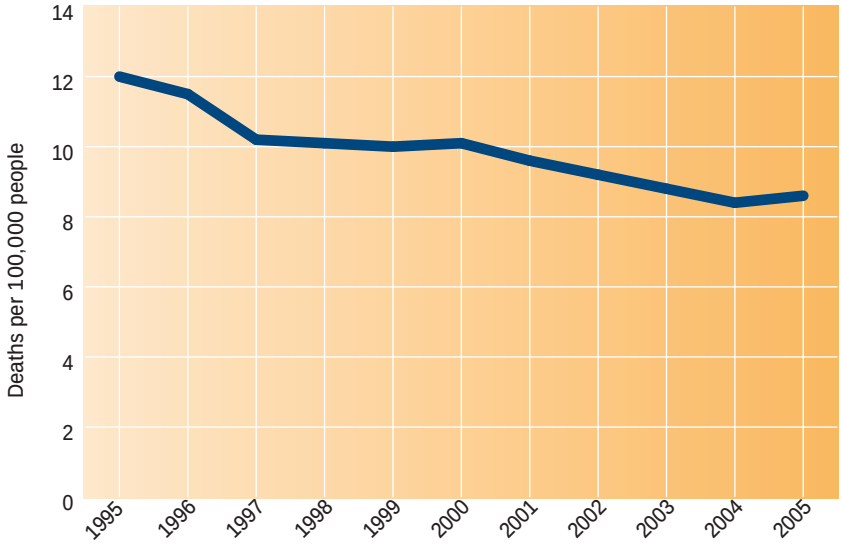
Table 2: Australian transport fatalities by mode, calendar years 1995 to 2005

Year	Road	Rail	Marine	Aviation
1995	2017	46	55	44
1996	1970	30	60	43
1997	1767	43	46	30
1998	1755	43	46	48
1999	1764	41	51	42
2000	1817	38	42	38
2001	1737	34	56	40
2002	1715	30	38	24
2003	1621	29	51	35
2004	1590	30	48	24
2005	1628	31	49	38

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.

The number of transport accident fatalities per 100 000 population decreased from 12.0 fatalities per 100 000 population in 1995 to 8.6 in 2005 (Figure 1).

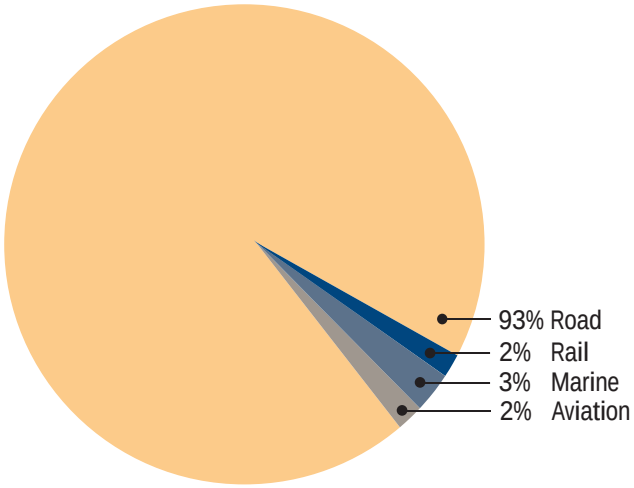
Figure 1: Australian transport fatalities (all modes) per 100 000 population, calendar years 1995 to 2005



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 transport deaths. It accounted for 93 per cent of total transport fatalities from 2000 to 2005.

Figure 2: Australian transport fatalities 2000 to 2005 by mode

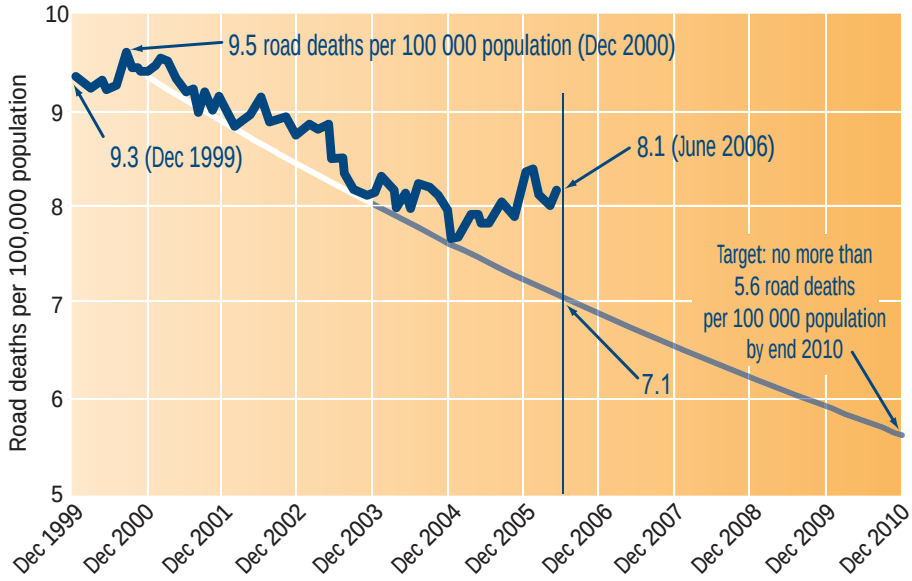


Source: *ATSB (road and aviation). Australian Bureau of Statistics (rail and marine). Marine and rail data were estimated for 2004 and 2005.*

Road safety trends

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

Figure 3: Australian road deaths per 100,000 population, 2000–2006, including NRSS 2010 projected target

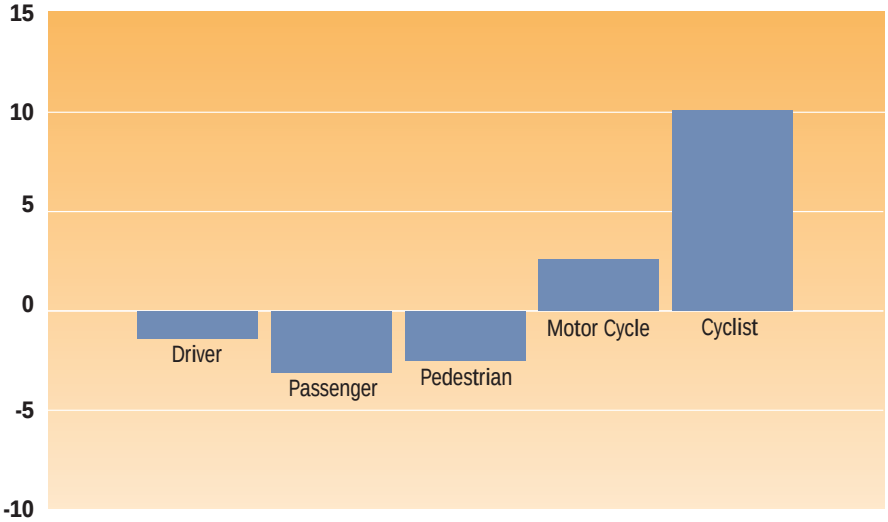


Source: *ATSB*

The NRSS 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 above the 9.3 rate used as a base for the NRSS. Figure 3 shows that at mid-2006 the Australian 12-month road death rate per 100 000 population stood at 8.1, a fall of 13.4 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-2006 was 7.0 deaths per 100 000 population, a projected fall of 24.4 per cent. The substantial challenge of meeting the 2010 target is evident.

Compared with the annual road deaths when the NRSS was introduced, in the five years to the end of 2005, vehicle occupant and pedestrian deaths had declined by 14 per cent and 18 per cent respectively, while motorcyclist and bicyclist deaths had increased by 28 per cent and 35 per cent respectively.

Figure 4: Comparison of road deaths amongst user groups average annual change over last 5 years



Source: *ATSB*

As shown in Figure 4, the annual number of deaths in the motorcyclist sub-group has grown each year by approximately 2.6 per cent. By comparison, the annual number of deaths in the pedestrian sub-group has fallen by approximately 2.5 per cent each year.

A national transport injury database has been established and a publication on *Serious Injury Due to Road Crashes* is available in the road safety statistics section of the ATSB website. Table 3 details serious road crash injury by road user group for July 1999 to June 2003. There is as yet insufficient data available to comment on serious injury trends.

Table 3: Persons seriously injured in road crashes, Australia, July 1999 to June 2003: road user group by period

Period	Drivers	Passengers	Pedestrians	Motorcyclists	Bicyclists	Other	Total
Jul–Dec 1999	3242	3071	1471	1895	1257	209	11145
Jan–Jun 2000	3297	2952	1395	2067	1384	144	11239
Jul–Dec 2000	3454	2939	1472	2001	1215	155	11236
Jan–Jun 2001	3230	2825	1328	2161	1198	151	10893
Jul–Dec 2001	3672	2994	1326	2187	1191	132	11502
Jan–Jun 2002	3414	2883	1260	2299	1303	114	11273
Jul–Dec 2002	3427	2694	1243	2224	1254	133	10975
Jan–Jun 2003	3383	2692	1249	2215	1431	126	11096

Table 4: Australian road deaths per 100 000 population, by state and territory, calendar years 1999 to 2005

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	7.6	6.9	8.3	9.6	8.1	10.3	27.1	8.0	8.1

Sources: Calculated using ATSB road death data, and Australian Bureau of Statistics population data.

As indicated in Table 4, the road death rates per 100 000 population at the end of 2005 was lower than those for 2000 in all jurisdictions except Tasmania, the Northern Territory and the Australian Capital Territory. Over this same five-year period, the actual national road death rate had fallen by 15 per cent.

Truck safety trends

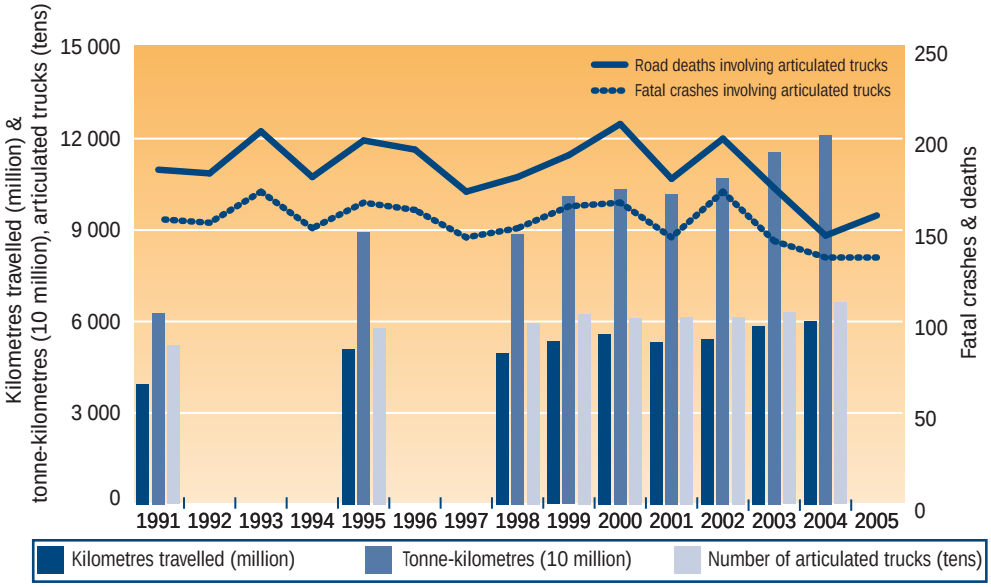
Table 5 shows the number of road deaths in crashes involving articulated trucks in each jurisdiction between 2000 and 2005. The downward trend since the commencement of the *National Heavy Vehicle Safety Strategy 2003–2010* is encouraging. Data for heavy rigid trucks are not yet available but are estimated 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 and territory, calendar years 2000 to 2005

	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	65	41	35	10	17	1	2	1	173
2004	64	37	13	11	17	4	1	0	147
2005	54	32	35	18	13	5	1	0	158

Source: *ATSB.*

Figure 5: Australian road deaths and fatal crashes involving articulated trucks, articulated truck kilometres travelled, tonne-kilometres, and number of articulated trucks, calendar years 1991 to 2005



Sources: *ATSB data, ABS 'Survey of Motor Vehicle Use' data.*

While road deaths and fatal crashes involving articulated trucks have declined over the past three years, in general, they have remained relatively stable since the early 1990s. On the other hand, kilometres travelled, tonne-kilometres, and articulated truck numbers all increased substantially (figure 5). Overall, between 1991 and 2004, (the latest period for which activity data is available):

- the road death rate per kilometre travelled declined by 47 per cent

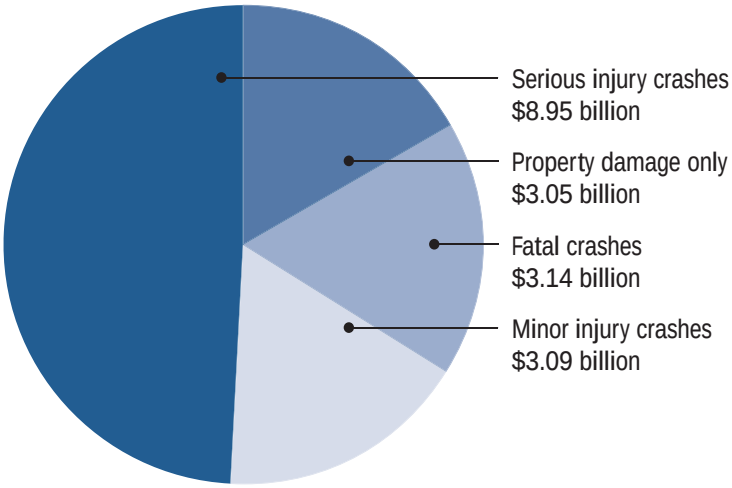
- the road death rate per tonne-kilometre declined by 55 per cent
- kilometres travelled by articulated trucks increased by 52 per cent
- articulated truck tonne-kilometres increased by 93 per cent
- articulated truck numbers increased by 27 per cent.

The ATSB has developed an Australian Truck Crash Database to investigate serious casualty crashes involving both articulated trucks and heavy rigid trucks. Currently, data for the years 2000 and 2002 are available.

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 2005 has been conservatively estimated at $18 billion (ATSB update of BTE estimate). Figure 6 shows the breakdown of these costs across crashes of different severity categories.

Figure 6: Annual cost of road crashes in Australia, 2005, 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: Australian rail fatalities, calendar years 1994 to 2003

	NSW	Vic	Qld	SA	WA	Tas	NT	ACT	Australia
1994	18	8	6	4	7	0	0	0	43
1995	16	14	11	3	1	0	1	0	46
1996	9	11	3	2	5	0	0	0	30
1997	21	16	2	2	2	0	0	0	43
1998	25	8	3	3	4	0	0	0	43
1999	19	10	2	2	8	0	0	0	41
2000	14	12	2	3	6	0	0	1	38
2001	14	11	6	1	2	0	0	0	34
2002	12	9	5	0	2	0	1	1	30
2003	16	8	2	1	2	0	0	0	29

Note: *States and territories shown are those in which the death was registered. Suicides are excluded.*
Sources: *Compiled by ATSB using unpublished data from the Australian Bureau of Statistics.*

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

	Rail accidents		Other rail-related incidents		
Type of costs of rail accidents	Rail accidents excluding level crossing accidents	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 2005.

Table 8: Australian marine investigations by incident type, 1 January 1991 to 30 June 2005, and 1 July 2005 to 30 June 2006

Incident type	1991–2005	2005–06	Total
Grounding	59	1	60
Collision	37	3	40
Fire/Explosion	24	1	25
Foundering	10	–	10
Structure	5	–	5
Equipment	14	–	14
Berthing	7	–	7
Machinery damage	11	1	12
Accidents causing fatalities	26	5	31
Accidents causing serious injuries	9	2	11
TOTAL	202	13	215

Source: ATSB

Table 9: Number of vessels involved in incident investigations by vessel type, 1 January 1991 to 30 June 2005 and 1 July 2005 to 30 June 2006

Vessel type	1991–2005	2005–06	Total
Bulk carrier	96	10	106
Tanker	23	–	23
Container	17	–	17
General	19	–	19
Roll on/roll off	8	–	8
Livestock	5	–	5
Supply/offshore	9	1	10
Tug	5	–	5
Training	4	1	5
Fishing Vessel	29	1	30
Passenger	4	–	4
Pleasure	7	1	8
Other	6	2	8
TOTAL	232	16	248

Source: ATSB

Table 10: Total Australian maritime accident casualties and costs, 1993

Year	No. of fatalities	No. of hospital injuries	Cost to the community 1993 $m
1993	73	901	316

Source: BTCE estimates based on data provided by Australian Bureau of Statistics, Australian Department of Transport, Australian Maritime Safety Authority, National Injury Surveillance Unit and the Insurance and Superannuation Commission.

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 4200 kg)
- low-capacity (Regular Public Transport aircraft with a seating capacity of 38 or less seats or a maximum payload of 4200 kg)
- General Aviation (aircraft used for charter, agricultural spraying, training, survey, private and business operations).

Aviation accidents

Accidents and fatal accidents involving Australian-registered aircraft by category, calendar years 1996 to 2005.

Table 11: Aviation accidents and fatal accidents for the 10 year period 1996 to 2005

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
High Capacity										
All accidents	1	0	1	7	3	3	1	1	1	1
Fatal accidents	0	0	0	0	0	0	0	0	0	0
Low Capacity										
All accidents	2	0	2	3	3	3	4	3	0	2
Fatal accidents	0	0	0	0	1	0	0	0	0	1
General Aviation										
All accidents	224	243	216	173	202	187	144	141	152	122
Fatal accidents	23	18	25	22	16	26	10	17	11	16

Note: General Aviation data includes charter, agriculture, business, private, flying training, other aerial work and 'VH' registered sports aviation, gliding and ballooning accidents.

High-capacity aircraft operations continue to be the safest in the country, with extremely low accident rates. As Table 11 shows, both high-capacity and low-capacity operations are very safe in terms of the number of accidents reported. For the General Aviation sector, 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 2005.

Figure 7: Fatal accidents and total accidents involving Australian-registered General Aviation aircraft, calendar years 1996-2005

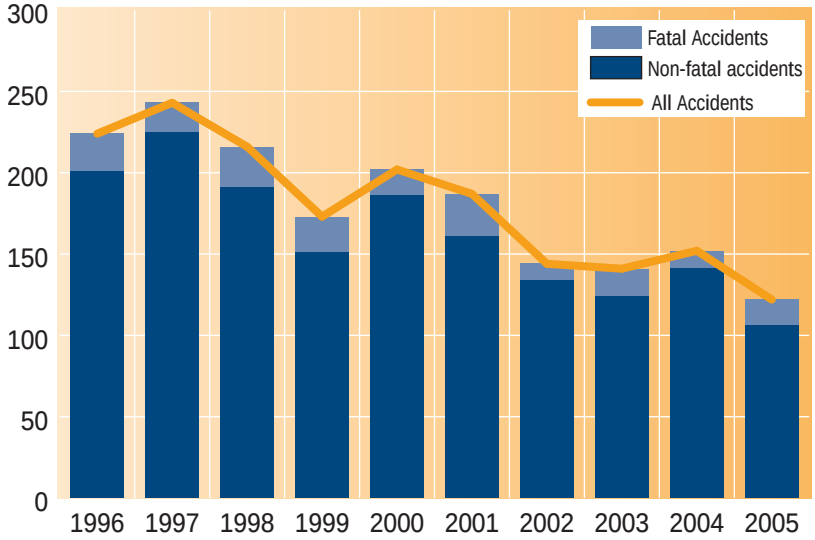


Figure 7 shows a downward trend in total accidents recorded in the General Aviation sector. An additional perspective may be obtained by examining accident rates based on the number of hours flown. Figure 8 shows accident rates for the General Aviation sector in Australia over the 10 years 1996 to 2005.

Figure 8: Accidents involving Australian-registered General Aviation aircraft per 100 000 hours flown, calendar years 1996–2005

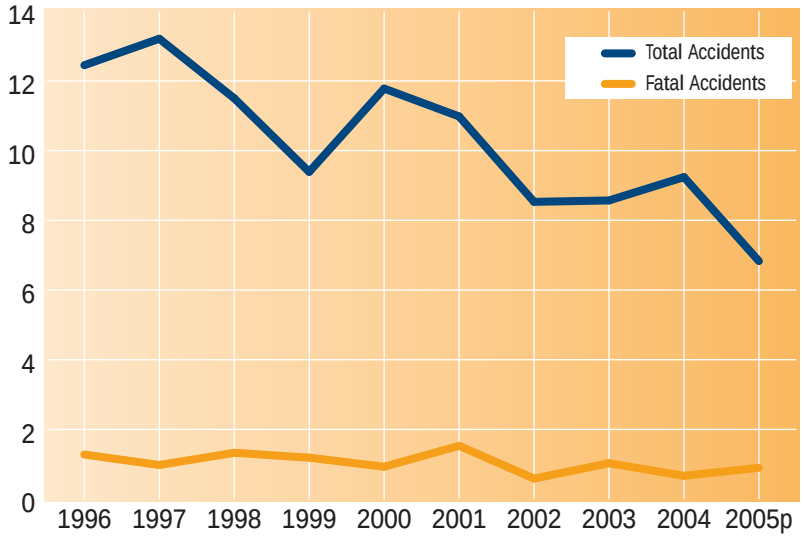


Figure 8 shows a statistically significant overall decrease in the General Aviation accident rate over the last decade.

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

Table 12: Australian registered High Capacity Air Transport traffic (departures and hours), calendar years 1996 to 2005

Year	Departures (x1000)	Hours Flown (x1000)
1996	299.6	704.5
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

Source: BTRE

Table 13: Australian registered Low Capacity Air Transport traffic (departures and hours), calendar years 1996 to 2005

Year	Departures (x1000)	Hours Flown (x1000)
1996	324.8	258.2
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

Source: BTRE

Table 14: Australian registered Charter traffic (hours flown), calendar years 1996 to 2005

Year	Hours Flown (x1000)
1996	483.3
1997	486.7
1998	497.5
1999	507.5
2000	479.7
2001	468.6
2002	448.0
2003	431.6
2004	483.8
2005	473.0

Source: BTRE

From 1996–2005, high capacity activity generally increased with a slight decrease occurring in 2002 and 2003 associated with the collapse of Ansett.

From 1996–2005 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 30 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 fallen in recent years.

Tables 15, 16 and 17 provide accident information for high-capacity, low-capacity and charter respectively, for the years 1996 to 2005. The data are presented in terms of the categories used by the ATSB to record accidents and incidents. Categories 1 and 2 are applied if there is a an accident involving one or more RPT (Air Transport) aircraft with fatalities and/or serious injuries; or where there was a significant risk of fatalities or serious injuries and a substantial commitment of investigative resource. Category 4 is normally used for occurrences where the facts do not indicate a serious safety deficiency or where the deficiency is well-known. Occurrence categories have varied over time, with the balance between categories 4 and 5 in particular influenced by resource availability and investigator workload.

For complete definitions of investigator categories refer to Appendix 7 or the ATSB website.

For the period 1996 to 2005, most high-capacity, low-capacity and charter accidents were category 4.

Table 15: Accidents involving Australian-registered High Capacity aircraft by investigation category, calendar years 1996 to 2005

	Investigation Category				
Year	2	3	4	5	Total
1996	~	1	~	~	1
1997	~	~	~	~	0
1998	~	~	1	~	1
1999	1	2	3	1	7
2000	~	1	2	~	3
2001	~	~	1	2	3
2002	~	~	~	1	1
2003	~	1	~	~	1
2004	~	~	~	1	1
2005	~	1	~	~	1

Table 16: Accidents involving Australian-registered Low Capacity aircraft by investigation category, calendar years 1996 to 2005

	Investigation Category				
Year	2	3	4	5	Total
1996	~	1	1	~	2
1997	~	~	~	~	0
1998	~	~	2	~	2
1999	~	1	2	~	3
2000	1	~	2	~	3
2001	~	~	2	1	3
2002	~	~	~	4	4
2003	~	~	~	3	3
2004	~	~	~	~	0
2005	1	~	1	~	2

Table 17: Accidents involving Australian-registered Charter aircraft by investigation category, calendar years 1996 to 2005

	Investigation Category				
Year	2	3	4	5	Total
1996	~	9	24	1	34
1997	~	3	38	8	49
1998	1	3	37	~	41
1999	~	2	19	~	21
2000	1	3	7	15	26
2001	1	2	7	22	32
2002	1	1	5	13	20
2003	~	2	6	16	24
2004	~	1	5	9	15
2005	~	2	4	3	9

Table 18 shows that, based on hours flown, both high and low capacity aircraft operations have significantly lower accident rates than do charter operations.

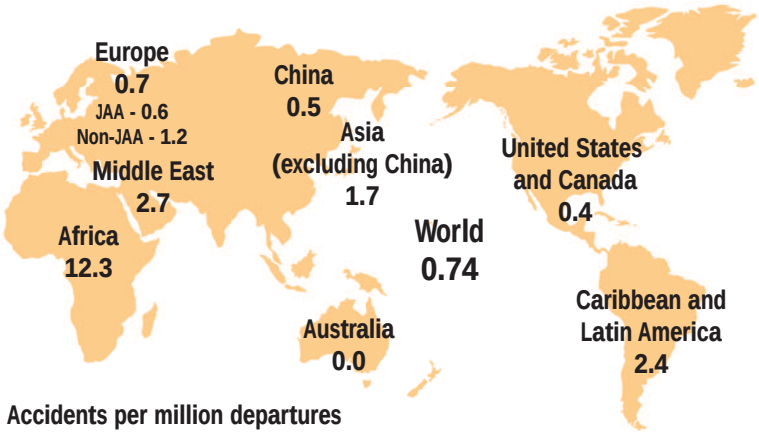
Table 18: Australian-registered aircraft accidents per 100 000 departures and per 100 000 hours flown (high-capacity, low-capacity and charter), calendar years 1995 to 2004

	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
1995	0.3	0.2	1.3	1.6	9
1996	0.3	0.1	0.6	0.8	7
1997	0	0	0	0	10.1
1998	0.3	0.1	0.6	0.7	8.2
1999	2.4	1	0.9	1.1	4.1
2000	0.9	0.4	0.9	1.1	5.4
2001	0.9	0.4	1.1	1.2	6.8
2002	0.3	0.1	1.8	1.9	4.5
2003	0.3	0.1	1.5	1.5	5.6
2004	0.3	0.1	0	0	3.1
2005	0.3	0.1	1.0	1.0	1.9

International comparison

Compared with the rest of the world, Australia has the lowest accident rate for high-capacity aircraft (see figure 9). In Canada for example, the number of accidents per 100 000 hours for such airlines varies each year from 0.3 to 1.2 and was 0.3 in 2004. International comparisons of high-capacity operations are often based on hull losses per million departures.

Figure 9: International comparison of hull losses per million departures, calendar years 1991 to 2004



Source: *Flight Safety Foundation and the ATSB*

Figure 9 provides data for the period 1991 to 2004 for the different regions of the world compared with the world average of 0.74 hull losses per million departures. Australia has never had either a hull loss or a fatal accident involving a high-capacity jet aircraft. It is less economic to repair older aircraft and hull loss data are in some measure biased by the age of aircraft involved in serious accidents.

Incidents

Compared with accidents, there are considerably more incidents recorded. Tables 19 to 21 show the incidents recorded by investigation category for high-capacity, low-capacity and charter aircraft.

Table 19: Reported incidents involving Australian-registered High Capacity aircraft by investigation category, calendar years 1996 to 2005

	Investigation Category				
Year	2	3	4	5	Total
1996	~	5	59	660	724
1997	~	7	264	573	844
1998	~	2	580	784	1366
1999	~	1	552	1060	1613
2000	~	4	76	1602	1682
2001	~	10	33	1659	1702
2002	~	2	26	1711	1739
2003	~	6	10	1430	1446
2004	~	6	22	1891	1919
2005	~	5	22	2319	2346

Table 20: Incidents involving Australian-registered Low Capacity aircraft by investigation category, calendar years 1996 to 2005

	Investigation Category				
Year	2	3	4	5	Total
1996	~	~	29	328	357
1997	~	4	157	277	438
1998	1	2	315	258	576
1999	~	2	289	383	674
2000	1	4	37	746	788
2001	~	4	15	714	733
2002	1	~	4	536	541
2003	~	2	4	548	554
2004	~	1	10	597	608
2005	~	3	12	659	674

Table 21: Incidents involving Australian-registered Charter aircraft by investigation category, calendar years 1996 to 2005

	Investigation Category				
Year	2	3	4	5	Total
1996	~	~	20	341	361
1997	~	~	96	242	338
1998	~	1	187	218	406
1999	~	3	173	234	410
2000	~	~	16	411	427
2001	~	1	7	342	350
2002	~	~	5	393	398
2003	~	~	2	367	369
2004	~	~	8	434	442
2005	~	1	5	510	516

Although changes in investigation category definitions over time complicate comparisons, Tables 19 and 21 show that over the period 1996 to 2005, the yearly number of reported incidents involving high-capacity and low-capacity air transport operations has increased particularly from 1998 to 2002. The introduction of electronic safety incident reports from Air Services Australia during 1998 resulted in an increased number of incidents reported. The improvement in reporting also suggests a growing safety culture within the airlines. 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 from 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 22 shows reported incident rates for high-capacity, low-capacity and charter aircraft. In contrast to reported charter accidents per 100 000 hours (see Table 15), 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 22: Incidents involving Australian-registered aircraft (high-capacity, low-capacity and charter), calendar years 1996 to 2005

	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
	264.5	116.5	103.2	129.0	75.9
1996	241.7	102.8	109.9	138.2	74.7
1997	286.0	117.5	134.8	158.3	69.4
1998	466.1	192.8	174.8	201.7	81.6
1999	549.8	227.3	203.4	236.1	80.8
2000	520.4	216.4	241.2	275.8	89.0
2001	500.8	213.1	266.2	294.1	74.7
2002	560.7	241.4	245.6	259.6	88.8
2003	442.4	190.6	272.9	282.9	85.5
2004	505.9	217.5	319.3	329.7	91.4
2005p	595.8	254.3	342.5	338.3	109.1

Table 23: Contributions to cost of Australian aviation accidents and indidents, 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

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

Source: *BTRE estimates.*

International Transportation Safety Association (ITSA)

Chairmanship

The ATSB is a member of the International Transportation Safety Association (ITSA), which consists of 12 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 became Chairman of ITSA on 1 March 2006, the 4th ITSA Chairman and first Australian Chairman since ITSA's formation in 1993. Mr Bills took over the Chairmanship from the Chairman of the US National Transportation Safety Board.

2006 International Transportation Safety Association Chairman's Meeting — Canberra March 2006

As the new Chairman, the Executive Director hosted the 2006 ITSA Chairman's Meeting in Canberra from 15–17 March 2006.

Representatives from nine member countries and two observing countries attended the meeting, which provided an opportunity for the exchange of information, views and lessons.

Topics discussed at the meeting included investigation methodology and database renewal associated with the ATSB's new Safety Investigation Information Management System; tracking, assessing and measuring the success of safety recommendations; International Maritime Organization developments; European developments in safety regulation and investigation; investigator training; protection and use of sensitive investigation information; International Civil Aviation Organization Annex 13 audits and possible areas for review; threats to investigation independence; road safety; regional investigation agreements; and multi-modal confidential reporting.

Internal management and processes

Financial overview

In 2005–06 the ATSB utilised $17.473m of operating expenditure (including $0.203m sourced from own revenue), and $0.512m of capital expenditure to deliver its investigation and safety outputs.

Overall operating expenditure in 2005–06 was similar to 2004–05, however the employee expense component was significantly higher reflecting the success of recruitment initiatives to lift staffing close to budgeted levels. ATSB expenditure (including allocated support functions) comprised 74 per cent on investigation activities, 6 per cent on aviation safety research and 20 per cent on road safety activities (including research, statistics, public education and funding grants).

The ATSB operating budget allocation for 2006–07 is broadly in line with 2005–06 after allowance for one–off factors. Additional depreciation funding of $0.670m has been allocated for the Safety Investigation Information and Management System (SIIMS) which is expected to become operational in the third quarter. The ATSB, like all other DOTARS Divisions, is required to absorb the 4 per cent staff pay rise effective 1 July 2006 pursuant to the new DOTARS Collective Agreement 2006–2009 under which further 4 per cent increases take effect in July 2007 and July 2008. The ATSB also continues to financially support the ongoing novice driver road safety education initiative (to which the Australian Government has contributed $3m) by way of significant management coordination 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	8.195	8.860	10.020	11.733	12.145
Supplier expenses[1]	3.689	2.895	4.758	4.343	3.328
Depreciation expenses[2]	0.424	0.419	0.467	0.583	1.284
Other expenses	0.004	0.190	2.165	0.814	0.350
Total Departmental expenses	12.312	12.364	17.410[3]	17.473	17.107
Revenue (own source)	0.388	0.336	0.398	0.203	0.050
Net Cost	11.924	12.028	17.013	17.269	17.057
Capital Expenditure					
Plant and Equipment[4]	0.600	0.204	0.487	0.110	0.230
SIIMS Project[5]				0.402	0.564
Staffing					
Average staffing level (FTE)[6]	92	89	98	109	114

Notes:

1. *Supplier expense contains a small $0.5m departmental component of the (extended) Black Spot Programme allocated to ATSB.*
2. *2006–07 Budget includes commencement of depreciation expense for the SIIMS safety management system.*
3. *Includes 2004 budget measure funding for increased aviation investigations and replacement of the aviation investigation database; also includes internal funding of $1m for new novice driver education road safety initiative.*
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 Integrated Management System 'SIIMS' for which funding was provided in the 2004 Budget.*
6. *Average staffing FTE across the year. 2006–07 Budget includes 4.8 non–ongoing SIIMS project staff.*

The 2006–07 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 budget resourcing by Output, including corporate overhead attributed to the ATSB.

ATSB Price of Outputs ($m)[7]

	2004–05 Actual $m	2005–06 Budget PAES $m	2005–06 Actual $m	2006–07 Budget PBS $m
Output 1.1.1 Investigation				
ATSB	11.669	13.251	12.982	13.632
Corporate	5.833	5.929	5.968	5.765
Total	17.502	19.180	18.950	19.397
Output 1.1.2 Safety				
ATSB	5.741[8]	3.129	4.491[9]	3.596
Corporate	1.409	1.332	1.373	1.402
Total	7.150	4.461	5.864	4.998
Summary				
ATSB	17.410	16.380	17.473[10]	17.228
Corporate	7.242	7.262	7.341	7.167
Total	24.652	23.642	24.813	24.395

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 contributions for Novice Driver Trial $1.0m; AusRAP $0.350m; GAPAN $0.250m; RADD $0.050m; ANCAP $0.500m.

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. Above budget expenditure was incurred with prior approval.

Comparison of staffing levels (year end FTE)

Classification level	2005–06 Actual 30 June 06	2006–07 Budget 30 June 07
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	9.0	9.0
Senior Transport Safety Investigator	41.8	49.6
Transport Safety Investigator	8.0	1.0
Executive Level 2	8.8	7.8
Executive Level 1	3.6	3.6
Australian Public Service Level 6	11.4	12.4
Australian Public Service Level 5	16.1	12.1
Australian Public Service Level 4	7.0	7.0
Australian Public Service Level 3	1.0	1.0
Australian Public Service Level 3 (GAPS)	2.0	2.0
Australian Public Service Level 1	1.0	0.0
TOTAL (year end FTE)	115.7	111.5

Risk management

The ATSB Business Plan's risk management section outlines a number of risks faced and suggested how the Bureau might respond to the more serious ones. Major areas of risks included:

- A major safety accident occurs
- Ministers/stakeholders lose confidence in ATSB/DOTARS
- Inappropriate or inaccurate material is released
- Customers are critical of the ATSB
- IT is not reliable or aligned with our business.

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 114 responses to letters for the Ministers.

Briefing minutes for Ministers

The ATSB submitted 301 minutes to Ministers including 15 meeting briefs and speeches, 25 other briefing minutes and 261 report release notification minutes.

Questions on Notice

During 2005–06 the ATSB drafted 11 Questions on Notice responses and significant contributions to responses, excluding the Senate Committee responses listed below.

Parliamentary committees

In 2005–06 the ATSB appeared at two Senate Estimates Hearings of the Rural and Regional Affairs and Transport Legislation Committee:

- Additional Estimates in February 2006, after which the ATSB drafted answers to 16 questions on notice.
- Budget Estimates in May 2006, after which the ATSB drafted answers to two questions on notice.

The ATSB also answered two questions on notice from the Supplementary Budget Estimates Hearings on 31 October 2005. The Bureau was not required to appear at these Hearings.

Overview of key safety outputs

Figure 10: ATSB occurrence investigations initiated / in process / completed (aviation, marine and rail modes)

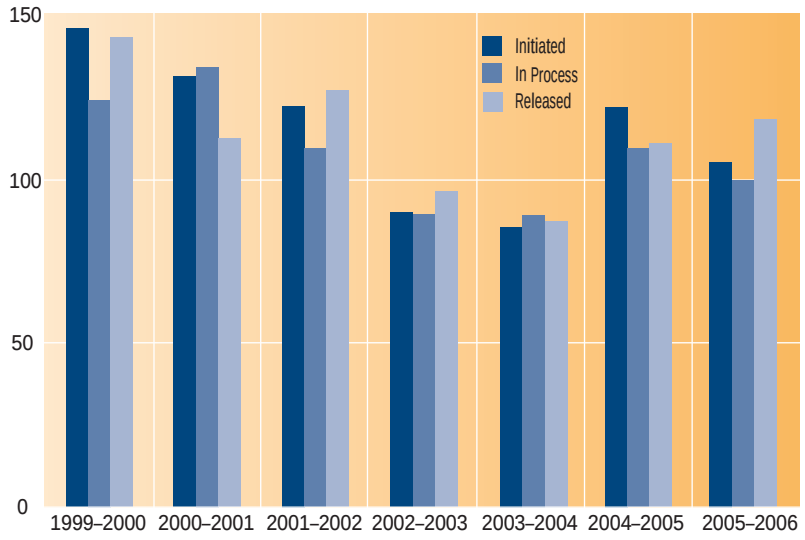
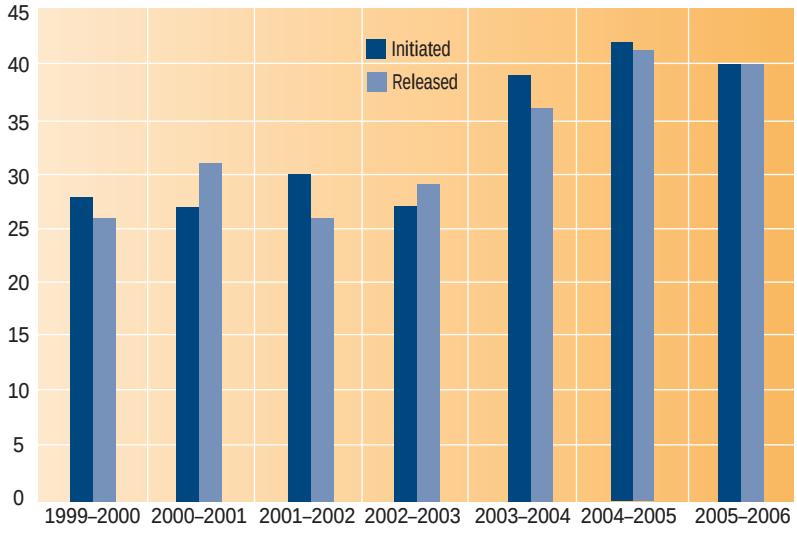


Figure 11: ATSB statistical and research publications initiated / completed



Major accident preparedness

In 2005–06, the ATSB reviewed its structures, policies and procedures for responding to a major transport safety accident in Australia. A workshop was held at the ATSB's premises in April 2006, aimed at identifying strategies for improved major accident preparedness, including training and management issues. As well as ATSB staff, technical experts from the UK, including from Cranfield University and the UK Air Accident Investigation Branch, participated in leading the workshop.

A desk-top aviation accident exercise is planned for the first half of the 2006–07 financial year which will focus on the ATSB's relationship with other agencies.

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 required.

Asset management

The ATSB has assets with a book value of $1.168m 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. 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 2005 and 2006 also address equity issues specific to Indigenous road safety. In 2005–06 the ATSB supported continued collaboration among jurisdictions on indigenous road safety issues by:

- commencing planning to chair and convene a national forum in Broome, Western Australia, from 23 to 25 October 2006 to facilitate information sharing to improve Indigenous road safety
- employing a university student during semester breaks to assist with preparations for the forum under the National Indigenous Cadetship Project conducted by the Department of Employment and Workplace Relations
- convening and chairing a teleconference of the Indigenous Road Safety Working Group on 4 November 2005 to monitor progress on recommended actions from the previous forum held in Alice Springs in 2004
- initiating action through the forum and the Indigenous Road Safety Working Group to improve the quality of Indigenous road safety data collected nationally
- participating as a working group member to support Western Australia's ongoing improvement of the *HealthInfoNet Indigenous Road Safety Website*
- releasing on the ATSB website the research report *Australian Indigenous Road Safety – Update 2005* by the ARRB Group
- distributing on request, copies of the Aboriginal road safety video *Corrugations to Highways*.

Disability strategy

The Department is also committed to the Australian Government's Disability Strategy. The ATSB is increasingly placing its key reports on the website using HTML, where this is practicable, to assist those with a disability.

Government online and e-services initiatives

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

All ATSB investigators receive occupational health and safety training during their induction and are vaccinated against possible bloodborne pathogen hazards while conducting an on-site investigation. The ATSB conducts recurrent OH&S training for all investigators and has five OH&S representative positions to manage and monitor the on-site and off-site wellbeing of investigators and staff.

During 2005–06 the ATSB also provided information and training to emergency services personnel about the hazards likely to be encountered at accident sites. The ATSB highlighted recent safety developments in aviation to police officers and emergency services personnel, particularly in relation to hazards associated with ballistic recovery parachute systems and air-bag seat belt systems currently being fitted into new and old aircraft.

This year the ATSB has developed additional training for investigators in on-site and off-site decontamination processes for items that are returned from an accident site for further examination. The ATSB has also recently updated breathing apparatus for use at a composite material contaminated accident site. A training program for the new equipment will be conducted during 2006–07.

The ATSB continues to provide training in accident site OH&S hazards and bloodborne pathogens to personnel from airlines that are likely to assist the ATSB in the event of a major accident investigation.

A total of 38 ATSB employees chose to receive influenza innoculations offered without charge.

Looking ahead

Projects to be undertaken in 2006–07 include:

- More than 6000 aviation, marine and rail occurrence reports are entered into the database after assessment
- Approximately 90 aviation, 10 marine and 10 rail occurrence and failure analysis investigations are completed, and a similar number are commenced
- Approximately 25 road safety reports and 10 aviation safety reports are released and a similar number are commenced
- Release of the final report on the Lockhart River aviation accident
- Completion of main phase of the Safety Investigation and Information Management System 'SIIMS' project
- A major cooperative novice driver education trial is progressed in NSW and Victoria
- Development and Australian Transport Council approval of the National Road Safety Action Plan for 2007 and 2008 to commence 1 January 2007
- NPP review in October for rail investigation, aviation research and marine confidential reporting funding
- TSI Act amendment legislation introduced and aviation confidential reporting commenced under new REPCON regulations
- Succession planning within the ATSB including future recruitment of graduates
- Contribute to international safety improvements including through the International Maritime Organization, International Civil Aviation Organization, International Society of Air Safety Investigators, International Transportation Safety Association, and Marine Accident Investigators International Forum.

Because much of the ATSB's work is necessarily reactive, many investigations will be undertaken in 2006–07 that were unknown at the beginning of the financial year.

Appendixes

Appendix 1: Research, statistical, and other non-investigation publications released in 2005–06

The ATSB released the following major publications during 2005–06. Most of the reports are available on the Bureau's website www.atsb.gov.au or can be obtained by telephoning 1800 621 372.

Road safety research reports

Australian Indigenous road safety: 2005 Update (2006) (CR 225)

Research organisation: ARRB Group Ltd

The aim of this project was to update the indigenous road safety scoping study that was undertaken in 2003. The work involved a new literature review and consultation process to investigate the current state of Indigenous road safety in Australia. The study identified data sources and limitations, and highlighted major risk issues among Indigenous road users. The findings are fully documented in the published report, along with eleven recommendations for further research and other priority activities.

A pilot study of the effects of macrotexture on stopping distance (2006) (CR 226)

Research organisation: ARRB Group Ltd

A small pilot study was undertaken to investigate the effects of road texture on vehicle stopping distances at different speeds. A series of trials were conducted using a late model Holden Commodore Station Wagon fitted with anti-lock braking (ABS), a Global Positioning System (GPS), an accelerometer and a computer. Testing was carried out at four sites with different combinations of macrotexture and skid resistance. The study did not produce any clear findings relating road texture to stopping distance, partly attributable to the difficulty of locating suitable test sites. It was recommended that a full study not proceed at this time, but that future work should concentrate on examining the direct relationship between road surface conditions and crash occurrence.

Community attitudes to road safety: Community attitudes survey wave 18 (2006) (CR 227)

Research organisation: The Social Research Centre

This report documents the findings from the ATSB's latest survey of community attitudes to road safety. 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 1,690 interviews were conducted in March and April 2005, with an average interview length of 14 minutes. A disproportionate stratified sampling methodology was used 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 73 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.

A content analysis of Australian motor vehicle advertising (2006) (CR 228)

Research organisation: Centre for Accident Research & Road Safety, Queensland University of Technology

This project aimed to identify and evaluate any changes in the themes and driving practices depicted in Australian vehicle advertising before and after the introduction of the Federal Chamber of Automotive Industries (FCAI) *Voluntary Code of Practice for Motor Vehicle Advertising* in 2002. The study found some significant changes in the themes seen in vehicle advertising after the initial introduction of the Code, and particularly after the introduction of a revised Code in July 2004. These changes include reductions in the occurrence of the primary themes 'performance' and 'exciting/fun to drive'.

This study was funded jointly by the ATSB and Queensland Transport.

Road safety statistics reports

- Twelve issues of *Road Deaths Australia* – Monthly Bulletin
  - this publication maintains current numbers of national road crash deaths
- *Road deaths Australia: 2005 statistical summary*
  - analysis and time series for numbers of Australian road crash deaths

- *International Road Safety Comparisons: The 2004 Report*
  - road death rates for OECD nations and Australian states/territories
- *International Road Safety Comparisons: The 2003 Report*
- *Driveway Deaths of Child Pedestrians*
  - presents a summary of driveway deaths involving child pedestrians
- *Road crash casualties and rates, Australia,* 1925 to latest year
  - Annual rates for fatalities and serious injuries
- Public Internet access to the latest fatal road crash data via a user-friendly interface.

2005–06 Aviation Safety Research reports

Interpretation of measured alcohol levels in fatal aviation accident victims

Post-mortem analysis to determine alcohol levels in pilots prior to an accident may be problematic because ethanol (alcohol) may be produced by tissues degrading, following death. This paper examined current techniques used to determine a blood ethanol concentration post-mortem, and difficulties that may be encountered interpreting those results as part of an accident investigation.

MBZ Report: An examination of airspace-related occurrences in Mandatory Broadcast Zones

The ATSB has previously published report on airspace related occurrences within Mandatory Broadcast Zones (MBZs). This report updated that earlier study by analysing the number of occurrences in MBZ airspace involving general aviation and regular public transport aircraft between 2001 and 2004. The study sought to identify intentional and unintentional non-compliance with MBZ procedures.

Dangerous Distraction: An examination of accidents and incidents involving pilot distraction in Australia between 1997 and 2004

An examination of the ATSB's aviation occurrence database indicated that distraction contributed to a number of aviation accidents and incidents. This study examined the characteristics of pilot distraction and explored the range of distraction sources that have contributed to aviation safety occurrences. A taxonomy of pilot distractions was also developed, along with suggested strategies to minimise the risk of pilot distraction.

Analysis of fatality trends involving civil aviation aircraft in Australian airspace between 1990 and 2005

Analysis of fatal accident and fatality trends involving civil aircraft in Australian airspace between 1990 and 2005 was undertaken to provide accurate data to the industry and public by identifying key trends and characteristics. The paper examined fatal accidents and fatalities by pilot licence type, type of operation, level of proficiency, and aircraft weight.

Wire-strike accidents in general aviation: Data analysis 1994 to 2004

Wire strikes are a significant safety concern for general aviation operations. Wire strikes may result in fatalities and/or the destruction of an aircraft. This research analysed the characteristics of general aviation wire-strike occurrences using aviation accident and incident data collected by the ATSB during the period 1994–2004.

Destination weather assurance: Risks associated with the Australian operational rules for weather alternate minima

Weather conditions at the destination is an important safety factor, particularly for the landing. A study, using records of weather forecasts and observations analysed the level of statistical confidence that had been achieved with destination weather forecasts under various conditions. The study proposed additional mechanisms that could be used to enhance aviation safety with respect to weather-related incidents.

Depressurisation Accidents and Incidents Involving Australian Civil Aircraft 1 January 1975 to 31 March 2006

Commercial aircraft involved in high altitude operations are generally pressurised to protect the occupants from the adverse effects of hypoxia, decompression illness and hypothermia. Failure of the pressurisation system is a potential threat to flight safety. The purpose of this study was to determine the prevalence and consequences of aircraft decompression events in Australian civil aviation. In general, the results of this study show that there is a high chance of surviving a pressurisation system failure, provided that the failure is recognised and the corresponding emergency procedures are carried out expeditiously.

Communication in context: A conversation analysis tool for examining recorded voice data in investigations of aviation occurrences

A research consultancy project explored the potential value of an established sociological research methodology, called conversation analysis, for representing

and analysing recorded voice data for investigations of aviation or other transport occurrences. This report presents a tool for using conversation analysis that may assist the analysis of recorded voice data in investigations.

A layman's introduction to human factors in aircraft accident and incident investigation

Human factors, which includes 'ergonomics' as it is called in some industries, is the practice of applying scientific knowledge from varied, mostly human science disciplines to designing, building, maintaining and managing systems and products.

This paper seeks to provide a general plain English explanation of human factors issues, its evolution, and its application to aircraft accident and incident safety investigations. The paper also provides an overview of international agreements and Australian law as they apply to aircraft accident and incident investigations.

Accidents and incidents involving alcohol and drugs in Australian civil aviation 1 January 1975 to 31 March 2006

Drug and alcohol use in pilots can have a detrimental impact on aviation safety. Important cognitive and psychomotor functions necessary for safe operation of an aircraft can be significantly impaired by drugs and alcohol. The purpose of this study was to determine the prevalence and nature of drug and alcohol-related accidents and incidents in Australian civil aviation. It found that while the frequency of accidents for which drug and alcohol consumption had been detected was very low, the consequence was high in terms of the proportion of these accidents that involved fatalities.

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

July–August 2005

- *TCAS traffic advisory near Hamilton Island*
- *Risks associated with aerial campaign management*
- *Executive Director's Message – Aviation research findings*
- *Safety Briefs* (R22 clutch shaft failure, Fatal training flight at Bankstown, Collision with ground, Infringement of separation standard, Helicopter crash near Kununurra, Seaplane rollover on takeoff).

September–October 2005

- *Executive Director's Message – Reflecting on the ATSB's aviation outputs in 2004–05*
- *Power loss related accidents involving twin-engine fixed wing aircraft*

- *Preliminary Report on Mount Hotham Fatal Accident*
- *Safety Briefs* (Failure of cooling turbines, Fractured landing gear struts, Fatigue cracking of stabiliser tube, R22 clutch shaft failure-preliminary report, Tail strike during takeoff, unforecast weather conditions).

November–December 2005

- *Executive Director's Message – Overseas visit*
- *Aviation Safety Research*
- *Final report on fatal helicopter accident near Camden*
- *Safety briefs* (Fuel crossflow valve problem, Loss of control after takeoff, Engine failure, Ice on airframe, Collision with powerlines, Cabin door separation).

January–February 2006

- *Executive Director's Message – Aviation accident statistics*
- *Aviation research on Mandatory Broadcast Zone occurrence*
- *Final report on fatal helicopter accident near Roma*
- *Safety briefs* (Breakdown of separation, Powerplant bull gear failure, collision with ground, dynamic rollover, Clutch shaft failure, Breakdown of separation).

March–April 2006

- *Executive Director's Message – International activities*
- *Final report into fatal accident near Benalla*
- *Lockhart River Accident – Interim factual report and subsequent safety recommendations*
- *Safety briefs* (Research on fatal accidents and fatalities, In flight loss of aileron control, Inflight engine shutdown, Breakdown in coordination, Inadequate lubrication, Actuator failure).

May–June 2006

- *Executive Director's Message – Progress on Lockhart River Investigation*
- *Final report on the Mount Hotham fatal accident*
- *Collision with ground-Interim Factual Report on fatal Cessna 310R crash near Tamworth*
- *Safety Briefs* (Engine failure, Flight Management System computer malfunction, Infringement of separation standards, Collision with ground, Loss of control, Failure to follow procedures, STAR non-compliance).

ATSB articles in Australian Safety Journals during 2005–06

Aviation safety

Tarmac magazine	July 2005	Terrain Proximity Warning near Canberra
Tarmac magazine	August 2005	Lockhart River Preliminary Report
Tarmac magazine	September 2005	Pilots' Flying Experiences
Tarmac magazine	October 2005	Mount Hotham Preliminary Report
Tarmac magazine	December 2005	Power loss related fixed wing aircraft accidents
Tarmac magazine	January 2006	Robinson helicopter accident near Camden
Tarmac magazine	February 2006	Fatal accident near Ballidu WA
Tarmac magazine	March 2006	Fatal Robinson R44 helicopter accident near Roma, Qld
Tarmac magazine	April 2006	Final report on fatal Benalla accident
Tarmac magazine	May 2006	Lockhart River Interim Factual Report
Tarmac magazine	June 2006	Fatality Trend Analysis

Marine safety

Ausmarine magazine	May 2006	Commercial Fishing Awareness Campaign
Ausmarine magazine	June 2006	*Malu Sara* investigation

Rail safety

Railway Digest	September 2005	Bates train derailment
Railway Digest	April 2006	Glenalta train derailment
Railway Digest	May 2006	South Dynon train collision
Railway Digest	June 2006	Greenbank train collision

Road safety

Australian Local Government Yearbook	April 2006	National Road Safety Strategy

Multimodal safety

The Australian Logistics and Transport Review 2005	November 2005	Multimodal Transport Safety Progress
Australian Infrastructure Review	May 2006	Multimodal Transport Safety Progress

Appendix 2: ATSB safety research grants 2005-2006

Road safety research grants

Successful applications

Four grants were awarded for work to be undertaken under the Road Safety Research Grant Scheme funded by the ATSB:

Medications and crash involvement for older drivers: a population based study

Applicant: Dr Lynn Meuleners, Edith Cowan University, WA

This case-control study uses a linked database to derive an odds ratio for the crash risk of drivers who are on medication, compared with those who are not. There is a growing population of drivers on medication. This study takes advantage of the recent addition of pharmaceutical records to the WA linked database, and aims to examine medication use among crash-involved drivers, compared with an age and gender matched group of older drivers.

Sleepiness and hazard perception while driving

Applicant: Dr Simon Smith, University of Queensland

This is a well-structured proposal to investigate the interaction between sleepiness and hazard perception among young and experienced drivers. Younger drivers are at a higher risk of fatigue-related crashes than older drivers, and their hazard perception skills are not as good. If hazard perception skills are adversely affected by fatigue, this could help explain the high involvement of young drivers in fatigue-related crashes, and provide useful information for public education.

Psychosocial factors influencing mobile phone use while driving

Applicant: Mrs Shari Walsh, Queensland University of Technology

A well-planned and structured proposal that aims to study why and in what circumstances people use mobile phones while driving. This study will provide information that may be of assistance in developing methods to discourage mobile phone use while driving.

Aboriginal People Travelling Well

Applicant: Ms Kim O'Donnell, Flinders University

This study aims to assess the impact of the lack of access to safe and reliable transport in aboriginal communities as a factor in the acceptance of high-risk behaviours. It will consider urban and rural communities, and consider the range of issues that influence the decision to accept unsafe transport choices.

Road safety research grant reports issued 2005–06

Beliefs and attitudes about speeding and its countermeasures

Author: J Hatfield, RFS Job, School of Psychology, University of Sydney

Speeding substantially reduces road safety, and despite efforts to reduce speeding it remains the norm. This research surveyed licenced drivers in metropolitan Sydney, regional NSW, and rural NSW on their attitudes, experience and behaviour in relation to speeding. A significant group (24.0 per cent) of respondents reported being likely to speed 'under typical conditions in the middle of the day'.

Self-reported speeding was less likely under poor conditions and near schools, and more likely in situations where it has clear benefits and is perceived as unlikely to result in crashing or being booked. Self-reported speeding was more likely among respondents who were male, younger, more educated, and single, and who had held their licence for a shorter period.

Respondents recognised that speeding poses a threat to safety, and acceptance of current speed limits and penalties for speeding was relatively high.

The research recommends that campaigns aim to identify that speeding is likely to result in crashing or being penalised, and encourage social disapproval of speeding. In particular, campaigns should address the perception that speeding can be safe under any circumstances.

Other grants

Other road safety grants

Amy Gillett Safe Cycling Foundation

The ATSB provided a grant of $50,000 (+GST) to the Amy Gillett Safe Cycling Foundation in honour of Amy Gillett, a member of the Australian women's cycling team, who was killed in a tragic road crash while on a team training ride in Germany on 18 July 2005. This grant is to support an annual Amy Gillett scholarship which will give the opportunity to a talented young Australian female cyclist to pursue cycling at the elite level; and sponsorship of 'Amy's Ride 2007' in Victoria.

Australian Road Assessment Programme (AusRAP)

The ATSB provided the Australian Automobile Association with a grant of $339,500 (+GST) to support further development of the Australian Road Assessment Program (AusRAP) initiative. The grant will assist the Australian Automobile Association (AAA) to extend the coverage of the programme, with a particular focus on rural links in the national road network.

National Transport Commission (NTC) Reform Evaluation Study

The ATSB has provided a grant of $50,000 (+GST) to the NTC to undertake an evaluation of two recent transport reforms relating to the introduction of new compliance and enforcement requirements and changes to fatigue management regimes for heavy vehicles. The objective of the evaluation is to obtain information prior to implementation of both reforms, which can then be matched with a complementary post implementation study. This will allow an evaluation of the success of these significant national reform initiatives.

Motor Vehicle Advertising Content Analysis – International Comparisons

In 2006 the ATSB provided a grant of $27,603 (+GST) to the Queensland University of Technology (QUT) to examine the influence of vehicle advertising codes in Australia, New Zealand and the United Kingdom. The amount paid in 2005–06 was $18,905. This research will compare the content of motor vehicle advertisements shown in the UK and New Zealand within the last three years with the content of Australian advertisements, using the results of a previous content analysis of messages in motor vehicle advertising that was co-sponsored by the ATSB and Queensland Transport and undertaken by QUT.

Used Car Safety Ratings

In 2006 the ATSB contributed $15,500 (+GST) to the Used Car Safety Ratings program developed by the Monash University Accident Research Centre (MUARC). This project has been running for several years, co-sponsored by state transport agencies and motoring clubs. The main purpose of the programme is to produce information about the safety performance of different passenger car models based on recorded occupant injuries in real-world crashes: vehicles are rated for both crashworthiness (occupant protection) and aggressivity (threat to occupants of other vehicles). These ratings have been updated annually and published in a widely disseminated consumer booklet, designed to focus greater community and industry attention on vehicle safety issues.

Model Licence Re-Assessment Procedure for Older Drivers

In 2005–06 the ATSB contributed $30,000 (+GST) to the Austroads study, the Model Licence Re-Assessment Procedure for Older Drivers Stage 3. The total amount of the grant is $54,000. The Stage 3 work, which is being undertaken by

MUARC, involves a field trial of the procedure in the Albany Region of WA to test the feasibility of its implementation at jurisdictional level, and a pilot case-control study to test its effectiveness in reducing older driver crash rates.

Aviation Safety Research Grants Programme

Successful applications

The ATSB awarded four aviation safety research grants in 2005–06.

Forensic Identification of Aviation Bird Strikes in Australia

Applicant: Dr Leslie Christidis

Bird strikes on Australian aircraft increased by more than 80 per cent between 1991–1992 and 2000–2001. The aim of this study was to investigate the feasibility of forensic DNA-based techniques in identifying species involved in Australian aviation bird strikes. Forensic DNA identification of birds involved in bird strike incidents would allow better data collection and subsequently assist management and other preventative measures. This has the flow on effect of increasing safety to people travelling in aircraft as well as significantly reducing high costs to airlines and aerodromes from bird strike risk and incidence.

Investigation of Visual Flight Cues for Timing the Initiation of the Landing Flare

Applicant: Dr Stephen Palmisano

While improper execution of the flare manoeuvre has been implicated in many landing incidents, very few human factors studies appear to have examined this problem. The flight simulation study examined three different visual strategies that pilots could use to time the flare. On each trial, participants were required to judge either their time-to-contact with the ground or an idealised time to initiate the flare. Pilot performance was generally superior to non-pilot performance. However, both pilots and non-pilots were found to demonstrate flare timing biases during impoverished visual conditions. Importantly, very accurate timing judgments were possible with richer visual displays that provided performance feedback. Entry-level flight simulators can be used for flare timing training if certain minimum visual display conditions have been met.

Design and Evaluation of Auditory Icons as Informative Warning Systems

Applicant: Associate Professor Catherine Stevens

Incidents have occurred resulting from lack of pilot attention to the cabin pressurisation warning light. Although auditory alarms have been recommended there is little research guiding signal type and modality of presentation. 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 will be conducted that investigate the effect of warning type (abstract, icon) and modality (auditory, visual, auditory + visual) on event recognition speed and accuracy. The results will inform the design of warning signal sets in civil aviation cockpits.

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

Applicant: Dr Matthew Thomas

Work-related fatigue presents a significant risk to aviation safety. Recent incidents involving the Australian transcontinental back of clock operations of commercial carriers have been investigated by the ATSB, and negative safety outcomes have been attributed to fatigue-related factors. The aim of the proposed project is to determine the impact of back of clock operations on sleep and performance in commercial aviation flight crew. The project will evaluate the relative fatigue risk of current rostering practices, and provide significant new data to inform better use of common fatigue modelling approaches.

Aviation safety research grant reports issued in 2005–06

Forensic Identification of Aviation Bird Strikes in Australia

Applicant: Dr Leslie Christidis *(See page 117)*

Investigation of Visual Flight Cues for Timing the Initiation of the Landing Flare

Applicant: Dr Stephen Palmisano *(See page 117)*

An Assessment of General Aviation Pilot Performance During Simulated Flight

Applicant: Dr Mark Wiggins

The primary aim of this study was the development of a set of normative data that captured the performance of a sample of general aviation pilots during a simulated flight from Wagga Wagga to Bankstown via Canberra, Goulburn and Mittagong. A secondary aim was to consider the impact of pilot qualification on the performance of pilots during the flight. Overall, the data acquired in the study represented a useful normative dataset against which the performance of pilots can be assessed in the future. As expected, there is a significant level of variability in the performance of pilots who conducted the simulated approach.

This variability was most evident during the final stage of the flight when the demands on pilots were most acute and when the impact of fatigue was most likely to occur.

Evacuation Commands for Optimal Passenger Management

Applicant: Ms Lauren Thomas

The efficient evacuation of passengers is crucial to survivability in aircraft accidents where hull-loss is not immediate. The first phase of the project was a best practice forum and survey, supported by members of the Asia Pacific Cabin Safety Working Group of the Australian Society of Air Safety Investigators, to establish the commands, policies and procedures currently in use among Australian and Asian operators. The second phase involved both survey and experimental work, with members of the public participating as passengers. The aim of the experimental tests was to investigate the effectiveness of selected cabin crew commands in managing passengers during evacuations.

Fire Safety of Advanced Composites for Aircraft

Applicant: Professor Adrian Moritz

Fire contributes to aircraft accidents and many fatalities. The growing use of polymer composite materials in aircraft has the potential to increase the fire hazard due to the flammable nature of the organic matrix. This report assesses the fire hazard of current and next-generation polymer composites for aircraft, and identifies those materials with improved flammability resistance. A comprehensive review of the scientific literature was performed to develop a database on the fire properties of a large number of polymer composite materials.

Fatigue Management in the New Zealand Aviation Industry

Applicant: Dr T Leigh Signal

At present, very little is known about how fatigue is being managed in the New Zealand aviation industry. The present study aimed to gather information on how New Zealand aviation organisations are managing fatigue, the different strategies being used, the advantages and disadvantages of different approaches, the barriers companies are facing in managing fatigue, and the resources used or required to help organisations better manage fatigue.

Organising for Flight Safety

Applicant: Dr Robert Dannatt

Many factors contribute to an airline's safety record, some external to the organisation and others internal. An important internal contribution comes from

the manner in which the company's flight operations are managed. This study addresses the organisational factors impinging on an airline's safety outcome that are subject to influence by managers in their flight operations divisions. Particular attention is given to evidence of the concept known as 'institutional resilience'.

Child Restraint in Aircraft

Applicant: Mr Tom Gibson

Commercial airlines in Australia do not require infants under the age of 24 months to occupy their own seats during flight. However, the children carried in the arms of adult passengers must be restrained during taxi, take-off, landing and turbulence. The aims of this project were to review the developments in safe transport of children in aircraft and to conduct a test program based on current Australian child restraint systems (CRS). This initial program was later extended to include the assessment of infant carrier systems (commonly referred to as baby slings) for use as infant restraints in aircraft.

Appendix 3: Investigation reports released in 2005–06

Rail reports released in 2005–06

Occurrence Date	Rail accident or incident	Location	Report release date
15–Mar–04	Derailment of Freight Train 6SM9V	Alumatta, VIC	18–Aug–05
25–Feb–04	Near collision between stationary Coal Train LD166 and an empty Endeavour Passenger Train D743	Sandgate, NSW	21–Sep–05
15–Nov–04	Derailment of Cairns Tilt Train VCQ5	Berajondo, QLD	5–Oct–05
28–Jun–04	Signal MR5 Passed At Danger, Freight Train Y245	Murarrie, QLD	21–Nov–05
20–Sep–04	Signal Passed At Danger	Fisherman Islands, QLD	3–Jan–06
11–Oct–04	Derailment of coal train DS212	Thornton, NSW	23–Jan–06
21–Nov–04	Derailment of Pacific National freight train 7MP5, Glenalta, SA	Glenalta, SA	2–Feb–06
23–Sep–04	Derailment of freight train 4VM9-V	Benalla, VIC	8–Feb–06
13–Oct–02	Collision Between Steam Passenger Train 8382 & Loaded B-double truck	Benalla, VIC	23–Feb–06
2–Feb–05	Shunting Accident	Regency Park, SA	31–Mar–06
19–Jan–05	Collision between Freight Train 4MP5 and XPT Passenger Train 8622	South Dynon, VIC	23–May–06
25–Aug–05	Collision between Freight Train 5BS7 and Track Vehicle, Greenbank, Qld	Greenbank, QLD	13–Jun–06
30–Jan–05	Derailment of Pacific National 6MP4 and Pacific National 6SP5 Trains	Koolyanobbing & Booraan, WA	26–Jun–06
Preliminary Report			
9–Feb–06	Derailment of XPT Passenger Train	Harden, NSW	21–Mar–06

Marine reports released in 2005–06

Report Number	Date	Vessel(s)	Location	Date released
211	15–Apr –05	Collision between the bulk carrier *Spartia* and the fishing vessel *Hannah Lee*	Off the south-west coast of Western Australia	21–Sep–05
214	16-May–05	Fatality on board the bulk carrier *Golden Bell*	Dampier, WA	10–Nov–05
213	11–May–05	Fatality on board the products/oil/bulk/ore carrier *Probo Panda*	Gladstone, Qld	16–Nov–05
216	24–Jun–05	Collision between the bulk carriers *Pilsum* and *China Steel Growth*	Newcastle anchorage, NSW	14–Dec–05
212	21–Apr–05	Serious injury on board the bulk carrier *Hui Shun Hai*	Off the south coast of Western Australia	9–Jan–06
208	7–Oct–04	Lifeboat accident and fatalities on board the bulk carrier *Lowlands Grace*	off Port Hedland, WA	9–Feb–06
210	19–Feb–05	Collision between the bulk carrier, *Goa*, and the sailing vessel *Marie Chocolat*	off Newcastle, NSW	10–Feb–06
218	15–Sep–05	Engine room fire on board the bulk carrier *Opal Naree*	Dampier, WA	7–Mar–06
217	22–Jul–05	Grounding of the sail training ship *Leeuwin II*	Prince Frederick Harbour, WA	13–Mar–06
219	16–Sep–05	Grounding of the sail training ship *Leeuwin II*	Shark Bay, WA	13–Mar–06
209	27–Jan–05	Fatality and lifeboat accident on board the Antarctic support vessel *L'Astrolabe*	Southern Ocean	27–Mar–06
222	15–Oct–05	Loss of the DIMIA vessel, *Malu Sara*, with five fatalities	Torres Strait, Qld	19–May–06
221	14–Oct–05	Serious injury on board the bulk carrier *River Embley*	Gladstone, Qld	14–Jun–06
186	22–Sep–02	Equipment failure on board the bulk carrier *Goliath*	Bass Strait, Vic	21–Jun–06
191	12–Feb–03	Equipment failure on board the bulk carrier *Goliath*	Off Jervis Bay, NSW	21–Jun–06

Aviation investigation and technical analysis reports released in 2005–06

Report number	Occurence Date	Occurence number	Occurrence Type	Registration	Location	State	Date Released
1	08–Nov–03	200304546	Accident	VH-YKL	43km NW Kununurra, Aerodrome	WA	25–Jul–05
2	11–Nov–03	200304589	Accident	VH-CTT	Bankstown, Aerodrome	NSW	27–Jul–05
3	08–Oct–04	200403825	Serious Incid.	VH-TNW	Gold Coast, Aerodrome	QLD	01–Aug–05
4	18–Apr–05	200501656	Accident	VH-LCZ	Warooka, (ALA)	SA	01–Aug–05
5	06–Apr–04	200401270	Incident	VH-QPC	Sydney, Aerodrome	NSW	02–Aug–05
6	08–Mar–05	200501287	Accident	VH-FGN	Patek, (ALA)	Other	03–Aug–05
7	15–Jun–04	200402215	Accident	VH-HMT	11km W Innisfail	QLD	10–Aug–05
8	25–Dec–03	200501310	Incident	B-22805	Sangshan, Aerodrome	Other	15–Aug–05
9	07–Dec–04	200404857	Serious Incid.	VH-SQR	130km NW Maroochydore / Sunshine Coast, Aerodrome	QLD	22–Aug–05
10	25–Jan–05	200500302	Incident	9L-LEK	Brisbane, Aerodrome	QLD	22–Aug–05
11	01–Nov–04	200404287	Incident	VH-ZXC/A97J	9km ENE Sydney, Aerodrome	NSW	12–Sep–05
12	19–Apr–05	200501720	Serious Incid.	VH-TQX/N196UA	167km E Sydney, VOR	NSW	13–Sep–05
13	19–Feb–05	200500778	Incident	VH-TQR	Sydney, Aerodrome	NSW	14–Sep–05
14	19–Jul–04	200402669	Accident	VH-RTK	12km W Wodonga	VIC	12–Oct–05
15	30–Aug–04	200403202	Accident	HB-LRW	El Questro, (ALA)	WA	18–Oct–05
16	28–Jul–05	200503675	Serious Incid.	VH-OJE	Frankfurt/Main, Aerodrome	Other	21–Oct–05
17	30–Aug–04	200403209	Incident	VH-SSL	28km W Mount Mcquoid, VOR	NSW	24–Oct–05
18	27–May–04	200401904	Incident	VH-VBX	41km SSE Cairns, Aerodrome	QLD	25–Oct–05
19	02–Apr–04	200401217	Accident	VH-UTY	5km NW Brisbane, Aerodrome	QLD	26–Oct–05
20	21–Jan–05	200500222	Incident	VH-JEA	Wilton, (ALA)	NSW	26–Oct–05

Aviation investigation and technical analysis reports released in 2005–06 *continued...*

Report number	Occurence Date	Occurence number	Occurrence Type	Registration	Location	State	Date Released
21	13–Oct–04	200403956	Serious Incid.	VH-WPF/ VH-PMW	11km SW Jandakot, Aerodrome	WA	27–Oct–05
22	24–Apr–05	200501819	Serious Incid.	ZS-SLA	Perth, Aerodrome	WA	27–Oct–05
23	21–Oct–04	200404178	Incident	VH-VBN/ VH-XSY	65km SE Alice Springs, Aerodrome	NT	31–Oct–05
24	28–Nov–04	200404707	Incident	HS-TGJ/VH-OJM	278km NW NIKOM, (IFR)	Other	02–Nov–05
25	10–Mar–05	200501155	Tech Analysis	VH-LHX	Near Moliana	Other	02–Nov–05
26	03–Mar–05	200500925	Incident	VH-FNB	11km ENE Perth, Aerodrome	WA	03–Nov–05
27	14–Feb–05	200500620	Tech Analysis	VH-SZA	Tamworth	NSW	06–Nov–05
28	18–Jun–04	200402415	Serious Incid.	VH-KEQ	83km SW Albury, Aerodrome	VIC	08–Nov–05
29	04–Mar–05	200500994	Incident	VH-VOG	Melbourne, Aerodrome	VIC	08–Nov–05
30	07–Sep–04	200403333	Serious Incid.	VH-KJD	13km WNW Theodore	QLD	15–Nov–05
31	20–Jun–03	200302820	Accident	VH-OHA	13km NW Camden, Aerodrome	NSW	24–Nov–05
32	19–Feb–04	200400610	Accident	VH-LST	58km NNW Hobart, Aerodrome	TAS	19–Dec–05
33	28–Jul–04	200402819	Incident	VH-NJA	Pecan, (IFR)	NSW	20–Dec–05
34	06–Apr–05	200501392	Incident	VH-TNX / VH-VOJ	37km S Proserpine, VOR	QLD	23–Dec–05
35	02–Aug–04	200402839	Incident	VH-HWR	Perth, Aerodrome	WA	03–Jan–06
36	10–Aug–04	200402947	Accident	VH-MZV	4km NW Darwin, Aerodrome	NT	03–Jan–06
37	01–Jul–03	200305448	Tech Analysis	VH-VLH	Technical Analysis Investigation, Populated place	ACT	04–Jan–06
38	09–Sep–04	200405510	Accident	ZS-KOX	61 km NE Livingstone	Other	05–Jan–06
39	08–Sep–04	200403351	Accident	VH-JWX	56km W Roma, Non Directional Beacon	QLD	02–Feb–06
40	22–Nov–04	200404590	Accident	VH-CSH	12km SW Dunedoo, (ALA)	NSW	02–Feb–06

Aviation investigation and technical analysis reports released in 2005–06 *continued...*

Report number	Occurence Date	Occurence number	Occurrence Type	Registration	Location	State	Date Released
41	06–Sep–03	200303861	Incident	VH-TNG	Brisbane, Aerodrome	QLD	03–Feb–06
42	16–Apr–04	200401353	Serious Incid.	VH-OAE	65km E Mount Gambier, VOR	SA	03–Feb–06
43	30–Jul–04	200402820	Accident	VH-ZZN	Brisbane	QLD	03–Feb–06
44	14–Apr–05	200501628	Serious Incid.	VH-VBU/ VH-YJR	Brisbane, Aerodrome	QLD	03–Feb–06
45	01–Aug–05	200503694	Accident	VH-LMB	Port Augusta, Aerodrome	SA	03–Feb–06
46	28–Jul–04	200402797	Accident	VH-TNP	34km SE Benalla, Aerodrome	VIC	07–Feb–06
47	18–Jan–05	200500145	Incident	VH-OLM/ VH-TQV	Albury, VOR	NSW	13–Feb–06
48	13–Apr–05	200501655	Serious Incid.	VH-HXU	Currymore Station, near Mt Carbine	QLD	13–Feb–06
49	12–May–05	200502078	Accident	VH-ADC	Shannons Flat	NSW	17–Feb–06
50	03–May–05	200502272	Tech Analysis	ZK-POA	Stratford, North Island, New Zealand	Other	02–Mar–06
51	02–Jul–05	200503139	Accident	VH-SEQ	Townsville, Aerodrome	QLD	02–Mar–06
52	13–Jul–04	200402667	Incident	VH-KEX	28km E Ceduna, Aerodrome	SA	13–Mar–06
53	06–Oct–05	200504925	Accident	VH-HUZ	Calindary Station, Populated place	NSW	30–Mar–06
54	02–Feb–05	200500395	Incident	VH-TQE	41km E Scone	NSW	31–Mar–06
55	30–Apr–05	200501905	Serious Incid.	VH-FWE	15km N Benalla, Aerodrome	VIC	31–Mar–06
56	03–Oct–03	200305494	Tech Analysis	ZK-KFU	19km N Paraparaumu, Aerodrome		03–Apr–06
57	25–Jun–05	200502968	Incident	VH-YJI / VH-SBB	Cairns, Aerodrome	QLD	13–Apr–06
58	15–Aug–04	200403006	Accident	VH-DXZ	8.5km NNE Caloundra, (ALA)	QLD	21–Apr–06
59	15–May–05	200502116	Accident	VH-TUF	Stonefield	SA	24–Apr–06
60	22–Oct–04	200404214	Incident	VH-EBU	Istem, (IFR)	Other	26–Apr–06
61	15–Sep–05	200504615	Incident	OE-LAZ	19km NE Melbourne, Aerodrome	VIC	08–May–06

Aviation investigation and technical analysis reports released in 2005–06 *continued...*

Report number	Occurence Date	Occurence number	Occurrence Type	Registration	Location	State	Date Released
62	08–Jul–05	200503265	Accident	VH-OAO	Mount Hotham, (ALA)	VIC	11–May–06
63	27–Nov–01	200105618	Accident	VH-LQH	Toowoomba, (ALA)	QLD	18–May–06
64	10–Aug–04	200402948	Serious Incid.	VH-VQA	22km SSE Melbourne, Aerodrome	VIC	31–May–06
65	17–Nov–05	200505925	Incident	VH-NXE / VH-JOI	28km E Alice Springs, VOR	NT	31–May–06
66	22–Jan–06	200600383	Accident	VH-FBE	Gulgong, (ALA)	NSW	31–May–06
67	30–May–05	200502400	Serious Incid.	JA 8184	Sydney, Aerodrome	NSW	01–Jun–06
68	19–Dec–04	200405118	Incident	VH-VOH	Canberra, Aerodrome	ACT	02–Jun–06
69	22–Jan–05	200500285	Serious Incid.	VH-VQI	28km ENE Cairns, Aerodrome	QLD	05–Jun–06
70	13–Oct–05	200505028	Incident	VH-TFP / VH-UYA	Townsville, Aerodrome	QLD	05–Jun–06
71	06–Dec–05	200506306	Accident	VH-KPQ	30km W Packsaddle	NSW	05–Jun–06
72	01–Feb–05	200500382	Incident	VH-VXH	Sydney, Aerodrome	NSW	08–Jun–06
73	18–Jan–05	200500167	Accident	VH-SGT	Perth, Aerodrome	WA	22–Jun–06
74	05–Mar–05	200500993	Accident	VH-OXY	2km W Jandakot, Aerodrome	WA	22–Jun–06
75	20–Aug–05	200504077	Incident	VH-NJN	Alice Springs, Aerodrome	NT	22–Jun–06
76	23–Apr–05	200501788	Accident	VH-UPS	7km S Healesville	VIC	23–Jun–06
77	27–Sep–04	200403651	Accident	VH-MTF	Strahan	TAS	28–Jun–06
78	18–Dec–05	200506650	Incident	VH-VQI / VH-LLD	9km S Williamtown, Aerodrome	NSW	28–Jun–06
79	24–Jan–06	200600633	Incident	VH-VXR / VH-NJN	Perth, Aerodrome	WA	28–Jun–06

Aviation investigation and technical analysis reports released in 2005–06 *continued...*

Report number	Occurence Date	Occurence number	Occurrence Type	Registration	Location	State	Date Released
80	31–Jan –05	200500355	Incident	VH-SDA / REG 2005003551 /REG 2005003552	Williamtown, Aerodrome	NSW	29–Jun–06
81	17–Feb–05	200500719	Incident	VH-VXN	83km E Adelaide, VOR	SA	29–Jun–06
82	06–Nov–05	200505623	Incident	A6-EBG	WHALE, (IFR)	Other	29–Jun–06
83	03–Dec–05	200506508	Incident	VH-OJO / UR-VVF	POXEM, (IFR)	Other	29–Jun–06
84	25–Jan–06	200600396	Incident	VH-VXC / 9V-SVH	APOMA, (IFR)	NSW	29–Jun–06
85	07–Jul–04	200405514	Tech Analysis	N/A	Technical Analysis Investigation, Populated place	NSW	30–Jun–06
86	13–Oct–04	200405511	Tech Analysis	REG_2004055111	Thargomindah, (ALA)	QLD	30–Jun–06
87	09–Dec–04	200405064	Incident	VH-QPC	Singapore, Changi, Aerodrome	Other	30–Jun–06
88	09–May–05	200502004	Tech Analysis	N16-100	Nias Island, Indonesia	Other	30–Jun–06
89	25–Jul–05	200503586	Accident	VH-PRJ	Nhill, Aerodrome	VIC	30–Jun–06
90	20–Aug–05	200504074	Accident	VH-QPE	184km E Sabgu, (IFR)	Other	30–Jun–06
91	27–Oct–05	200505332	Incident	VH-SUV	9km N Warwick, (ALA)	QLD	30–Jun–06
92	16–Jan–06	200600160	Incident	VH-ORX	15km SSW Lismore, Aerodrome	NSW	30–Jun–06
93	02–Feb–06	200600524	Accident	VH-OGH/N127UA	Melbourne, Aerodrome	VIC	30–Jun–06

Appendix 4: Transport safety recommendations and safety advisory notices issued in 2005–06

This appendix provides detailed information on the status of safety recommendations and safety advisory notices issued by the Australian Transport Safety Bureau in 2005–06.

Rail

The ATSB completed eleven rail investigation reports in 2005–06 under the provisions of the TSI Act including 83 safety recommendations. In October 2005 the Queensland Minister for Transport released the final report into the joint Queensland Transport/ATSB Tilt train report including six recommendations. In February 2006 the Victorian Minister for Transport released the final report on the ATSB investigation into the 2002 Benalla rail level crossing accident including 18 recommendations. There is no regulatory requirement for the rail industry to respond to these recommendations.

Marine

Thirteen investigation reports completed in 2005–06 contained 40 safety recommendations that were released in 2005–06. There is no regulatory requirement for the shipping industry to respond to these.

Aviation

Under existing memoranda of understanding, both the Civil Aviation Safety Authority and Airservices Australia have agreed to respond to the ATSB within 60 days of the date of issue of any safety recommendations. No other organisations 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. This situation may result in a response date being prior to the formal issue date.

In 2005–06, the ATSB issued 18 recommendations and received 18 responses. Of the responses nine were closed-accepted, two were closed-partially accepted, six were being monitored, one was closed not accepted.

Updated responses to prior year recommendations are available at the ATSB website.

The ATSB also issued four safety advisory notices which do not require formal responses.

Rail safety recommendations	Date of issue
Derailment of Freight Train 6SM9V at Alumatta, Victoria on 15 March 2004 (2004/002)	*18 August 2005*

Australian Rail Track Corporation

RR20050012

The ATSB recommends that the ARTC review their risk analysis for track standards to ensure that suitable track maintenance and monitoring standards, aligned with contemporary practices and workforce resources, are implemented on ARTC leased track in Victoria.

RR20050013

The ATSB recommends that the ARTC conduct an audit of crossing loops, turnouts and cripple sidings on their leased standard gauge track in Victoria with a view to ensuring this track is fit for intended purpose.

RR20050014

The ATSB recommends that the ARTC enures compliance to section 4.6 of the ARTC Incident Management Plan TA44, specifically the requirements for immediate communication with other train control centres.

RR20050015

The ATSB recommends that the ARTC, in conjunction with other track owners and operators, examine ways of improving operational transparency between standard and broad gauge parallel corridors within Victoria.

Pacific National

RR20050016

The ATSB recommends that the Freight Australia Emergency Management Plan or the current equivalent (if updated or replaced by Pacific National), ensures that in the event of an incident or suspected incident on the broad gauge track that immediate contact is made with the ARTC train controller. This recommendation applies to all corridors in Victoria where Pacific National leased tracks and ARTC leased tracks parallel each other.

R20050017

The ATSB recommends that Pacific National reinforces the need for locomotive drivers not to increase the speed of their trains above the maximum permitted until the whole of the train is clear of a curve, turnout or temporary speed restriction.

R20050018

The ATSB recommends that Pacific National ensure that locomotive speedometers and countdown / distance measuring devices (where fitted) are checked for accuracy in accordance with existing requirements.

Rail safety recommendations	Date of issue
Victorian Department of Infrastructure R20050019 The ATSB recommends that the Victorian Department of Infrastructure review their requirements for accreditation to ensure that suitable track maintenance and monitoring standards, aligned with contemporary practices and workforce resources, are implemented on ARTC leased track within Victoria. R20050020 The ATSB recommends that the Victorian Department of Infrastructure monitors the recommended ARTC audit of crossing loops, turnouts and cripple sidings. R20050021 The ATSB recommends that the Victorian Department of Infrastructure monitors the recommended examination of improvements to operational transparency between standard and broad gauge parallel rail corridors within Victoria.	
Near collision between stationary Coal Train LD166 and an empty Endeavour Passenger Train D743 at Sandgate, NSW on 25 February 2004 (report no.2004/001) Rail Corp RR20050022 The Australian Transport Safety Bureau recommends that RailCorp review and reinforce the use of blocking facilities to the greatest effect through initial and SMS employee training. RR20050023 The Australian Transport Safety Bureau recommends that RailCorp consider random audits by supervisory staff to review and reinforce the use of blocking facilities to signal operators. RR20050024 The Australian Transport Safety Bureau recommends that RailCorp consider reviewing the application of blocking facilities to provide effective protection. RR20050025 The Australian Transport Safety Bureau recommends that RailCorp review and reinforce the use Special Proceed Authority forms to the greatest effect through initial and SMS employee training. RR20050026 The Australian Transport Safety Bureau recommends that RailCorp consider revised training practices with regard to 'live action' Special Proceed Authority training for signal operators.	*21 Sep 05*

Rail safety recommendations	Date of issue
RR20050027 The Australian Transport Safety Bureau recommends that RailCorp review the content of the Network Rules and procedures so that the effective use of blocking facilities and SPAs are better defined. RR20050028 The Australian Transport Safety Bureau recommends that RailCorp review fatigue management principles to monitor and prevent roster induced fatigue. RR20050029 The Australian Transport Safety Bureau recommends that RailCorp review the human interface design of signalling equipment at Hanbury Junction signal box. RR20050030 The Australian Transport Safety Bureau recommends that RailCorp review the maximum speed of trains whilst travelling in the wrong running direction without signals. Independent Transport Safety and Reliability Regulator RR20050031 The Australian Transport Safety Bureau recommends that the Independent Transport Safety and Reliability Regulator liaise with RailCorp on the effective implementation of these recommendations.	
Signal MR5 Passed At Danger, Freight Train Y245 at Murarrie,QLD on 28 June 2004 Recommendations (2004/003) Queensland Rail RR20050033 The ATSB recommends that QR undertake a review of practices and procedures at the Mayne Control Centre to cater for necessary short term absences from train controller workstations. RR20050034 The ATSB recommends that QR review their medical standards to ensure that safety critical staff who are at high risk of incapacitation are subject to increased medical surveillance. RR20050035 The ATSB recommends that QR introduce a scheme to ensure that operational managers can properly assess and act upon the risk posed by significant changes in the health of safety critical staff who develop or exacerbate health problems between medical examinations.	*21 Nov 2005*

Rail safety recommendations	Date of issue
RR20050032 The ATSB recommends that QR review their SPAD investigations and related Employee Management System procedures with focus on the following: ' Ensuring that a system of investigation and counselling for relevant safety critical staff exists, which adheres to strict timelines, to ensure SPAD incidents are fully dealt with in the timeliest manner. ' Investigation of SPADs includes examination of individual actions and organisational factors so that all causal factors are identified. ' Review the monitoring and management of employees who have returned to safety critical tasks after involvement in a SPAD, particularly multi-SPAD or high category SPAD employees.	
Signal Passed At Danger at Fisherman Island, Queensland on 20 September 2004(2004/004) Queensland Rail RR20050036 The ATSB recommends that QR compile a fatigue management policy/standard to guide managers and workers in how to manage fatigue in planning and operational situations. This policy/standard should also provide guidance on how to deal with reported instances of fatigue. RR20050037 The ATSB recommends that QR evaluate the installation of wayside secondary protective/prompt device/s in advance of signal FS66. Such device is to be compatible with all operators. This recommendation is made in light of the position of FS66 and the number of SPADs that have occurred at this signal. RR20050038 The ATSB recommends that QR amend the emergency response procedures applicable to Fisherman Islands to ensure that initial notification of a SPAD is sent to the officer who has control of the signal in question. RR20050039 The ATSB recommends that QR amend the interface procedures between Mayne train control centre and Fisherman Islands with the intention of ensuring that all trains are contactable by the Fisherman Islands area controller/station officer when in signalled territory controlled by the Fisherman Islands area coordinator/station officer. Boundaries of signalled territory to be clearly defined and current discrepancies in regard to radio channels and signal control to also be amended.	*3 January 2006*

Rail safety recommendations	Date of issue
RR20050040 The ATSB recommends that QR undertake training of all concerned in regard to emergency response and interface procedures between the Mayne train control centre and Fisherman Islands. RR20050041 The ATSB recommends that QR examine methods of ensuring continued attendance by appropriately qualified employees at the Fisherman Islands area coordinator/station officer workstation. Queensland Rail Safety Regulator RR20050042 The ATSB recommends that the Queensland Railway Safety Regulator: • Actively monitor the actions initiated by QR in response to this investigation. • Recognise that the findings of this investigation may be relevant to other organisations, and take the appropriate actions to ensure they are advised accordingly.	
Derailment of coal train DS212 at Thornton, NSW on 11 October 2004	*23 January 2006*
Australian Rail Track Corporation RR20050058 The Australian Transport Safety Bureau recommends that the ARTC review the maintenance standards for track inspections and observations, including reporting and remedial actions, to ensure that physical track is consistent with track standards in NSW RR20050059 The Australian Transport Safety Bureau recommends that the ARTC identify high risk areas of wide gauge and implement an effective monitoring and remedial regime. Pacific National RR20050060 The Australian Transport Safety Bureau recommends that Pacific National review the implications of asymmetric wheel tracking and wear on rail vehicle safety. RR20050061 The Australian Transport Safety Bureau recommends that Pacific National review the effect of lateral wheel load forces in relation to asymmetric wheel tracking and wear on rail vehicle safety. RR20050062 The Australian Transport Safety Bureau recommends that Pacific National reinforce the requirements of the ARTC network rules and procedures regarding the protection of trains.	

Rail safety recommendations	Date of issue
Independent Transport Safety and Reliability Regulator NSW RR20050063 The Australian Transport Safety Bureau recommends that ITSRR, during routine audits, ensure that ARTC track in NSW complies with accredited ARTC track standards.	
Derailment of Pacific National freight train 7MP5, Glenalta, SA on 21 November 2004 (2004/008) Pacific National RR20050043 The ATSB recommends that Pacific National: ' Review any ambiguity regarding the ACOP definition of a 'vehicle', and the application of that definition to multiple platform wagons. ' Review the loading and marshalling requirements, with consideration given to the intended application of the ACOP's Standard Marshalling Requirements and with consideration given to modern rail operations. ' Implement the relevant changes and initiate the ACOP change process using the Code Management Company's documented procedures. R20050044 The ATSB recommends that Pacific National enhance the functionality of the OASIS and TMS systems by incorporating the criteria for confirming a train for departure (including the loading and marshalling criteria). RR20050045 The ATSB recommends that Pacific National: Enhance the Train Consist Report provided to locomotive drivers such that each platform of a multi-platform drawbar connected wagon is presented as an individual wagon. Encourage drivers to refer to the Train Consist Report and tailor their driving technique to reflect any undesirable factors relating to the load distribution, such as the use of dual braking on steep descending grades. RR20050046 The ATSB recommends that Pacific National conduct further investigation and review into the suspension configuration of the RQZY wagon and similar wagons, with consideration to: ' The wagon's ability to handle discrete wheel impacts when in tare condition ' The wagon's ability to handle twisted track when loaded with a light weight empty container. Noting that the wagon body would no longer retain its tare condition flexibility.	*2 February 2006*

Rail safety recommendations	Date of issue
Australian Rail Track Corporation RR20050047 The ATSB recommends that the ARTC review the calculated and published speed limits for curves in areas of steep gradient, especially curves that are non-transitioned with all the cant runout entirely within the curve. RR20050048 The ATSB recommends that the ARTC: • Enhance the functionality of the WILD system to include automatically generated alarms when defined criteria are exceeded. For example, generating alarms when lightly loaded vehicles are detected within a heavy consist. • Document and implement appropriate procedures for managing automatically generated alarms when defined criteria are exceeded. South Australian Department of Transport RR20050049 The ATSB recommends that the South Australian Rail Safety Regulator: • Actively monitor the actions initiated by organisations in response to this investigation. • Recognise that the findings of this investigation may be relevant to other rail organisations or regulatory jurisdictions, and take the appropriate actions to ensure they are advised accordingly.	
Derailment of freight train 4VM9-V at Benalla, Victoria on 23 September 2004 (2004/005) Australian Rail Track Corporation RR20050050 The ATSB recommends that the Australian Rail Track Corporation consider appropriate modifications to the assessment of track infrastructure by inspection to identify deteriorated conditions such as those which led to this derailment. RR20050051 The ATSB recommends that the Australian Rail Track Corporation consider appropriate modifications to the assessment of track geometry as a whole so that all geometrical parameters are taken into account to identify the potential for track that could compromise the integrity of rail safety. RR20050052 The ATSB recommends that the Australian Rail Track Corporation consider the introduction of a standardised infrastructure methodology by way of the National Code of Practice to the DIRN in Victoria.	*8 February 2006*

Rail safety recommendations	Date of issue
RR20050053 The ATSB recommends that the Australian Rail Track Corporation consider appropriate modifications to the assessment, including post analysis interpretation, of track infrastructure by AK Car data to identify successive dips, twists and cross-levels (cants) that could cause dynamic roll of railway vehicles.	
RR20050054 The ATSB recommends that the Australian Rail Track Corporation give appropriate level of consideration to assessing AK Car data for repeated dips in one rail, or alternating between rails. This assessment should be considered together with variations in cross-level (cant).	
RR20050055 The ATSB recommends that the Australian Rail Track Corporation revise the emulation procedure used with the AK Car to provide a data set for comparison with standards, and consider a procedure using AK Car inertial data.	
RR20050056 The ATSB recommends that the Australian Rail Track Corporation undertake a comparative track survey and track recording car measurement run to determine calibration, measurement, calculation and reporting errors, and how best to use AK Car data.	
Victorian Department of Infrastructure	
RR20050057 The ATSB recommends that the Victorian Department of Infrastructure monitor the Australian Rail Track Corporation's consideration of the introduction of a standardised infrastructure methodology by way of the establishment of the National Code of Practice to the DIRN in Victoria.	

Rail safety recommendations	Date of issue
Shunting Accident at Regency Park, South Australia on 2 February 2005	*31 March 2006*

Specialised Container Transport (SCT)

RR20060001

The ATSB recommends that SCT:

- develop arrangements that do not require employees to ride a locomotive/wagon whilst it is being shunted, this should be done without compromising the safety of shunt movements; or if not feasible develop a restraint mechanism/workstation to protect a shunter from falling from a locomotive/wagon whilst carrying out a shunt movement.

RR20060002

The ATSB recommends that SCT:

- develop procedures that ensure a driver validates the position of a shunter, before starting a shunt movement and also regularly validates the wellbeing/whereabouts of a shunter whilst undertaking shunting activities.

RR20060003

The ATSB recommends that SCT:

- undertake a thorough risk assessment of its shunting activities. Translate this risk assessment into a comprehensive safe working procedure and develop/provide an associated and accredited training program. Provide regular retraining of employees with respect to safety critical activities.

RR20060004

The ATSB recommends that SCT:

- remind employees of their Occupational Health and Safety (OHS) responsibilities with respect to their personal safety, which includes a requirement to regularly check/replace worn personal protective equipment (PPE) such as safety boots/shoes and compliance with prescribed safety policies.

RR20060005

The ATSB recommends that SCT:

- undertake/record results of regular audits of employees working practices to ensure that they are complying with documented safe working procedures and training directives.

Rail safety recommendations	Date of issue
RR20060006 The ATSB recommends that SCT: ' ensure mandated medical instructions/restrictions are implemented. If the intent of a medical directive cannot be fully achieved consult with the medical practitioner to ensure any proposed alternative is effective. South Australian Railway Safety Regulator RR20060007 The ATSB recommends that the South Australian Railway Safety Regulator: ' Actively monitor the actions initiated by SCT in response to this investigation. RR20060008 The ATSB recommends that the South Australian Railway Safety Regulator: ' Recognise that the findings of this investigation may be relevant to other organisations, and take the appropriate actions to ensure they are advised accordingly.	
Collision between Freight Train 4MP5 and XPT Passenger Train 8622, South Dynon, Vic.	*23 May 2006*
Pacific National RR20060012 The ATSB recommends that Pacific National undertake a revision of their safety management system particular to the marshalling of trains in South Dynon yard and take into consideration the contributing factors to the 19 January 2005 occurrence. RR20060013 The ATSB recommends that Pacific National consider a revision of their safety management system to incorporate the need for a supervisory structure in relation to trainees in terminal operator teams. RR20060014 The ATSB recommends that Pacific National consider improvements to make sure that the rostered strength of terminal operator teams are adequately covered with contingencies for terminal operator sick leave and recreation leave.	

Rail safety recommendations	Date of issue

Victorian Department of Infrastructure

RR20060015

The ATSB recommends that the Victorian Department of Infrastructure consider the level of performance and implement improvements to the Moonee Ponds Creek Junction, South Dynon catch-points number 215D. The development of improvements should be based on the outcomes of a risk assessment and control measures may include but not be limited to the use of a throw-off rail or cross-over 'natural trap' style catch point or equivalent

RR20060016

The ATSB recommends that the Victorian Department of Infrastructure monitor Pacific National's revision of their safety management system particular to the marshalling of trains in South Dynon yard and their consideration of the contributing factors to the 19 January 2005 occurrence.

RR20060017

The ATSB recommends that the Victorian Department of Infrastructure monitor Pacific National's consideration of their safety management system to incorporate the need for a supervisory structure in relation to trainees in terminal operator teams.

Australasian Railway Association, Code Management Company

RR20060018

The ATSB recommends that the Australasian Railway Association consider the development of specifications for catch-points and similar devices for inclusion to the Code of Practice for the Defined Interstate Rail Network.

Pacific National

RR20060010

Interim Recommendations

That Pacific National review their procedures for the marshalling of trains at South Dynon to ensure that:

1. Communication protocols and phrases are clarified to ensure understanding and compliance.
2. Terminal operator teams do not diminish their effectiveness by attending to multiple requirements.
3. The terminal operator training program be reviewed to ensure a structured learning experience is achieved and suitable mentoring is provided for on-the-job training

Rail safety recommendations	Date of issue
Australian Rail Track Corporation RR20060011 Interim Recommendation That the Australian Rail Track Corporation review the existing protection arrangements between signal 214U and the main line at Moonee Ponds Creek Junction, South Dynon to ensure that the intended function of catch points 215D is adequate	
Collision between Freight Train 5BS7 and Track Vehicle, Greenbank, Qld on 25 August 2005	*13 June 2006*
Queensland Rail RR20060019 The ATSB recommends that Queensland Rail structure and enforce the training curriculum for trainee train controllers to ensure that practical experience at a train control workstation is undertaken in an appropriate manner at the intended stage of training. Consideration to be given to train controller workload factors in conjunction with the stage of trainee development. RR20060020 The ATSB recommends that Queensland Rail review verbal communication protocols to provide advice to employees on the use of unambiguous language. RR20060021 The ATSB recommends that Queensland Rail ensure that appropriate blocking facilities are applied on the Acacia Ridge to Glenapp corridor to prevent conflicting movements between trains and non track circuited track vehicles. Such measures to be progressed conjointly with the custodians of the rules and procedures that apply on the Glenapp to Casino corridor. RR20060022 The ATSB recommends that Queensland Rail progress the issue of rule and procedure conformity to ensure that the rules and procedures on the Acacia Ridge to Glenapp corridor match those on the Glenapp to Casino corridor. Queensland Railway Safety Regulator RR20060024 The ATSB recommends that Queensland Transport actively monitor the actions initiated by Queensland Rail in response to these recommendations.	

Rail safety recommendations	Date of issue
Australian Rail Track Corporation RR20060025 The ATSB recommends that the Australian Rail Track Corporation ensure that appropriate blocking facilities are applied on the Glenapp to Casino corridor to prevent conflicting movements between trains and non track circuited track vehicles. Such measures to be progressed conjointly with the custodians of the rules and procedures that apply on the Acacia Ridge to Glenapp corridor. RR20060026 The ATSB recommends that the Australian Rail Track Corporation progress the issue of rule and procedure conformity to ensure that the rules and procedures on the Glenapp to Casino corridor match those on the Acacia Ridge to Glenapp corridor.	
Derailment of Pacific National 6MP4 and Pacific National 6SP5 Trains at Koolyanobbing and Booraan, WA on 30 January 2005 WestNet Rail RR20060027 The ATSB recommends that WestNet Rail develop, document and implement procedures for managing reduced track stability due to track maintenance. The procedures should give consideration to: • The effect that maintenance may have on track stability, especially when conducted during periods of high ambient temperatures. • The period of time that the track is likely to exhibit reduced stability and the effect of high ambient temperatures during this period. • The application of speed limits following track maintenance work that may reduce track lateral stability. R20060028 The ATSB recommends that WestNet Rail develop, document and implement procedures for monitoring and management of longitudinal rail movement on the defined interstate rail network. The procedures should give consideration to: • Descending gradients and 'fixed point' locations, such as road level crossings, that may encourage rail bunching and a lowering of the rail's effective neutral temperature. • Measurement and correction of rail stress and rail neutral temperature if longitudinal rail movement is detected. RR20060029 The ATSB recommends that WestNet Rail develop, document and implement procedures whereby minor defects, identified through scheduled inspections, are assessed to identify factors that may have contributed to the defect.	*26 June 2006*

Rail safety recommendations	Date of issue

RR20060030

The ATSB recommends that WestNet Rail ensure a full ballast profile for the defined interstate rail network, especially at locations that exhibit an increased risk of longitudinal rail movement.

RR20060031

The ATSB recommends that WestNet Rail document the procedure for managing potential risks to safe rail operations during periods of high ambient temperature. (ie. the procedure for managing heat speed restrictions).

RR20060032

The ATSB recommends that WestNet Rail and its operational customers, develop, document and implement procedures that clearly define the responsibilities of each party involved in a rail accident. The procedures should take a 'whole of incident' approach and give consideration to:

- The role of the accident investigation to identify factors that may have contributed to the accident
- The requirement that essential evidence required for the investigation is not contaminated
- The understanding that the investigation should not unnecessarily prevent prompt recovery work
- The procedure should be generic such that all accidents are relevant.

Western Australian Rail Safety Regulator

R20060033

The ATSB recommends that the Western Australian Rail Safety Regulator:

- Actively monitor the actions initiated by organisations in response to this investigation.
- Recognise that the findings of this investigation may be relevant to other rail organisations or regulatory jurisdictions, and take the appropriate actions to ensure they are advised accordingly.

Rail safety recommendations	Date of issue
Rail safety recommendations under Victorian legislation	
Collision between Steam Passenger Train 8382 and Loaded B-double truck at Benalla, Victoria on 13 October 2002 (Victorian Government, not TSI Act)	*23 February 2006*
The Victorian Department of Infrastructure	
RR20020014	
Arrange for a review of risk methodology for railway level crossing protection treatment levels on B-double approved routes, including line markings and signage.	
RR20020015	
Monitor the review of procedures for varying level crossing protection when local factors change, such as traffic flow and type, speed, and vegetation	
RR20020016	
Monitor the review of the number of steam locomotive footplate visitors allowed.	
VicRoads	
RR20020017	
Review all existing railway level crossing protection treatment levels on B-double approved routes, including line markings and signage.	
RR20020018	
Develop community education programmes on the use and dangers of railway level crossings.	
RR20020019	
Review procedures for varying level crossing protection when local factors change, such as traffic flow and type, speed, and vegetation.	
RR20020020	
Actively involve the railway industry with level crossing safety issues.	
6.1.3 Benalla Rural City Council	
RR20020021	
Review all existing railway level crossing protection treatment levels on B-double approved routes, including line markings and signage, in particular the Saleyards Road level crossing.	

Rail safety recommendations	Date of issue
RR20020022 Develop community education programmes on the use and dangers of railway level crossings. RR20020023 Review procedures for varying level crossing protection when local factors change, such as traffic flow and type, speed, and vegetation RR20020024 Actively involve the railway industry with level crossing safety issues. RR20020025 Review the B-double route on the Racecourse Road, Gillies Street, and Saleyards Road level crossing. Freight Australia RR20020026 Monitor the review of all existing railway level crossing protection treatment levels on B-double approved routes, including line markings and signage. West Coast Railway RR20020027 Review the number of footplate visitors allowed at any one time whilst the locomotive is in motion. Rail Tram and Bus Union RR20020028 Review the fatigue management process applied to crew rostering for special trains, particularly crews in secondary employment. 6.1.7 Standards Association of Australia RR20020029 Review AS1742 part 7, with consideration to long and heavy vehicles such as B-doubles and increasing risks associated with these vehicles. Victorian Level Crossing Committee RR20020030 In conjunction with relevant authorities review all existing railway level crossing protection treatment levels on B-double approved routes, including line markings and signage, in particular the Saleyards Road level crossing. RR20020031 Pursue a more cost effective method of upgrading railway level crossings to provide active protection with no negative impact on safety.	

Rail safety recommendations	Date of issue
Recommendations under Queensland Government legislation	
Joint Queensland Transport/ATSB investigation into the derailment of the Cairns Tilt Train at Berajondo Queensland.	*15 November 2005*
Recommendations from the final report form of this investigation are on http://www.transport.qld.gov.au/qt/LTASinfo.nsf/index/railsafety_reports_cairns	

Marine Safety Recommendations issued in 2005–06

Marine Safety Recommendations	Date of issue
Collision between bulk carrier Spartia and fishing vessel Hannah Lee off the south-westcoast of Western Australia on 15 April 2005 MR20050019 All State and Territory registered commercial vessels operating offshore should be required to carry an operational VHF radio which is capable of maintaining a continuous watch on channel 16 (156.8 MHz) and, if required for vessel operations, another channel. MR20050020 Skippers of commercial State and Territory registered vessels should ensure that they have a full understanding of the COLREGS and their obligation under those regulations, with particular regard to keeping a lookout and actions to avoid a collision. MR20050021 State and Territory marine regulatory authorities should consider amending their policy and regulations with regard to perpetual certificates of competency with a view to implementing a revalidation process consistent with the requirements of the National Standard for Commercial Vessels. MR20050022 State and Territory marine regulatory authorities, through the National Marine Safety Committee, and in consultation with the Australian Seafood Industry Council, should ensure the safety and welfare of fishing vessel crews by reviewing work practices on Australian fishing vessels with a view to establishing guidelines for the management of crew fatigue	*21 September 2005* .
Fatality on board the products/oil/bulk/ore carrier, Probo Panda, at Gladstone, Qld on 11 May 2005 MR20050023 Shipping companies, managers and ship's masters should ensure that shipboard safety management systems include procedures for working on electrical equipment that are adequate and not ambiguous. It is essential that these procedures are backed up by sufficient onboard training and auditing to ensure personnel involved in performing or supervising electrical work understand and fully implement these procedures. MR20050024 Regulatory authorities, shipping companies and ship managers should consider the feasibility of widening the requirement for medical examinations and certificates to include more stringent testing for, and monitoring of, chronic conditions such as heart disease and diabetes.	*16 November 2005*

Marine Safety Recommendations	Date of issue
Fatality on board the bulk carrier, Golden Bell, at Dampier, WA on 16 May 2005 MR20050025 Ship owners, managers and masters should revise operational procedures to reflect the need to ensure that open deck areas on board their ships are adequately safeguarded. MR20050026 WA police, port authorities and port users should ensure that all parties likely to be involved in medical evacuations from ships are aware of standing arrangements regarding the provision of trained medical staff to accompany the helicopters used	*10 November 2005*
Collision between the bulk carriers Pilsum and China Steel Growth at the Newcastle anchorage, NSW on 24 June 2005 MR20050027 The Newcastle Port Corporation should consider a modification to the instructions given by the vessel traffic information centre to ships that intend anchoring off the port, with a view to increasing the clearing distances between ships in the anchorage. MR20050028 The Newcastle Port Corporation should consider modifying the advice contained in the Australian Pilot. This advice should highlight the risks associated with the Newcastle anchorage in adverse weather conditions. MR20050029 Ships' masters and crews formulate and implement plans that take into account equipment failures and other identified risks	*14 December 2005*
Serious injury on board the bulk carrier Hui Shun Hai, off the Western Australia coast, on 21 April 2005 MR20050030 Ship's managers and masters should review their safety management systems and the associated permit to work arrangements, to ensure that hydraulic systems are correctly isolated and relieved of pressure before work on the system has commenced.	*9 January 2006*

Marine Safety Recommendations	Date of issue
Collision between the bulk carrier Goa and the sailing vessel Marie Chocolat off Newcastle NSW on 19 February 2005 MR20060001 Masters and skippers need to be aware of the difficulty of detecting small craft especially as the weather deteriorates. A full briefing and instruction to any lookout, especially the inexperienced, should be given to use them to maximum advantage to ensure that an effective lookout is kept at all times. MR20060002 State and Territory marine regulatory authorities should review their certification requirements with regard to licensing of persons operating a vessel offshore with a view to including yacht masters. Consideration should also be given to implementing a qualification revalidation process. MR20060003 State and Territory marine authorities, through the National Marine Safety Committee, should review the carriage requirements for radar reflectors with a view to increasing the early detection of small craft by larger radar-equipped vessels.	*10 February 2006*
Lifeboat accident and fatalities on board the bulk carrier Lowlands Grace, off Port Hedland, WA on 7 October 2004 MR20060004 It is recommended that ship owners, managers, statutory authorities and classification societies ensure that the keel attachments for hooks on lifeboats in service are inspected without delay to ensure that they are structurally sound. MR20060005 It is recommended that ship managers, ship's crews, ISM accreditation authorities and classification societies ensure that lifeboat maintenance and survey regimes include thorough ongoing monitoring of the condition of keel connection arrangements for lifeboat hooks. MR20060006 It is recommended that Umoe Schat-Harding (Mills Marine), UK, review the design of their Titan on-load release system in light of the *Lowlands Grace* accident and other incidents involving on-load release systems of similar design.	*9 February 2006*

Marine Safety Recommendations	Date of issue
Engine room fire on board the bulk carrier Opal Naree, off Dampier, WA on 15 September 2005	*7 March 2006*
MR2006007 The ship manager should review the work permit system, and ensure that the instructions contained in the permits are clear, and unambiguous.	
MR2006008 Owners and managers of ships that are not fitted with appropriate fire detection and alarm systems in engine rooms should consider fitting such systems.	
MR2006009 The flag state should consider referring the issue of fire protection of high risk areas to the International Maritime Organization for consideration.	
MR2006010 Owners, managers and ships' masters should consider implementing procedures that would ensure that isolating doors between engine rooms and any space containing an emergency fire pump or its source of power are kept closed at all times.	
MR2006011 The flag state should consider referring the issue of the positioning of emergency fire pumps in ships to the International Maritime Organization for consideration.	
MR2006012 The West Australian Fire and Emergency Services should consider reviewing their procedures with regard the use of the international shore connection when fighting fires on board ships.	
The groundings of the sail training ship Leeuwin II, at Prince Frederick Harbour, WA on 22 July 2005 and at Shark Bay, WA on 16 September 2005	*13 March 2006*
MR20060013 The Australian Hydrographic Service, in consultation with local commercial vessel operators, should consider implementing a schedule for the complete survey of the Bonaparte Archipelago to ensure that priority is given to those areas most highly trafficked.	
MR20060014 Masters of vessels navigating in areas which are inadequately surveyed should ensure that they are aware of the limitations of the information displayed on the navigation charts.	

Marine Safety Recommendations	Date of issue
MR20060015 The Leeuwin Ocean Adventure Foundation, in consultation with *Leeuwin II*'s masters, should undertake an analysis of the risks involved in operating the vessel in areas that are unsurveyed or inadequately surveyed, with the intention of developing effective risk management strategies and local knowledge. MR20060016 The Leeuwin Ocean Adventure Foundation should consider the practicalities of installing a forward scanning depth indicating device on board *Leeuwin II*. MR20060017 Masters and skippers of vessels of all sizes are encouraged to forward hydrographic notes to the Australian Hydrographic Service when they discover any navigational anomalies that are not displayed on the chart.	
Fatality and lifeboat accident on board the Antarctic support vessel L'Astrolabe, in the Southern Ocean on 27 January 2005 MR20050018 Owners, operators and masters of vessels fitted with totally enclosed lifeboats should consider replacing suspension rings attached to the lifeboats' fall blocks with suitably designed rings with 'hand holds' attached. MR20050019 Owners, operators and masters of vessels should consider the provision of foul weather recovery strops for use with the designated rescue boat on board. MR20050020 The owners and masters of *L'Astrolabe* should consider the introduction of a more rigorous system of monitoring alcohol consumption by the crew on board the vessel. MR20050021 The Flag State should consider referring the issue of foul weather recovery strops to the International Maritime Organization (IMO) for consideration.	*27 March 2006*

Marine Safety Recommendations	Date of issue
Serious injury on board the bulk carrier River Embley, at Gladstone, QLD on 14 October 2005	*14 June 2006*
MR20060022 ASP Ship Management should review the safety management systems on board *River Embley* and her sister ships to ensure they contain adequate control measures for critical tasks such as a steam valve repair. The review should include all job safety analysis data to ensure that the analysis is complete, reviewed and approved.	
MR20060023 Ship owners, managers and auditing authorities should review routine safety management system auditing plans to ensure that procedures and control measures that are critical to personnel safety, such as work permits, tag-out systems and safety analysis, are implemented on board all ships.	
MR20060024 Training institutions, regulatory authorities and ship managers should consider the implementation of a form of team resource management training for engineers. This training should be aimed at encouraging the implementation of principles and practices consistent with the STCW95 requirements for BRM training of deck officers.	
Loss of the DIMA, Qld vessel Malu Sara with five fatalities in Torres Strait, QLD on 15 October 2005	*19 May 2006*
MR20060025 Subsee Explorer Pty Ltd should review their vessel designs, methods of construction, testing, certification, equipping and quality assurance system with a view to ensuring that vessels meet the required statutory and/or contracted standards.	
MR20060026 Search and rescue authorities should consult with satellite and other mobile telephone service providers to determine under what circumstances useful information from satellite telephones and switch records could aid search and rescue operations under certain conditions.	

Marine Safety Recommendations	Date of issue
Equipment failures on board the bulk carrier Goliath in Bass Strait on 22 September 2002 and off Jervis Bay, NSW on 12 February 2003 MR20060027 Shipowners, managers and ship's engineers should ensure that the maintenance regime applied to slow speed diesel engine scavenge spaces is thorough and takes into account the engine's history, condition and conditions of service. MR20060028 It is recommended that ABB Turbo Systems release a further service bulletin pursuant to service bulletin 5/98 detailing instances of turbocharger overspeeds with appropriate warnings and guidance for the safe operation of the affected turbochargers.	*21 June 2006*

Recommendation	Issue Date	Receiving organisation	Response due/received	Status of response
R20050005	09-Dec–05	BF Goodrich Aerospace	Received 15 Jun 2006	Closed-Not Accepted
The Australian Transport Safety Bureau recommends that BF Goodrich Aerospace formalise instructions to operators and maintenance organisations for the periodic inspection, based upon BFG SL 1714, of all Boeing 727 main landing gear wheels that have undergone a hub bushing repair.				
R20050006	09-Dec–05	Asian Express Airlines Pty Ltd	7 Feb 2006 Received 16 June 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.				
R20050008	09-Dec–05	National Jet Systems Pty Ltd	7 Feb 2006 Received 16 May 2006	Closed-Accepted
The Australian Transport Safety Bureau recommends that National Jet Express 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.				
R20050009	09-Dec–05	Aviation Australia Pty Ltd	7 Feb 2006 Received 17 May 2006	Closed-Accepted
The Australian Transport Safety Bureau recommends that Aviation Australia 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.				
R20050010	06-Feb–06	Air Services Australia	7 April 2006 Received 25 May 2006/ 20 July 2006	Closed/Partially Accepted
The Australian Transport Safety Bureau recommends that Airservices Australia review MATS 4.5.2.2 to ensure that separation between aircraft, established `by the use of visual observation of aircraft position and projected flight paths', is more clearly defined and consistently applied.				

Recommendation	Issue Date	Receiving organisation	Response due/received	Status of response
R20050011	06-Feb–06	AirServices Australia	7 April 2006 Received 20 July 2006	Closed/Partially Accepted
The Australian Transport Safety Bureau recommends that Airservices Australia ensure that controllers are aware of the importance of the separation assurance provisions of MATS 4.1.1.4, particularly in the application of procedural separation.				
R20050013	23-Dec–05	Civil Aviation Safety Authority	21 Feb 2006 Received 23 Feb 2006	Monitor
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.				
R20050014	23-Dec–05	Civil Aviation Safety Authority	21 Feb 2006 Received 6 Mar 2006	Closed-Accepted
The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority alert Australian operators of Kawasaki BK117 B-2 helicopter to the discrepancy with respect to the procedure for adjusting the collective pitch settings in the maintenance manual.				
R20040078	03-Jan–06	M7 Aerospace	Received 20 Jan 2006	Closed-Accepted
As a result of this investigation the Australian Transport Safety Bureau recommends that M7 Aerospace Pty Ltd review and amend its Fairchild SA-227 series maintenance manual to ensure that notes on operational tests, with regard to stabiliser movement versus trim switch position referred to in Section 27-40-10 for removal of the pitch trim switch, are included in Section 27-10-10 for related maintenance activities, or references to them are clearly noted in that part.				
R20060002	20-Jan–06	Civil Aviation Safety Authority	21 March 2006 Received 06 April 2006	Closed-Accepted
'The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority review and clarify the legal requirements concerning the qualifications for two-crew (pilot) operation during the conduct of instrument approaches in air transport operations. The review should assess the safety benefit arising from ensuring that when an instrument approach is conducted in an aircraft required to be operated by a two-person flight crew, both flight crew members are qualified to conduct the type of approach being carried out.				

Recommendation	Issue Date	Receiving organisation	Response due/received	Status of response
R20060003	20-Jan–06	Civil Aviation Safety Authority	21 March 2006 Received 3 April 2006	Monitor
The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority review the adequacy of current legislation and regulation and: • to assess the safety benefit that could be achieved from the fitment of a serviceable autopilot to all aircraft currently on the Australian civil aircraft register, engaged on scheduled air transport operations • with a view to ensuring that all aircraft placed on the Australian civil aircraft register after a specified date and intended to be engaged on scheduled air transport operations are equipped with a serviceable autopilot.				
SAN20050012	01-Feb–06			
The Australian Transport Safety Bureau notifies operators of Dash 8 aircraft fitted with part number A44700 –007 and/or A44700 –009 roll spoiler actuator components, of the increased risk of the cracking and/or rupture failure of the actuator cylinder section as the actuators accumulate service cycles. Failures have been sustained by actuators with service lives ranging from 27,909 to 41,716 cycles. Cracking or rupture of an actuator cylinder results in the loss of contents and subsequent failure of the associated aircraft hydraulic system. Given that the loss of an aircraft hydraulic system will result in extended landing distance requirements, operators are advised to consider the safety implications of operating affected aircraft to regions where the increased landing distance requirements may not be easily accommodated by available primary or alternate aerodromes.				
R20060004	02-Feb–06	Civil Aviation Safety Authority	3 April 2006 Received 22 May 2006/ 22 May 2006	Monitor
The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority (CASA), review the requirements for the carriage of on-board recording devices in Australian registered aircraft as a consequence of technological developments.				
R20060005	10-Feb–06	Civil Aviation Safety Authority	11 April 2006 Received 22 May 2006/ 16 August 2006	Monitor
The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority review the maintenance requirements for cockpit voice recording systems and flight data recording systems against international standards such as EUROCAE ED-112 and ICAO Annex 6 with the aim of improving their reliability and increasing the availability of data to investigators.				

Recommendation	Issue Date	Receiving organisation	Response due/received	Status of response
R20060006	10-Feb–06	Civil Aviation Safety Authority	11 April 2006 Received 22 May 2006	Monitor
The Australian Transport Safety Bureau recommends that the Department of Transport and Regional Services, with the assistance of the Civil Aviation Safety Authority, pursues further the development of proposals to amend the provisions of Part IIIB of the Civil Aviation Act 1988. While recognising the need to have protections to prevent inappropriate disclosure and use of Cockpit Voice Recorder information, the proposals to amend the CA Act should take into account the need to enable approved maintenance organisations to replay in-flight Cockpit Voice Recorder data for legitimate maintenance and testing purposes.				
R20060006	10-Feb–06	Department of Transport and Regional Services	11 April 2006 Received 24 Feb 2006	Monitor
The Australian Transport Safety Bureau recommends that the Department of Transport and Regional Services, with the assistance of the Civil Aviation Safety Authority, pursues further the development of proposals to amend the provisions of Part IIIB of the Civil Aviation Act 1988. While recognising the need to have protections to prevent inappropriate disclosure and use of Cockpit Voice Recorder information, the proposals to amend the CA Act should take into account the need to enable approved maintenance organisations to replay in-flight Cockpit Voice Recorder data for legitimate maintenance and testing purposes.				
R20060008	08-Mar–06	Civil Aviation Safety Authority	7 May 2006 Received 31 May 2006	Monitor
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 kgs, against international standards such as ICAO Annex 6 and regulations such as FAR 91.223, with the aim of reducing the potential for 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 NTSB recommendation for the fitment to turbine-powered helicopters certificated to carry six or more passenger seats.				
R20060010	01-May–06	Civil Aviation Safety Authority	30 June 06 Received 9 June 2006[1]	Closed-Accepted
The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority publish educational material, to promote greater awareness of the flat light phenomenon for pilots operating in susceptible areas.				

Recommendation	Issue Date	Receiving organisation	Response due/received	Status of response
R20060013	01-May–06	Civil Aviation Safety Authority	30 June 06 Received 16 August 2006	Closed-Accepted
The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority review its surveillance methods, which may include cooperation with Airservices Australia for the detection of patterns of unsafe practices and non-compliance with regulatory requirements.				
SAN20050014	26-Jun–06	Department of Defence		
The Australian Transport Safety Bureau suggests that the Department of Defence distributes this report widely among controllers so that supervisors are aware that intervention in separation and sequencing at the tactical level has the potential to adversely affect the situational awareness of controllers under their supervision. Further, they must be prepared to take control of a situation if necessary until the controller is able to safely resume responsibility for separation.				
SAN20050015	26-Jun–06	Department of Defence		
The Australian Transport Safety Bureau suggests that the department of Defence ensures that controllers are aware of the importance of the separation assurance provisions of MATS 4.1.1.4.				
SAN20050016	29-Jun–06	Owners, operators, maintainers and manufacturers of autogyro rotorcraft (gyrocopters)		
The Australian Transport Safety Bureau advises owners, operators, maintainers and manufacturers of autogyro rotorcraft (gyrocopters) of the potential for premature failure of the rotor hub bar or related components as a result of fatigue cracking developing from bolted connections within the hub bar assembly. Factors found to be significant in the development of cracking include the design of the rotor hub assembly, the tensioning, security and condition of the teeter and blade bolted connections and the duration, magnitude and frequency of flight loads.				

Note: 1. On 9 June 2006 CASA published an article in ***Flight Safety Australia*** *on the Mount Hotham accident including coverage of the 'flat light' phenomenon*

Appendix 5: ATSB investigations underway at 30 June 2006

Rail investigations underway at 30 June 2006

Occurence date	Location	Description
11–Aug–05	Horsham, Vic.	Fatal collision at an active level crossing
30-Sep–05	Eden Hills, S.A	Minor collision between a suburban passenger train and freight protruding from a passing train
4–Jan–06	Yerong Creek, NSW	Derailment of a freight train
9–Feb–06	Harden, NSW	Failure of an axle on the power car of an interstate passenger train
28-Mar-06	Adelaide railway station, SA	Safeworking irregularity incident
25–May–06	Lismore, Vic.	Fatal collision at a passive level crossing
2–Jun–06	Benalla, Victoria	Derailment of a freight train
5–Jun–06	Albury, NSW	Fatal collision at an active level crossing

Marine investigations underway at 30 June 2006

Vessel	Incident date	Vessel type	Location
Windeward Bound	3–Jun–04	Sail Training	Bass Strait
Mellum	28–Sep–04	Bulk Carrier	Thevenade, SA
Java Sea	24–May–05	General Cargo	Cairns, Qld
Safe Concordia	18–Sep–05	Platform	Bass Strait
Desh Rakshak	4–Jan–06	Tanker	Port Phillip, VIC
Global Peace/Tom Tough	24–Jan–06	Bulk Carrier/Tug	Gladstone, Qld
Pacific Sun	5–Feb–06	Passenger	Sydney, NSW
Dampier Spirit	6–Apr–06	Tanker	Off Dampier, WA
Crimson Mars	1–May–06	Bulk Carrier	Bell Bay, TAS
Kota Pahlawan	19–Jun–06	Container	Torres Strait

No.	Date	Occurrence No.	Occurrence Type	Investigation Category	Registration	Manufacturer	Model	Location
1	1-Jul-03	200305443	Tech Analysis	2				Technical Analysis Investigation, Populated place
2	30-May-04	200401917	Accident	3	VH-MIB	Robinson Helicopter Co	R22 MARINER	40km S Tobermorey, (ALA)
3	25-Aug-04	200403110	Incident	3	9V-SYB	Boeing Co	777-312	Melbourne, Aerodrome
4	31-Aug-04	200403238	Incident	4	VH-SBJ	de Havilland Canada	DHC-8-315	78km NNW Brisbane, VOR
5	19-Oct-04	200404085	Accident	3	VH-ZXZ	FFT GMBH	SC01 B-160	20km SW Saint George, Aerodrome
6	21-Nov-04	200404589	Serious Incid.	3	VH-TAG	Fairchild Industries Inc	SA227-AC	33km ENE Canberra, Aerodrome
7	6-Jan-05	200500004	Accident	3	VH-BQN	Air Tractor Inc	AT-802A	2.7km ESE Wynella Station
8	10-Feb-05	200500860	Incident	4	VH-SBI	de Havilland Canada	DHC-8-315	45km WNW Maleny, VOR
9	15-Feb-05	200500654	Incident	4	VH-TNX	de Havilland Canada	DHC-8-102	Hamilton Island, Aerodrome
10	7-Mar-05	200501000	Accident	3	VH-FIN	Cessna Aircraft Company	310R	7km WSW Tamworth, Aerodrome
11	18-Mar-05	200501189	Incident	4	VH-VQB	Boeing Co	717-200	38km SE Fliki, (IFR)

No.	Date	Occurrence No.	Occurrence Type	Investigation Category	Registration	Manufacturer	Model	Location
12	8-Apr-05	200501462	Tech Analysis	4	VH-WOU	Cessna Aircraft Company	207	Perth
13	28-Apr-05	200501912	Incident	4	VH-XUD	Embraer-Empresa Brasileira de Aeronautica	EMB-120 ER	36km SE Marymia, (ALA)
14	30-Apr-05	200501921	Incident	4	VH-LAX/ VH-PVX	Boeing Co/ Cessna Aircraft Company	717-200/ A152	Hobart, Aerodrome
15	7-May-05	200501977	Accident	2	VH-TFU	Fairchild Industries Inc	SA227-DC	12km NW Lockhart River, Aerodrome
16	13-May-05	200502316	Incident	4	VH-INM	Hughes Helicopters	369E	Fig Tree Pocket
17	17-May-05	200502137	Serious Incid.	3	VH-VQI	Boeing Co	717-200	Hobart, Aerodrome
18	18-May-05	200502231	Tech Analysis	4	VH-IGW	Piper Aircraft Corp	PA-31P-350/ A2	13km WSW Young
19	29-Jul-05	200504018	Incident	4		Unknown	Aeroplane	Townsville, Aerodrome
20	1-Aug-05	200503722	Serious Incid.	3	9M-MRG	Boeing Co	777	36km S DONGA, (IFR)
21	9-Aug-05	200503971	Incident	4	VH-VBD	Boeing Co	737-700	Sydney, Aerodrome
22	12-Aug-05	200503921	Serious Incid.	4	VH-OGP	Boeing Co	767-338ER	Mallacoota, VOR
23	25-Aug-05	200504188	Incident	4	VH-TJX	Boeing Co	737-476	6km SSE Sydney, Aerodrome

No.	Date	Occurrence No.	Occurrence Type	Investigation Category	Registration	Manufacturer	Model	Location
24	31-Aug-05	200504338	Incident	4	VH-UUA/ VH-VQD	Fairchild Industries Inc / Boeing Co	SA227-DC/ 717-200	Brisbane, Aerodrome
25	1-Sep-05	200504340	Serious Incid.	3	VH-OZF	Embraer-Empresa Brasileira de Aeronautica	EMB-110P2	Bankstown, Aerodrome
26	23-Sep-05	200504768	Serious Incid.	3	VH-SEF	Fairchild Industries Inc	SA227-AC	6km N Gayndah, Non Directional Beacon
27	24-Sep-05	200504847	Accident	3	VH-BKM	Beech Aircraft Corp	A36	35km E Tenterfield
28	11-Oct-05	200505107	Serious Incid.	3	VH-BKS	Kawasaki Heavy Industries	BK117 B-2	46km N Brisbane, Aerodrome
29	20-Oct-05	200505170	Serious Incid.	3	HL7530	Boeing Co	777	Sydney, Aerodrome
30	22-Oct-05	200505236	Accident	3	VH-NIT	Air Tractor Inc	AT-602	Ballidu
31	26-Oct-05	200505311	Serious Incid.	3	HS-TNA	Airbus	A340-642	Melbourne, Aerodrome
32	3-Nov-05	200505536	Incident	4	VH-VQH/ VH-VQV	Boeing Co/ Airbus	717-200/ A320-232	Gold Coast, Aerodrome
33	9-Nov-05	200505683	Serious Incid.	3	VH-VBI	Boeing Co	737-7Q8	46km S Tanta, (IFR)
34	11-Nov-05	200507077	Re-Opened	2				Toowoomba, (ALA)
35	12-Nov-05	200505808	Accident	4	VH-DEQ	Piper Aircraft Corp	PA-31	Birdsville, Aerodrome

No.	Date	Occurrence No.	Occurrence Type	Investigation Category	Registration	Manufacturer	Model	Location
36	18-Nov-05	200505952	Incident	4	VH-OJD	Boeing Co	747-438	Nandi Aerodrome
37	2-Dec-05	200506266	Accident	3	VH-PYN	Piper Aircraft Corp	PA-31-350	28km N Condobolin
38	2-Dec-05	200506298	Serious Incid.	3	VH-VBC	Boeing Co	737-7Q8	46km W Mackay
39	3-Dec-05	200506294	Incident	4	VH-TQW	de Havilland Canada	DHC-8-102	74km SE Melbourne, Aerodrome
40	7-Dec-05	200506614	Incident	4	VH-IME	Kawasaki Heavy Industries	BK117 B-2	28km W Cessnock
41	9-Dec-05	200506380	Incident	4	VH-EEQ	Fairchild Industries Inc	SA227-AC	89km SE Mackay, VOR
42	10-Dec-05	200506443	Accident	4	VH-BZA/VH-UMB	Piper Aircraft Corp / Piper Aircraft Corp	PA-28-161 / PA-28-161	2km NE Coldstream, (ALA)
43	15-Dec-05	200506646	Incident	4	VH-HJS/VH-LMY	Piper Aircraft Corp / Piper Aircraft Corp	PA-31-350 / PA-28-151	Bankstown, Aerodrome
44	17-Dec-05	200506780	Incident	4	VH-FWI	Fokker B.V.	F28 MK 100	Darwin, Aerodrome
45	23-Dec-05	200506834	Incident	4	VH-OAE	British Aerospace Plc	3201	93km E Adelaide, VOR
46	2-Jan-06	200600001	Accident	3	VH-UYB	Cessna Aircraft Company	U206	Willowbank, (ALA)
47	4-Jan-06	200600039	Accident	4	VH-KVN	Aerospatiale	AS.350B	Near Port Hedland Heliport, (ALA)

No.	Date	Occurrence No.	Occurrence Type	Investigation Category	Registration	Manufacturer	Model	Location
48	18-Jan-06	200600958	Tech Analysis	4	PK-LMJ	McDonnell Douglas Corporation	MD-82	Makassar
49	19-Jan-06	200600256	Accident	3	VH-MNI	Beech Aircraft Corp	58	4km E McArthur River Mine, Aerodrome
50	25-Jan-06	200600395	Incident	4	VH-MWQ/ VH-VQQ	Beech Aircraft Corp / Airbus	200 / A320-232	13km NE Melbourne, Aerodrome
51	2-Feb-06	200600523	Accident	3	VH-MFI	Bell Helicopter Co	206B (III)	20km E Parkes, VOR
52	5-Feb-06	200600563	Incident	3	VH-KLP	Cessna Aircraft Company	208	9km E Queenstown, Aerodrome
53	9-Feb-06	200601133	Tech Analysis	4	N/A			Canberra Head Office, Named feature
54	11-Feb-06	200601351	Incident	4	PK-KKE	Boeing Co	737-329	Ujung Pandang, Aerodrome
55	12-Feb-06	200600738	Incident	4	VH-WYS	Robinson Helicopter Co	R44	St Kilda
56	15-Feb-06	200600837	Serious Incid.	4	VH-OTV	de Havilland Canada	DHC-3	Lombadina, (ALA)
57	16-Feb-06	200600851	Accident	3	VH-FVF	PZL-Warszawa-Okecie	M-18A	20km SSW Cootamundra, Aerodrome

No.	Date	Occurrence No.	Occurrence Type	Investigation Category	Registration	Manufacturer	Model	Location
58	19-Feb-06	200602839	Serious Incid.	4	PK-YTH	Boeing Co	737-204	Balikpapan-Sepinggan Airport, Indonesia
59	21-Feb-06	200600979	Accident	3	VH-HBS	Robinson Helicopter Co	R44	10km W Gunpowder, (ALA)
60	27-Feb-06	200601053	Incident	4	VH-LBA	Cessna Aircraft Company	441	40km NW Callion
61	28-Feb-06	200601076	Incident	4	PK-GZJ/ VH-NXH	Boeing Co/ Boeing Co	737-400 / 717-200	39km NNW EROPA, (IFR)
62	2-Mar-06	200601173	Tech Analysis	4				Canberra, Aerodrome
63	3-Mar-06	200601291	Tech Analysis	4				Canberra Head Office, Named feature
64	4-Mar-06	200601392	Tech Analysis	4	PK-LMW			Surabaya, Aerodrome
65	15-Mar-06	200601367	Incident	4	VH-MZM	Piper Aircraft Corp	PA-31-350	Dubbo, Aerodrome
66	19-Mar-06	200601453	Incident	4	VH-QPB	Airbus	A330-303	Brisbane, Aerodrome
67	26-Mar-06	200601509	Accident	3	VH-ZIP	Cessna Aircraft Company	A188B/A1	55km SW Narrandera, Aerodrome

No.	Date	Occurrence No.	Occurrence Type	Investigation Category	Registration	Manufacturer	Model	Location
68	31-Mar-06	200601640	Accident	4	VH-BST	Amateur Built Aircraft	Lancair 320	4km ENE Archerfield, Aerodrome
69	4-Apr-06	200601663	Accident	4	VH-JIV	Bell Helicopter Co	206B (III)	7km S St Albans
70	5-Apr-06	200601688	Accident	3	VH-ZNZ	Neico Aviation Inc	Lancair 360	Bankstown, Aerodrome
71	19-Apr-06	200602115	Incident	4	VH-NXF/ VH-WBA	Boeing Co/ Fairchild Industries Inc	717-200/ SA227-DC	TASKA, (IFR)
72	21-Apr-06	200602099	Incident	4	VH-VXS	Boeing Co	737-838	Brisbane, Aerodrome
73	27-Apr-06	200602199	Accident	4	VH-SPI	Cessna Aircraft Company	U206G	Mabuiag Island, (ALA)
74	4-May-06	200602840	Serious Incid.	4	PK-YTQ	Boeing Co	737-281	Soekarno-Hatta Jakarta Airport, Indonesia
75	29-May-06	200603130	Incident	4	VH-OEE	Boeing Co	747-438	New York, JFK Airport
76	31-May-06	200603111	Incident	4	VH-UJA/ VH-VBH	Aero Commander Div/ Boeing Co	737-7Q8	17km W Melbourne, Aerodrome
77	1-Jun-06	200603140	Accident	3	VH-JDJ	Beech Aircraft Corp	A36	1km N Bathurst Island, Aerodrome

No.	Date	Occurrence No.	Occurrence Type	Investigation Category	Registration	Manufacturer	Model	Location
78	9-Jun-06	200603333	Accident	4	VH-CZE	Piper Aircraft Corp	PA-44-180	980km NE Hilo, Aerodrome
79	15-Jun-06	200603438	Serious Incid.	4	VH-SEF	Fairchild Industries Inc	SA227-AC	Maroochydore/ Sunshine Coast, Aerodrome
80	29-Jun-06	200603726	Incident	4	VH-QOD	Bombardier Aerospace	DHC-8-402	56km N Brisbane, Aerodrome
81	29-Jun-06	200603755	Incident	4	VH-HCU/ VH-VOG	Robinson Helicopter Co/ Boeing Co	R44/ 737-86N	Sydney, Aerodrome

Appendix 6: ATSB aviation recommendations to CASA and Airservices with the status of open or no response at 30 June 2006

Recommendation	Issue date	Receiving organisation	Response due date	Status of response
R20000130 The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority identify and adopt an appropriate specification for each grade of fuel that is approved for use in Australia, or in aircraft on the Australian civil register.	30-Mar-01	Civil Aviation Safety Authority	04-Mar-02	Open*
R20000131 The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority, either by itself, or in cooperation with other organisations, develop a process to satisfy itself that fuel that is fit for purpose is consistently supplied to aircraft.	30-Mar-01	Civil Aviation Safety Authority	04-Mar-02	Open*
R20000132 The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority develop appropriate lines of communication to ensure that it is made aware in a timely manner of information relating to the management of situations related to fuel quality that could affect the safety of flight.	30-Mar-01	Civil Aviation Safety Authority	04-Mar-02	Open*
R20000133 The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority ensure that prior to any significant devolution or change in regulatory process, appropriate measures are taken to ensure that aviation safety is not diminished.	30-Mar-01	Civil Aviation Safety Authority	04-Mar-02	Open*

Recommendation	Issue date	Receiving organisation	Response due date	Status of response
R20000186 The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority review its relationship with other regulatory bodies to clarify the limits of their respective regulatory powers and responsibilities with respect to aviation fuels, to ensure that aviation safety issues are effectively regulated.	30-Mar-01	Civil Aviation Safety Authority	04-Mar-02	Open*
R20060013 The Australian Transport Safety Bureau recommends that the Civil Aviation Safety Authority review its surveillance methods, which may include cooperation with Airservices Australia for the detection of patterns of unsafe practices and non-compliance with regulatory requirements.	1-May-06	Civil Aviation Safety Authority	30-Jun-06 Received 16-Aug-06	No response* Closed-Accepted

*Note * On 16 August 2006 CASA advised the ATSB that CASA has no further input on the five ATSB recommendations from 2001 and also responded to R20060013. The ATSB has now classified these five recommendations from 2000 as Closed-Not Accepted and has classified R20060013 as Closed-Accepted.*

Appendix 7: Accident procedures and categorisation

Rail

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; and
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; and
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.

Category 1

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

Category 2

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

Category 3

- An *accident* involving one or more trains with less than 5 fatalities (except where it is primarily a road accident), serious injuries and property damage.
- An *accident* involving one or more trains with serious injuries and property damage (except where it is primarily a road accident) where there was a significant risk of fatalities or serious injuries (on-train or off-train), substantial property damage and a substantial commitment of investigative resources is likely to significantly mitigate the possibility of future accidents.

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

Category 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.

Category 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; and
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; and
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.

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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 t o ships which do not qualify as “very serious casualties” or “serious casualties” and for the purpose of recording useful information also include “marine incidents” which themselves include “hazardous incidents” and “near misses”.
** The ship is in a condition, which does not correspond substantially with the applicable conventions, presenting a danger to the ship and the persons on board or an unreasonable threat of harm to the marine environment.*

Category 1

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

Category 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.

Category 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.

Category 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 Category 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.

Category 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 category, 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 category.

Category 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.*

Category 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.*

Category 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 category 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 category 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 category 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.

Category 4

- An *accident* involving a foreign aircraft covered by *Article 26* of the Chicago Convention that is not being investigated as category 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 category 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 category 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.*

Category 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.*

Australian Government

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