

INITIATIVES IN FATIGUE MANAGEMENT

Introduction

- 2.1 This chapter provides an overview of the steps that have been taken to manage fatigue in the Australian transport industry.
- 2.2 Some of the initiatives we describe have been sponsored by governments and some by individual operators in the industry. Some are broad ranging multi-dimensional initiatives, while others are specific to local circumstances and conditions. Some are prescriptive in their requirements and others are voluntary or discretionary.
- 2.3 These differences in approach are evidence of the fact that fatigue management is a complex, dynamic and growing field of expertise, both in Australia and overseas.
- 2.4 The differences can also be attributed, in part, to the divisions of responsibility imposed by Australia's federal system of government. Before moving to outline the most significant of the fatigue management initiatives that have been introduced, this chapter provides a summary of this division of responsibility.

Regulatory responsibility

- 2.5 Our federal system of government has contributed to a complicated mix of responsibilities in the Australian transport system.
- 2.6 In brief, management of land transport (road and rail) is essentially a matter for State and Territory Governments; management of aviation is almost exclusively a Commonwealth responsibility; while both tiers of

government have an interest in regulating maritime services. The Commonwealth Government is also responsible for Australia's international transport links.

- 2.7 For many years all levels of government have recognised the importance of striving for national consistency in transport policies and laws. Accordingly, a number of inter-governmental cooperative enterprises have developed to further this aim. The Australian Transport Council (ATC) is prime amongst these. The ATC comprises the transport ministers from the Commonwealth and each of the State and Territory governments. The ATC's role is to foster consistency and to take a lead on transport issues of national importance that require an inter-governmental response, are multi-jurisdictional or are international.¹
- 2.8 The ATC is also responsible for coordinating the work of the National Road Transport Commission (NRTC) and the National Marine Safety Committee (NMSC), which are inter-governmental bodies charged with achieving regulatory consistency within their sectors.
- 2.9 The following sections list some of the key legislative and structural features in each of the transport sectors.

Aviation Transport

- 2.10 The Commonwealth has direct responsibility for the *Civil Aviation Act 1988* and the *Civil Aviation Act 1998*. The Civil Aviation Safety Authority (CASA) is the Commonwealth regulatory body with direct responsibility for aviation regulation. The States and Territories have very few regulatory responsibilities for aviation.

Maritime Transport

- 2.11 The Commonwealth is responsible for trading vessels engaged on interstate voyages and all vessels (other than pleasure craft) on international voyages, principally through the *Navigation Act 1912* and the *Occupational Health and Safety (Maritime Industry) Act 1993*. The States and the Northern Territory are responsible for fishing vessels, pleasure craft and trading vessels engaged on intrastate voyages.²
- 2.12 The National Marine Safety Committee (NMSC) is an intergovernmental committee charged with achieving consistent marine safety regulation through out Australia. The NMSC was established in 1996 and formalised

1 Submission No 83, Vol 6, p. 1260 (Dept. Transport and Regional Services).

2 House of Representatives Standing Committee on Transport, Communications and Infrastructure, 1992, *Ships of Shame: Inquiry into Ship Safety*, AGPS, Canberra, p.16.

by an inter-governmental agreement in 1997. The NMSC reports to the Australian Transport Council.³

- 2.13 The Commonwealth's Australian Maritime Safety Authority (AMSA) administers matters relating to marine safety and works closely with State and Territory marine authorities, particularly through the NMSC. AMSA is responsible for regulating marine pilotage in the Great Barrier Reef. Port pilotage and towage operations are principally the responsibility of State and Territory port or marine authorities.

Road Transport

- 2.14 State and Territory governments are essentially responsible for regulating road transport systems and for developing and maintaining infrastructure. The Commonwealth has a number of specific roles in the area of safety, such as the 'Black Spots' Program and responsibility for developments and improvements in motor vehicle design.⁴ The Commonwealth also has funding responsibility for the national highway system and accepts a joint funding responsibility with States and Territories for other roads of national importance.⁵
- 2.15 The National Road Transport Commission (NRTC) was formed in 1991 to achieve nationally consistent transport policies and laws. The NRTC makes recommendations to the Australian Transport Council, made up of Federal, State and Territory transport Ministers, and works closely with the road freight and passenger sectors, governments, transport agencies, police and motoring organisations to develop practical reforms.⁶

Rail

- 2.16 Rail safety is regulated by State and Territory governments. In 1996 all jurisdictions (excluding the ACT) agreed through an Intergovernmental Agreement (IGA) that legislation be passed making *Australian Standard for Rail Safety AS 4292*⁷ the principal standard forming the basis for safety accreditation. They also agreed that parties make provision under existing or future legislation for accreditation by an accreditation authority and for mutual recognition (IGA 1996).

3 Information taken from NMSC web site at www.nmsc.gov.au.

4 Submission No 83, Vol 6, p. 1260 (Dept. Transport and Regional Services).

5 House of Representatives Standing Committee on Communications, Transport and Microeconomic Reform, 1997, *Planning Not Patching: An inquiry into Federal road funding*, The Parliament of the Commonwealth of Australia, Canberra, p.8.

6 Information taken from NRTC web site at www.nrtc.gov.au.

7 Australian Standard for Railway Safety AS 4292 specifies railway safety requirements to be included in a railway safety management system by any organisation seeking to demonstrate the ability to control the processes that determine the acceptability of railway safety activities.

- 2.17 According to State legislation, an organisation or person wishing to operate a train must be accredited in the jurisdiction in which the principal activities are undertaken. The accreditation process is based on the principle of co-regulation, with rail safety being managed jointly by industry and government. The operator or track owner, not the regulator, is responsible for the safety of its activities. The accreditation authority, usually within a State transport department, must be satisfied that the operator or track owner has in place, and can demonstrate, an appropriate safety management system. The system must be consistent with AS 4292.
- 2.18 An operator accredited in one State may apply for accreditation to operate in other States through mutual recognition. Mutual recognition was adopted in principal under the IGA and is legislated in all States, except NSW – mutual recognition is nonetheless, available in that State.⁸

Regulatory approaches to fatigue management

- 2.19 Recent years have seen some changes made to transport safety regulation to recognise concerns about fatigue management, particularly in the areas of road transport and aviation.
- 2.20 In road transport at the national level, the National Road Transport Commission (NRTC) has developed a package of regulatory reforms for the road transport industry, which are being implemented by the eastern States.
- 2.21 In the aviation sector, the Civil Aviation Safety Authority (CASA) is developing an alternative approach for regulating flight and duty times in commercial aviation and is looking at introducing measures for fatigue management in the areas of aircraft maintenance, air traffic control and cabin crew.
- 2.22 The rail industry is also developing and implementing a range of operational and regulatory measures to address safety issues, including fatigue.
- 2.23 The marine sector has not undergone the same level of regulatory change, although there are moves to develop national operational guidelines for marine pilots.

⁸ Information in this section is drawn from correspondence received from the Department of Transport and Regional Services, 28 June 2000; Submissions Nos 26, 88, Vols 2, 6, pp.314, 1465; Transcript of evidence, 9 November 1999, Canberra, p.722 (Mr John Murray—NSW Dept. of Transport).

Fatigue management in road transport

- 2.24 Research into fatigue in the road transport industry strongly suggests that merely limiting the hours of work through prescriptive legislation does not adequately address the problem of fatigue.⁹ As discussed in Chapter 1, factors such as time of day, the amount of prior rest and the timing of rest breaks are central to managing fatigue and which are usually not considered in road transport legislation and regulations. In response to these perceived regulatory deficiencies a consistent theme in the submissions is the need to move to a more flexible 'outcome' based approach that incorporates the latest thinking on fatigue management.
- 2.25 There are currently two strategies that have been implemented to address safety issues in the road transport sector. One is based on a multi-tiered regulatory regime incorporating prescriptive and non-prescriptive elements and is being progressively implemented in South Australia and the eastern States. The other is based on State and Territory occupational health and safety legislation in Western Australia and the Northern Territory.

Road Transport Reform (Driving Hours) Regulations

- 2.26 The aim of the *Road Transport Reform (Driving Hours) Regulations 1999* is to provide national consistency in jurisdictions that use prescriptive measures to manage fatigue. It incorporates both prescriptive and non-prescriptive elements and extends responsibility for managing fatigue through the inclusion of 'chain of responsibility' provisions.¹⁰
- 2.27 The regulations provide for a three-tiered regulatory regime ranging from a prescriptive regulated hours regime to a non-prescriptive and flexible operator formulated fatigue management option.
- A **Regulated Hours Regime (RHR)** of maximum hours of driving and minimum non-driving and rest periods. This allows for up to 12 hours of driving and 14 hours of work in any 24-hour period and not more than 72 hours of driving and/or work in a 7 day period.¹¹ This involves the continued use of logbooks and other measures to ensure compliance to the regulations. The RHR is viewed as a 'default'

9 Submissions Nos 1, 19, 28, 68, 75, 83, 88, Vols 1, 2, 5, 6, pp. 8, 259, 366, 1121, 1171, 1295, 1454; Exhibit 2, *Research paper*, (Assoc. Prof. Laurence Hartley).

10 Submission No 73, Vol 5, p. 1151 (NRTC).

11 Submission No 73, Vol 5, p. 1146 (NRTC). See also *Road Transport Reform (Driving Hours) Regulations 1999*, Part 2, Division 2, sections 19 (1) and 20 (1).

system applying to drivers and operators not covered by the other components of the scheme.¹²

- A Transitional Fatigue Management Scheme (TFMS) which allows up to 14 hours driving or work in any 24 hour period, a maximum of 144 hours driving in a 14 day period, at least 6 hours continuous rest in each 24 hours and at least two periods of 24 hours rest in any 14 day period.¹³ The compliance criterion for inclusion in the TFMS is that employers and drivers must apply for registration. Prior to registration drivers must obtain a driver certification manual, undergo a medical examination and undertake training in fatigue management. All members of staff responsible for rostering driving, working and resting of drivers also must complete an approved fatigue management course. The employer must make a commitment to managing fatigue prior to registration and be able to demonstrate effective fatigue management. A training course was developed by the NRTC in close consultation with the road transport industry, government authorities, State Workcover units and researchers.¹⁴ The TFMS is seen as a temporary measure pending the approval of the Fatigue Management Scheme (see below).
- A Fatigue Management Scheme (FMS)¹⁵ is available to operators able to demonstrate through an auditable process that they can control factors that contribute to driver fatigue.¹⁶ An operator accredited under the FMS will not be subject to prescriptive regulations.¹⁷ To qualify for the FMS operators and drivers must identify and manage fatigue risk factors such as trip scheduling, driver rostering, time working, lifestyle, and quality of rest and driver health standards.¹⁸ The FMS pilot was established by Queensland Transport and the Australian Trucking Association to develop and evaluate a heavy

12 Moore.B and Brooks.C, 2000, Heavy Vehicle Driver Fatigue: A Policy Advisers' Perspective, paper presented to Fourth International Conference on Fatigue and Transportation, Fremantle, 19-22 March 2000.

13 Submission No 73, Vol 5, pp. 1146, 1147-8 (NRTC) See also *Road Transport Reform (Driving Hours) Regulations 1999*, Part 2, Division 2, sections 28, 29 and 30.

14 Submission No 73, Vol 5, p. 1148 (NRTC).

15 The Fatigue Management Scheme is a module of the National Heavy Vehicle Accreditation Scheme (HVAS) being developed by the National Road Transport Commission, which provides alternative compliance arrangements for drivers and operators of heavy vehicles. The other compliance modules of the HVAS are Mass Management and Maintenance Management (Submission No 73, Vol 5, p. 1149-NRTC). These are voluntary alternative compliance schemes, where accredited operators who can demonstrate by auditable processes they comply with regulations are subject to reductions in conventional enforcement, such as weighing and annual vehicle inspections.

16 Submission No 73, Vol 5, p. 1146 (NRTC).

17 Submissions No 73, 105, Vols 5, 7, pp. 1149, 1708.

18 Submission No 73, Vol 5, p. 1149 (NRTC).

vehicle fatigue management program as an alternative to the regulated hours of service regime.¹⁹ Queensland is the only state that has legislation in place to establish and operate the FMS. New South Wales, Victoria and South Australia have issued permits which allow operators under the FMS to operate in their jurisdictions.²⁰ These permits may have specific conditions attached depending on the jurisdiction.²¹ The FMS is subject to review and evaluation prior to recommendation to the Australian Transport Council on full availability of fatigue management as an alternative to a prescriptive approach to driving hours.²²

- 2.28 A key feature of the regulations is the inclusion of 'chain of responsibility' provisions. This broadens the responsibility for fatigue and fatigue related accidents beyond the driver to incorporate all those involved in the transport chain. It applies both inside and outside a road transport company, taking in drivers and other company employees (up to the director or CEO), consignors and customers. This extended responsibility is expressed in the following terms:

Box 2.1: Road Transport Reform (Driving Hours) Regulations: Chain of Responsibility

"A person must not ask, direct or require, directly or indirectly, a driver to do something if the person knows, or reasonably ought to know, that by complying the driver would, or would be likely to, commit:

- a) a core driving hours offence
- b) a driving record offence
- c) a speeding offence

Penalty: \$1500

Example of requirement: "A requirement that is an express or implied condition of the drivers engagement."

- 2.29 At the time of writing, Queensland, New South Wales and South Australia have implemented the regulations. Victoria has implemented the regulations but has not implemented the 'chain of responsibility' provisions. Tasmania has implemented most of the provisions, but has

19 Information received from NRTC, 23 June 2000.

20 Transcript of evidence, 2 August 1999, Brisbane, p. 110 (Mr Gary Mahon—Qld Transport).

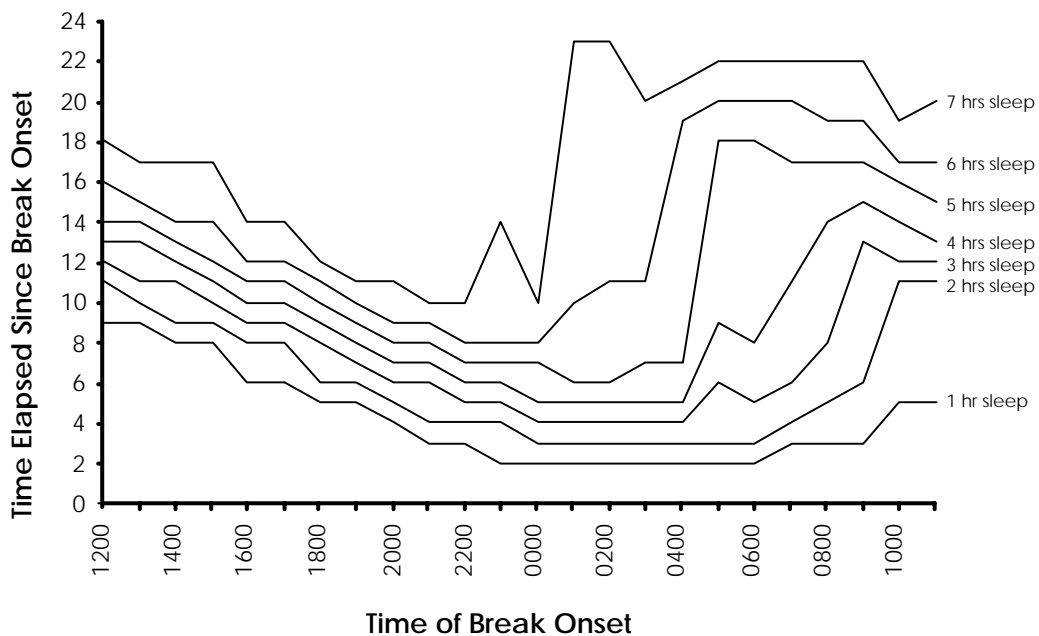
21 Transcript of evidence, 9 November 1999, Canberra, p. 726 (Dr. Don Carseldine—NSW Roads and Traffic Authority). The NSW Roads and Traffic Authority has placed certain restrictions on the way the Queensland fatigue management model operates when drivers are in NSW. Those operating under the Queensland fatigue management model in NSW must adhere to a range of conditions approved by the NSW Minister for Transport, such as restricting the amount of work possible in a 24-hour or two-week period.

22 Submission No 73, Vol 5, p. 1149 (NRTC).

not implemented the national log book requirements for long distance drivers.²³

- 2.30 Although the regulations have been widely accepted and implemented, they have attracted some criticism. The key criticism of the regulations is that they do not take adequate account of the time which the driving and rest takes place.²⁴ For example, the Transitional Fatigue Management Scheme effectively allows a driver to drive for 14 hours per night for 10 consecutive nights,²⁵ while the base regime allows for 12 hours driving per night for six consecutive nights.

Figure 1



Source Adam Fletcher, Centre for Sleep Research

- 2.31 The effectiveness of rest is dependent on when that rest break takes place. As stated in Chapter 1, rest taken during the day is not as effective as rest taken at night. Thus, the length of the rest period required to allow for adequate restorative sleep will vary depending on the time it is taken, as shown in Figure 1. For example, a 12-hour break beginning at 10pm (2200) provides the opportunity for 7 hours sleep but a 12-hour break beginning at midday (1200) only allows for 3–4 hours sleep.²⁶ It is clear

23 Moore.B and Brooks.C, 2000, Heavy Vehicle Driver Fatigue: A Policy Advisers' Perspective, paper presented to Fourth International Conference on Fatigue and Transportation, Fremantle, 19-22 March 2000.

24 Transcript of evidence, 13 March 2000, Canberra, p. 816 (Mr Dean Croke—MMI Insurance).

25 Submission No 73, Vol 5, p. 1148 (NRTC).

26 Submission No 19.01, Vol 8, p.1824-5 (Centre for Sleep Research).

that more time off is required following night driving or that the number of allowable driving hours be reduced at night to allow for adequate rest to be taken at the optimal time.

- 2.32 A focus on prescribed rest periods (their duration and timing) may result in certain driving schedules, such as those involving night driving (statistically the most dangerous time for driving) having the allowable driving hours reduced. Alternatively, the amount of rest following a night shift may be increased.²⁷
- 2.33 We also are very concerned that the regulations entrench long hours of work as standard operating practice in road transport.
- 2.34 Long hours of work have traditionally been a feature of the industry. But this doesn't make it best practice. In an environment where even more deliveries need to be made in shorter time frames and with quicker turnarounds, drivers are being pressured to work even longer hours.
- 2.35 We were told that there is conflict between trying to manage fatigue and allowing long hours of work to remain the norm:
- At a time when it appears all industry stakeholders are genuinely concerned about driver fatigue, a scheme is introduced that allows a driver to drive 14 hours in a 24 hour period!²⁸
- 2.36 Many regulators appear to accept unquestioningly that long hours are an essential part of the road transport industry. We believe that it need not be. As noted throughout the report, long hours, without adequate rest breaks, present an unacceptable danger to drivers and to the public.
- 2.37 We find it difficult to accept that 72 hours of work is the allowable work week for truck drivers. A recent survey of long distance truck drivers revealed that:
- 21 per cent of drivers worked more than 80 hours in the preceding week; and
 - 62 per cent of drivers believed the hours they worked were dangerous to their health and safety.²⁹
- 2.38 Dean Croke of MMI Insurance argues that this is about 45 per cent higher than what would be considered a normal working week by most

27 As stated in Chapter 1, Insurance companies also have recognised that the midnight to dawn period poses the highest risk for accidents in road transport, with some companies applying a 'midnight to dawn excess' on truck operators who wanted to work in that 'high risk zone.' (See Transcript of evidence, 13 March 2000, Canberra, p. 811-2, Mr Dean Croke—MMI Insurance).

28 Submission No 112, Vol 7, p.1821 (Mr Dean Croke—MMI Insurance).

29 Exhibits 41, Transport Workers Union Long Distance Survey: Summary.

Australians.³⁰ Speaking in regard to long haul truck driving, Mr Doug Hands, a long haul truck driver of 39 years experience, stated that:

I don't know of, or have ever heard of, another industry where 72 hours is a normal working week....it is no wonder driving fatigue is an issue.³¹

- 2.39 The regulations are very specific as to the allowable working hours. There is clear evidence that drivers and operators continue to break these regulations. We have made recommendations elsewhere in this report to give drivers and operators every opportunity to work safely. However, the regulations are not being enforced with sufficient rigour, nor are there sufficient penalties to deter drivers from breaking the rules. If the current allowable hours of work are to be accepted, we believe that regulators need to step up their enforcement efforts and that tough penalties must be introduced for fatigued driving. We have made a recommendation to that effect in Chapter 3.
- 2.40 It is clear that the current hours of work and rest methodology in the regulations goes against research findings and may not be consistent with occupational health and safety requirements. This issue needs to be addressed for the new regulations to be effective and adequately manage fatigue. There may be opportunities to incorporate time of day considerations and at the same time increase the effectiveness of prescribed rest breaks.
- 2.41 Accordingly, we recommend that the NRTC review the regulations with a view to incorporating time of day considerations and, in conjunction, that the regulations be amended to increase rest and off-duty times.

Recommendation 2

- 2.42 **The National Road Transport Commission should prepare amendments to the Road Transport Reform (Driving Hours) Regulations:**
- **incorporating time of day considerations into allowable driving and rest periods; and**
 - **in accordance with time of day considerations, amend the regulations with a view to increasing the minimum allowable rest periods.**
- 2.43 We also received a large amount of evidence indicating that the logbook system has fallen into disrepute (often referred to as the 'cheat book'), to

30 Submission No 112, Vol 7, p. 1822 (Mr Dean Croke—MMI Insurance).

31 Submission No 110, Vol 7, p. 1743 (Doug Hands Pty Ltd).

the point that we question whether logbooks serve any useful purpose at all in enforcing current regulations or managing fatigue. A recent survey of truck drivers indicates that around 57 per cent of drivers broke working hours regulations on at least half their trips³², which suggests the widespread abuse of the logbook system.

- 2.44 The NRTC recognises that the logbook system is problematic and told us that it was their 'ambition to see logbooks dead and gone as soon as we possibly can'.³³ In response to the deficiencies identified in the logbook system the NRTC has developed a national logbook, with the intention of progressively replacing various State specific logbooks in order to provide national consistency.³⁴ The NRTC is also trialing the use of driver specific monitoring devices, or 'electronic logbooks', as a way of improving the monitoring and recording of driving and working hours. The system uses a driver specific electronic device similar to a credit card and a vehicle mounted device. Driving records are stored on the card and in the vehicle and can be downloaded when required for auditing purposes.³⁵
- 2.45 There are some concerns also that the tiered system established by the regulations may present an impediment to small operators and owner-drivers.
- 2.46 Movement from the regulated hours regime to the fatigue management scheme not only involves higher degrees of operator and driver responsibility, but may also entail additional costs associated with the development and implementation of effective fatigue management policies and practices in the workplace. For example, Nolan's Interstate Transport, who are involved in the fatigue management scheme, have invested around \$250 000 in their fatigue management program.³⁶
- 2.47 Many smaller operators may find it is easier and cheaper to remain under the regulated hours regime, thus being denied the flexibility available to larger operators. In the long run, this may constitute a commercial disadvantage. We believe the NRTC should take steps to ensure all sectors of the road transport industry are able to operate under the new regulations without disadvantage; in particular, that smaller operators are not prevented, by cost considerations, from implementing fatigue management programs. We are aware that Queensland Transport has developed a Fatigue Management Program targeted at small operators

32 National Road Transport Commission, *Driver Fatigue: A survey of professional heavy vehicle drivers in Australia*, preliminary report, July 2000, p. xvi.

33 Transcript of evidence, 8 October 1999, Melbourne, p. 474 (Mr Stuart Hicks—NRTC).

34 Transcript of evidence, 8 October 1999, Melbourne, p. 475 (Mr Barry Moore—NRTC).

35 Transcript of evidence, 8 October 1999, Melbourne, p. 475, 484 (Mr Barry Moore—NRTC).

36 Transcript of evidence, 2 August 1999, Brisbane, p.96 (Mr Darren Nolan—Nolan's Interstate Transport).

and owner-drivers.³⁷ This program may provide a model that could be implemented more widely.

Recommendation 3

- 2.48 The National Road Transport Commission should introduce measures to ensure that participation in the two fatigue management schemes provided for in the Road Transport Reform (Driving Hours) Regulations is not beyond the financial means of any operator.**

Occupational Health and Safety and Code of Practice for Commercial Vehicle Drivers

- 2.49 In contrast to the three tiered *Road Transport Reform (Driving Hours) Regulations* system adopted by South Australia and the eastern States, Western Australia and the Northern Territory have developed alternative non-regulatory regimes based on occupational health and safety legislation and associated Codes of Practice. It is important to note that Western Australia has never had a system of prescribed hours and logbooks as found in the eastern States, Europe and the United States.³⁸ Interestingly, research suggests that despite the lack of prescribed driving hours drivers in Western Australia were no more likely to drive excessive hours than drivers in the eastern States.³⁹

Western Australia

- 2.50 In Western Australia driver fatigue is managed in accordance with the provisions of the *Occupational Safety and Health Act 1984*, specifically those provisions requiring employers to exercise 'duty of care' in respect of their employees.⁴⁰ We were advised by the Western Australian Minister for Transport that the 'emphasis under an occupational safety and health systems approach is for fatigue to be addressed before the vehicle leaves the depot. Management must factor in and plan for the risk'.⁴¹
- 2.51 In conjunction, a *Code of Practice for Commercial Vehicle Drivers* was developed in consultation with industry and unions outlining the essential features of a safe system of work.⁴² The Code was formally approved under the *Occupational Safety and Health Act 1984* in 1998.⁴³

37 Transcript of evidence, 2 August 1999, Brisbane, p.90 (Mr Gary Mahon—Qld Transport).

38 Submission No 75, Vol 5, p. 1172 (Minister for Transport, WA).

39 Exhibit 2, *Research paper*, Assoc. Prof. Laurence Hartley.

40 Exhibit 2, *Research paper*, Assoc. Prof. Laurence Hartley.

41 Submission No 75, Vol 5, p 1172 (Minister for Transport—WA).

42 Submission No 1, Vol 1, p. 8 (Assoc. Prof. Laurence Hartley).

43 Submission No 75, Vol 5, p. 1172 (Minister for Transport, WA).

- 2.52 The *Code of Practice for Commercial Vehicle Drivers* sets out standards that should be included in a fatigue management scheme. These include operating standards (such as maximum continuous active work time and breaks), and standards in regard to readiness for duty, health, workplace conditions, training and education, operator responsibilities, documentation and records, and the management of incidents.⁴⁴ The standards provided in the Code of Practice are advisory and do not have the force of law, although the Code does provide occupational safety and health inspectors and the Courts with a guide as to what constitutes safe working practices in regard to driver fatigue.⁴⁵
- 2.53 In recognition of difficulties faced by owner-drivers, such as limited administrative resources, a specific 'owner-driver' package has been developed.⁴⁶
- 2.54 As part of the implementation process Worksafe WA sent letters to all operators requiring them to submit details of their fatigue management plans for assessment and audit. To date, only 30 per cent of operators have responded and a follow up procedure is in place to ensure all operators respond.⁴⁷
- 2.55 Worksafe WA inspectors are empowered by the *Occupational Safety and Health Act 1984* to follow up on incidents and complaints and to undertake random inspections of worksites and audits of roster systems.⁴⁸ If problems are found a *Work Improvement Notice* may be issued requiring the problem to be rectified within a given time or a *Work Prohibition Notice* may be served prohibiting the operator to conduct business until the problem is properly addressed. Fines for breaches of the Act are as high as \$200 000 for an employer and up to \$20 000 for an employee.⁴⁹

Northern Territory

- 2.56 The Northern Territory government has developed a Fatigue Management Code of Practice for the road transport industry similar to that in force in Western Australia. The Code of Practice is enforced through the *Northern Territory Work Health Act*. The Code was developed in conjunction with

44 Exhibits 2, *Research paper*, Assoc. Prof. Laurence Hartley.

45 Brindal.D and Poore.L, 2000, Fatigue Management in Western Australia, paper presented to Fourth International Conference on Fatigue and Transportation, Fremantle, 19-22 March 2000.

46 Brindal.D and Poore.L, 2000, Fatigue Management in Western Australia, paper presented to Fourth International Conference on Fatigue and Transportation, Fremantle, 19-22 March 2000.

47 Brindal.D and Poore.L, 2000, Fatigue Management in Western Australia, paper presented to Fourth International Conference on Fatigue and Transportation, Fremantle, 19-22 March 2000.

48 Submission No 75, Vol 5, p. 1172 (Minister for Transport, WA).

49 Exhibits 2, *Research paper*, Assoc. Prof Laurence Hartley.

industry and provides operators with guidance in developing fatigue management strategies.⁵⁰

- 2.57 As is the case in Western Australia, adherence to the Code of Practice is not mandatory. The onus is on the operator to prove that their system of work is as safe as that outlined in the Code of Practice.⁵¹

Comment

- 2.58 We recognise that the occupational health and safety code of practice approach developed in Western Australia and the Northern Territory is a valid alternative to the regulatory regime employed in the eastern States.
- 2.59 While there is often a debate in academic circles about the relative merits of prescriptive and non-prescriptive approaches to fatigue management, we do not see the two approaches as necessarily being mutually exclusive. In many ways, they are complementary and there is certainly much that one can learn from the other.
- 2.60 It is also possible that each approach can be developed in a way that fosters a national consistency approach to fatigue management. The means of delivering the message might be different, but ultimately the substance of the message can be the same.

Fatigue management in aviation

- 2.61 The Civil Aviation Safety Authority (CASA) has a number of projects under-way which bear on fatigue management in the aviation industry:
- they are developing new rules for Air Operator Certification, as part of its complete review and revision of Australia's aviation safety requirements;
 - they are investigating the feasibility of introducing a Fatigue Risk Management System for air crew, in place of Civil Aviation Order Part 48 which currently regulates flight and duty times;
 - they are developing hours of duty rules for Licensed Aircraft Maintenance Engineers (LAMEs)⁵²;
 - they have been asked by the Minister for Transport and Regional Services to develop regulations, including rules for fatigue management, for air traffic control service providers⁵³; and

50 Submission No 87, Vol 6, p. 1426-7 (Northern Territory Government).

51 Exhibit 15, *Road Transport Code of Practice*, Western Australian Dept of Transport.

52 Transcript of evidence, 9 November 1999, Canberra, p. 696 (Mr Mick Toller—CASA).

53 Transcript of evidence, 9 November 1999, Canberra, p.701 (Mr Mick Toller—CASA).

- they are considering the application of flight and duty limits for cabin crew as part of the new arrangements in place of Civil Aviation Order Part 48 above.⁵⁴

2.62 Each of these projects are important and should remain priority objectives for CASA. In the sections that follow, we give an overview of each project and comment on issues we believe should be at the forefront of these developments.

New rules for Air Operator Certification

2.63 In May 2000 CASA released a discussion paper outlining its intention to introduce new rules for Air Operator Certification. An Air Operator Certificate (AOC) is the basic certification required for an aircraft operator wishing to conduct air transport operations in aeroplanes and/or helicopters in Australia. The new rules are being developed to simplify, clarify and harmonise the existing rules and to introduce new operator quality assurance and safety system requirements.⁵⁵

2.64 As part of the new rules, all operators will be obliged to 'instigate a flight safety program and larger operators [will be required] to instigate a safety management program, with the aim of inculcating a safety ethos throughout an operator's organisation'.⁵⁶ The new rules will also encompass any new flight and duty time scheme for air crew resulting from the revision of Civil Aviation Order Part 48 referred to below.

2.65 The new rules describe in some detail the safety management, accident prevention and flight safety systems that operators will be obliged to maintain. They are comprehensive and, at some points, imply that management of fatigue risk will be an essential part of such safety systems. In our view it would be preferable if the link between fatigue management and safe aircraft operations were made explicit, rather than just implied, in the new rules. A strengthening of the rules in this way would make it plain that the introduction and maintenance of sound fatigue managements practices is an essential part of conducting air transport operations.

54 Submission No 83, Vol 6, p. 1290 (Dept. Transport and Regional Services).

55 See CASA Discussion Paper, *Air Operator Certification – Commercial Air Transport: Proposed Civil Aviation Safety Regulation (CASR) Part 119*, Document DP 00030S, May 2000, Civil Aviation Safety Authority, Canberra.

56 CASA Discussion Paper, *Air Operator Certification – Commercial Air Transport: Proposed Civil Aviation Safety Regulation (CASR) Part 119*, Document DP 00030S, May 2000, Civil Aviation Safety Authority, Canberra. p.7.

Recommendation 4

- 2.66 **The Civil Aviation Safety Authority should ensure that the proposed new Civil Aviation Safety Regulations relating to Air Operator Certification (CASR Part 119) clearly state that the maintenance of sound fatigue management practices is an essential component of an air operator's safety system.**

New flight and duty rules for aircrew**Progress in making new rules**

- 2.67 At present flight and duty times for commercial pilots⁵⁷, flight engineers, flight navigators and flight radio operators are prescribed in Civil Aviation Order Part 48 (CAO 48).
- 2.68 CAO 48 establishes maximum limits on work periods (which are cumulative over periods of a week, month and a year); limits to work periods depending on the start time of the shift; and prescribed limits based on work load (sectors flown, usually based on the number of take-offs and landings).⁵⁸ The rules are of long standing and, for some time, CASA has been seeking to rewrite the rules consistent with international moves away from 'prescriptive' legislation to 'outcomes' based legislation, designed to allow operators some flexibility to meeting safety standards.⁵⁹
- 2.69 In April 1999 CASA released a discussion paper for industry comment that proposed to replace CAO 48 with a system of flight crew fatigue management modelled on similar legislation in Hong Kong (known as CAD 371) and the United Kingdom (known as CAP 371).
- 2.70 The discussion paper proposed a two-tiered regime, providing for a simple and straightforward regulatory scheme similar to the current regulations (including exemptions), and an alternative operator-formulated flight and duty scheme.⁶⁰ Operators would have chosen the scheme that suited their particular operational needs and environment. In the latter case, any operator proposing limits exceeding what CASA

57 The flight and duty time limitations prescribed by CAO 48 apply to those who hold a pilots licence, other than a private pilots licence, who are engaged in aerial work, charter or regular public transport operations. See Civil Aviation Orders, Part 48, Subsection 1, paragraph 1.3.

58 Submission No 59.01, Vol 7, p. 1629 (AIPA).

59 Submission No 83, Vol 6, p. 1289 (Dept. Transport and Regional Services).

60 Submission No 83, Vol 6, p. 1292 (Dept. Transport and Regional Services); Transcript of evidence, 9 November 1999, Canberra, p. 695 (Mr Mick Toller—CASA).

believed was the 'boundary' would be responsible for providing CASA with authoritative supporting data as to the benefit of the proposal.⁶¹

- 2.71 The majority of the commercial aviation industry rejected this proposal. The general message in the responses was that CAD 371 was unacceptable as the basis for Australian regulations, the proposal was too complex and operators and aircrew disagreed on what constituted acceptable limits. In response, CASA decided not to progress with the regulatory reform as outlined in the discussion paper.⁶² A particular concern was that the CAD 371 and CAP 371 derived data used in the proposal did not have a theoretical basis and was not relevant to the Australian environment.⁶³
- 2.72 In the latter stages of our inquiry CASA announced that it would not proceed with its original proposal, but would be developing an alternative approach which seeks to incorporate scientifically validated fatigue management principles. A working group has been established (comprising representatives from CASA, QANTAS, the scientific community and industry associations) to investigate the feasibility of such an approach, known at this point as the Fatigue Risk Management System.
- 2.73 We strongly support the proposal to base flight and duty times on sound fatigue management principles and urge the working group to complete its investigations promptly. If this work demonstrates that aircrew hours of duty can be successfully regulated by a Fatigue Risk Management System, it is conceivable that the principles and practices underpinning this system could be replicated throughout the aviation industry, and possibly transferred to other sectors of the transport industry.

Recommendation 5

- 2.74 **The Civil Aviation Safety Authority should implement a Fatigue Risk Management System to regulate flight and duty times for aircrew as soon as it is feasible to do so.**
- 2.75 Until such time as new flight and duty rules for aircrew are established, the rules provided for by CAO 48 will continue.⁶⁴

61 Submission No 83, Vol 6, p. 1317 (Dept. Transport and Regional Services); Transcript of evidence, 9 November 1999, Canberra, p. 696 (Mr Mick Toller—CASA).

62 Civil Aviation Safety Authority, *Summary of Responses to Discussion Papers DP 9904RP and DP 9906RP*, 25 May 2000, Civil Aviation Safety Authority, Canberra.

63 Correspondence received from Phil Armitage, Project manager, Fatigue Risk Management Project, QANTAS, 21 June 2000.

64 Civil Aviation Safety Authority, *Summary of Responses to Discussion Papers DP 9904RP and DP 9906RP*, 25 May 2000, Civil Aviation Safety Authority, Canberra.

- 2.76 For many in the industry, this in itself is a problem, as it is widely perceived that CAO 48 is no longer an effective regulatory mechanism.
- 2.77 This view is largely based on the fact that, since 1993, a system of exemptions to the rules in CAO 48 has developed. Exemptions were first introduced in response to changing industry needs and the increasing difficulty found in applying CAO 48 to all types of aviation operation.⁶⁵
- 2.78 There are now ten standard industry exemptions, covering activities ranging from international operations to aerial mustering, which the CASA district offices can apply.⁶⁶ In certain circumstances operators may also be granted specific exemption from CAO 48. Operators currently have the choice of adhering strictly to CAO 48 or with one of the standard industry or specific exemptions.⁶⁷
- 2.79 When first introduced, exemptions to CAO 48 were initially to be an interim measure, for a period of 12 months, until new flight and duty times could be formulated. However, due to a lack of agreement within the industry and the desire of the regulator to harmonise with international regulations, the process of developing new flight and duty times has been delayed considerably.⁶⁸
- 2.80 The Department of Transport and Regional Services acknowledges that the current flight and duty time limitations contained in CAO 48 and associated exemptions do not 'satisfactorily control pilot fatigue'. Further, it argues that the 'rules represent absolute limits to provide operators with flexibility and are not normally intended for continued, routine application. However, in practice, flight operations at the maximum allowable are being carried out routinely in some cases'.⁶⁹
- 2.81 The Australian Federation of Air Pilots (AFAP) contends that while the system of exemptions serves the interests of the operators, it has resulted in changes to the regulations by stealth and has never 'produced any data for analysis'.⁷⁰ The AFAP claim that

Review of existing exemptions has been practically non-existent, new exemptions have been handed out virtually on demand, and no attempt has been made to seek the views of pilots in the process.⁷¹

65 Submission No 83, Vol 6, p. 1288 (Dept. Transport and Regional Services).

66 Submission No 83, Vol 6, p. 1289 (Dept. Transport and Regional Services).

67 Transcript of evidence, 9 November 1999, p. 694 (Mr Mick Toller—CASA).

68 Submission No 83, Vol 6, p. 1288 (Dept. Transport and Regional Services).

69 Submission No 83, Vol 6, p. 1289 (Dept. Transport and Regional Services).

70 Submission No 15, Vol 1, p. 230 (AFAP).

71 Submission No 15, Vol 1, p. 230 (AFAP).

- 2.82 The Guild of Air Pilots and Navigators assert that exemptions are granted by staff with no training in fatigue management. Further, some exemptions, when investigated by State occupational health and safety authorities, cast doubt on their acceptability from a 'work safe' view point.⁷²
- 2.83 The Bureau of Air safety Investigation (BASI) has identified the practice of granting of exemptions to CAO 48 without evaluating their impact on pilots as a safety deficiency.⁷³ One respondent to the BASI *Regional Airline Safety Study* stated that:
- The [dispensation] system should be disbanded and revert back to the straight CAO 48 because if a pilot is worked (by the company) to the maximum that the dispensation allows, the fatigue becomes a major factor for that person.⁷⁴
- 2.84 Ansett believes that the current system had become an 'anachronism as most operators roster crews pursuant to exemptions to the order rather than the order itself'.⁷⁵
- 2.85 As noted by the Department of Transport and Regional Services, the 'proliferation of exemptions has resulted in unintended commercial disadvantage, industry disharmony, additional costs and increased difficulty of both operators and regulators'.⁷⁶
- 2.86 It is alarming that 'few, if any, operators operate to the published orders' and that exemptions have essentially acted as a 'de-facto regulatory regime since 1993'.⁷⁷
- 2.87 We acknowledge CASA's advice that it is seeking to overcome some of these problems by centralising control of the exemption process and reviewing those exemptions that have been granted with the intention of ensuring consistency. We are also somewhat reassured by CASA's claim that these measures 'can keep us going with the safety margins that we believe we need while we are developing the new system'.⁷⁸
- 2.88 Nevertheless, it is clearly unsatisfactory that such a core element of Australia's aviation safety regime should have been allowed to degrade in this way. Ensuring that the CAO 48 regime is capable of regulating flight and duty times for aircrew in a safe, efficient, consistent and fair manner

72 Submission No 12, Vol 1, p. 221 (Guild of Air Pilots and Air Navigators).

73 Exhibit 7, *Regional Airline Safety Study*, Bureau of Air Safety Investigation, p.49.

74 Exhibit 7, *Regional Airline Safety Study*, Bureau of Air Safety Investigation, p.21.

75 Submission No 13, Vol 1, p. 224 (Ansett Australia).

76 Submission No 83, Vol 6, p. 1290 (Dept. Transport and Regional Services).

77 Submission No 83, Vol 6, p. 1289 (Dept. Transport and Regional Services).

78 Transcript of evidence, 28 June 2000, Canberra, p. 848 (Mr Mick Toller—CASA).

should be a priority for CASA. The deficiencies that exist at present must be overcome urgently, as, judging by past performance, it may be some time yet before a new set of flight and duty time rules are prescribed.

- 2.89 At the same time as consolidating control of the process of issuing new exemptions, CASA should review existing exemptions with rigour to determine whether they have continuing relevance or whether they should be revoked. Where feasible, any new exemptions that are issued should contain sunset clauses or automatic review and audit provisions.

Recommendation 6

- 2.90 **The Civil Aviation Safety Authority should take urgent action to ensure that, while developing new rules for aircrew flight and duty times:**
- **the current rules for regulating flight and duty times are consistently and fairly applied until such time as they are replaced by new rules; and**
 - **the practice of issuing exemptions to the current rules is reviewed, refined and administered consistently.**

Aircraft maintenance engineers and fatigue

- 2.91 Aircraft maintenance engineers play a crucial role in the operation of a safe and efficient aviation industry. All aircraft in the industry must be regularly maintained by qualified Aircraft Maintenance Engineers (AMEs) and certified as fit to fly by Licensed Aircraft Maintenance Engineers (LAMEs). For the major commercial airlines this certification is required on a daily basis.

Current working environment

- 2.92 Many maintenance engineers are faced with regular, in some cases permanent, night shift work. Moreover, they nearly always contend with the pressure of having to complete their jobs in that brief period of time when aircraft are taken off-line for servicing. For the major airlines, most routine servicing is conducted between 8pm and 5.30am the following morning.
- 2.93 At present, the hours of work for maintenance engineers are described in industrial awards or individual contracts of employment. There is a strong theme in the evidence we received, and in other recent studies,

calling for the relevant authorities to prescribe duty time limits for aircraft maintenance engineers.⁷⁹

2.94 One LAME told us that while aircraft fleet numbers, daily movements and daily flying hours per aircraft had increased dramatically in recent years, the number of maintenance staff has remained static.⁸⁰

2.95 We also heard that static, or reduced, staffing levels can result in rushed work, heavy workloads and the need for some staff to work excessive hours to compensate in peak periods or to cover for absent employees.⁸¹ The ALAEA cited many cases of engineers working 'back to back' shifts to cover for employees on leave, or lack of qualified staff.⁸² The potential risks that this poses for airline safety was highlighted in the recent BASI *Regional Airlines Safety Study*, which quoted a LAME as saying:

Due to company pressure, lack of personnel and a lack of a legal duty period, I worked approximately 29 hours straight. The last job I had to do was a simple engine component change, one I had done many times before. Following the fitment of the component, I could not focus on the correct rigging procedure for the component. My concentration had lapsed to the point where I could not conduct a simple task...Companies adopt the 'you will stay until the job is finished' attitude.⁸³

2.96 The same report quotes a pilot as saying:

I find it hard to understand. I am limited to time worked so fatigue does not interfere with safety but the flying machine we all rely on, may have been worked on by tired and fatigued engineers with no time limits on work periods or rest periods.⁸⁴

2.97 BASI found that 29 per cent of maintenance staff were sometimes so tired at the end of a work period that they could not perform their tasks properly, 50 per cent had worked a duty period longer than 14 hours in the preceding twelve months and one third reported working a period of 18 hours.⁸⁵ As a result, BASI concluded that the absence of duty time limits for aircraft maintenance engineers is a 'safety deficiency'.⁸⁶

79 Submission Nos 6, 27, 32, Vol 1, 2, pp. 65, 346, 413; Transcript of evidence, 7 October 1999, Sydney, p.368 (Mr Iain Lang—ALAEA).

80 Submission No 32, Vol 2, p. 409 (Mr Andrew Mulford).

81 Exhibit 7, *Regional Airline Safety Study*, Bureau of Air Safety Investigation, p.96.

82 Transcript of evidence, 7 October 1999, Sydney, pp.372-3, 376 (Mr Chris Ryan and Mr Iain Lang—ALAEA).

83 Exhibit 7, *Regional Airline Safety Study*, Bureau of Air Safety Investigation, p.35.

84 Exhibit 7, *Regional Airline Safety Study*, Bureau of Air Safety Investigation, p.35.

85 Exhibit 7, *Regional Airline Safety Study*, Bureau of Air Safety Investigation, p.35.

86 Exhibit 7, *Regional Airline Safety Study*, Bureau of Air Safety Investigation, p.50.

- 2.98 This finding is underscored by the results of a recent Australian Transport Safety Bureau survey of aircraft maintenance engineers, showing that fatigue was the second most cited causal factor (13 per cent) when asked why an occurrence had happened.⁸⁷
- 2.99 Both QANTAS and Ansett indicated to us that they recognise the problems that can be caused by fatigue in the aircraft maintenance task, and are actively involved in addressing the problem.
- 2.100 QANTAS has a number of mechanisms in place to manage fatigue in its engineering and maintenance operations:
- controlled overtime;
 - a 'no blame' culture based on the Qantas Human Factors Program and the Boeing MEDA (Maintenance Error Decision Aid) process;⁸⁸
 - close auditing of subsidiary engineering and maintenance operations;⁸⁹ and
 - a fatigue management and education program consisting of written material and two days of education workshops conducted by the Adelaide Centre for Sleep Research.⁹⁰
- 2.101 Ansett told the committee that they actively promote fatigue management and educate staff as to the dangers of fatigue, how to recognise personal fatigue and fatigue in others and what systems and practices will minimise the occurrence and instances of fatigue.⁹¹ Ansett also audits its subsidiaries to ensure that safety standards are being maintained.⁹²
- 2.102 During the course of our inquiry we inspected both the QANTAS and Ansett jet maintenance facilities for discussions with management and maintenance staff.
- 2.103 These inspections gave us an understanding of the long hours and night work that maintenance engineers contend with on a regular basis. While

87 ATSB, 2000, *Aircraft Maintenance Survey – Results*, Department of Transport and Regional Services, Canberra, p.5: see also Hobbs.A, 'Maintenance Error: Lessons from the ATSB Survey', *Flight Safety Australia*, vol 4(2), March-April 2000, pp.36-7.

88 Transcript of evidence, 7 October 1999, Sydney, pp.447-8 (Mr Bruce Deahm—Qantas). A number of transport modes employ a 'no blame' culture when investigating accidents and incidents. In general terms 'no blame' refers to a process whereby, in making findings as the causes of an accident or incident, blame is not attributed nor is liability determined. The goal of an investigation is to identify the circumstances of an accident or incident and determine its causes.

89 Transcript of evidence, 7 October 1999, Sydney, p.457 (Mr Bruce Deahm—Qantas).

90 Transcript of evidence, 7 October 1999, Sydney, p.455-6 (Mr Bruce Deahm—Qantas).

91 Transcript of evidence, 8 October 1999, Melbourne, p.511 (Mr Trevor Jensen—Ansett).

92 Transcript of evidence, 8 October 1999, Melbourne, p.510 (Mr Trevor Jensen—Ansett).

we were impressed with the professionalism and commitment of the management and staff of both airlines, the potential for fatigue to inhibit maintenance performance was plain to see.

- 2.104 We were told by some engineers that they undertake the more complicated tasks in the early part of a night shift and reserve the simpler tasks for the latter parts of a shift, when people are feeling tired and are beginning to 'wind down'. We were also told that fatigue can become more of a problem on the second night of a night shift roster and that it can take longer and longer to complete routine tasks, giving rise to the temptation to 'cut corners' to get a job finished in time.

Need for better rules

- 2.105 We recognise that the commercial realities of the industry dictate that aircraft need to be serviced quickly, and often during the night between flight curfew hours at the major airports. For many aircraft engineers working night shifts is an unavoidable consequence of their job.
- 2.106 We acknowledge that many people like working night shifts and are happy to work additional hours, seeing such hours as resulting in valuable extra income.⁹³
- 2.107 We also acknowledge the view put to us by the Regional Airlines Association that the current unregulated approach to hours of work for maintenance engineers is beneficial for operators and staff in that it 'assists in dealing with those unscheduled problems in whatever way is proper'.⁹⁴
- 2.108 Nevertheless, we believe that the risks to personal and public safety are such that more should be done to regulate the hours of work for aircraft maintenance engineers. There is no reason why hours of duty for maintenance engineers should not be regulated as stringently as would be the case for flight crew.
- 2.109 CASA is currently developing a set of hours of work for aircraft maintenance engineers, which incorporates the latest research into fatigue management. We have been advised that the new rules will require that employees attend work in a state fit for duty and that employers ensure shift or roster patterns do not cause fatigue. The rules will also require operators to maintain auditable fatigue management systems.⁹⁵
- 2.110 This is promising advice. It is, however, important that the rules, and the fatigue management systems contemplated in the rules, specifically limit

93 Transcript of evidence, 7 October 1999, Sydney, p. 376 (Mr Chris Ryan—ALAEA).

94 Transcript of evidence, 7 October 1999, Sydney, p.380 (Mr Alan Terrell—RAAA).

95 Transcript of evidence, 9 November 1999 and 28 June 2000, p. 697, 849 (Mr Mick Toller—CASA).

excessive overtime, are sensitive to the time of day impact on fatigue and ensure adequate rest between shifts. The final version of the rules must take these key fatigue factors into account.

Recommendation 7

- 2.111 **The Civil Aviation Safety Authority should be required to develop hours of duty rules for aircraft maintenance engineers, incorporating fatigue management principles and auditable fatigue management systems.**
- 2.112 One of the key elements of the fatigue management systems referred to above should be that operators routinely test the shift roster patterns for their aircraft maintenance staff against the criteria used in fatigue management software, such as that developed by the Adelaide Centre for Sleep Research. This type of testing by operators, and checking by CASA, would be a relatively simple means of helping identify and control fatigue risks before they become problems.

Recommendation 8

- 2.113 **In determining whether an operator has implemented a fatigue management system, one of the factors the Civil Aviation Safety Authority should consider is whether shift rosters for aircraft maintenance staff are routinely tested using reputable computer-based fatigue modelling packages.**
- 2.114 It is also important that airline operators employ a sufficient number of engineering staff so that maintenance can be undertaken without the need for staff to work regular and excessive amounts of overtime. In response to inadequate staffing and excessive workloads in regional airlines the *BASI Regional Airlines Safety Study* recommends that:
- ...Certificate of Approval holders maintaining Class A aircraft greater than 5700kg, introduce an effective system to monitor functionally related staffing versus anticipated workload, and that these records be available for CASA surveillance.⁹⁶

Recommendation 9

2.115 The Civil Aviation Safety Authority should:

- **require that operators of commercial transport services introduce and maintain effective systems to monitor staffing levels and anticipated workloads; and**
- **routinely review these records to satisfy itself that effective staffing levels are maintained.**

2.116 On a related matter, we are most disturbed to learn that both major airlines have dramatically reduced their intake of aircraft maintenance apprentices. This is leading the airlines to recruit engineers from overseas and to 'poach' qualified staff from elsewhere in the industry. This practice, if continued, will:

- place at risk the strong corporate and safety cultures that the airlines have established and maintained by training their own staff;
- reduce Australia's capacity to be self-sufficient in this important part of the industry; and
- reduce the number of qualified staff in other parts of the industry, particularly in regional areas.

2.117 We were so concerned that we have written to the Minister for Transport and the Minister for Education, Training and Youth Affairs asking that they investigate what measures might be taken to ensure that the continuity of training and consequent safety standards in the industry are not jeopardised by these developments.

2.118 Similarly, we call all on all major airlines in Australia to ensure that any decisions they take about the training of apprentices have regard to long term consequences as well as short term needs.

Air traffic controllers and fatigue

2.119 At present, the majority of air traffic control services are provided in Australia by Airservices Australia, a Commonwealth Government entity. The hours of work for air traffic controllers (who are employees of Airservices Australia) are described in an enterprise bargaining agreement.⁹⁷

⁹⁷ Gander.P, 2000, Fatigue Management in Air Traffic control: The New Zealand Approach, paper presented to Fourth International Conference on Fatigue and Transportation, Fremantle, 19-22 march, 2000.

- 2.120 We received submissions from the Civil Air Operations Officers Association arguing that, as poorly managed fatigue in the provision of air traffic control services can represent a significant threat to public safety, it is inappropriate that hours of work for air traffic controllers be a matter for industrial negotiation.⁹⁸ The Association argues that hours of work for air traffic controllers should be regulated in the same manner as hours of duty for flight crew are regulated.⁹⁹
- 2.121 Airservices Australia, however, seem disinclined to vary the current arrangements, preferring to 'take a broad, less prescriptive approach to managing fatigue'.¹⁰⁰ They cite, in support of their position, the situation in the United Kingdom whereby the UK air traffic control authority has to continually issue dispensations to their strict regulations due to the lack of flexibility in the system.¹⁰¹
- 2.122 Under current arrangements, air traffic controllers are allowed to work up to 50 hours in a five-day period. On the basis of evidence we received it seems that Airservices Australia has no way of stopping its employees from working excessive overtime, other than relying on 'the professionalism of our supervisors to ensure that we do not end up with one person working continuous shiftwork'.¹⁰²
- 2.123 We are aware that CASA and the Department of Transport and Regional Services are currently preparing a new regulatory framework for the provision of air traffic control services in Australia. We note that this framework is intended to allow the phased introduction of competition into air traffic services, with the exception of the Sydney Basin airports.¹⁰³
- 2.124 A working group comprising representatives from Airservices Australia, the RAAF, the Civil Air Operations Officers Association, CASA and Professor Dawson from the Adelaide Centre for Sleep Research has been

98 Transcript of evidence, 8 October 1999, Melbourne, p. 530-1, 535 (Mr David Roy and Mr Peter Gerard—CAOOAA).

99 Submission No 43, Vol 3, p. 601, 606 (CAOOAA).

100 Transcript of evidence, 9 November 1999, Canberra, p. 706 (Mr David Adams—Airservices Australia).

101 Transcript of evidence, 9 November 1999, Canberra, p.707 (Mr Adrian Dumsa—Airservices Australia).

102 Transcript of evidence, 9 November 1999, Canberra, p.718 (Mr Adrian Dumsa—Airservices Australia).

103 See: A Policy Statement by the Hon. John Anderson MP Deputy Prime Minister and Minister for Transport and Regional Services, *A Measured Approach to Aviation Safety Reform*, Department of Transport and Regional Services, www.dotrs.gov.au/aviation/index.htm. See also: Notice of Proposed Rule Making (NPRM) 0001AS, *Regulatory Standards for Airspace, Air Traffic Services and Aeronautical Communications, CASA Safety Regulations Parts 171 and 177 and Manual of Operations Standards Parts 171 and 172*, Civil Aviation safety Authority, February 2000. The NPRM states that the new standards, when adopted, "will provide the regulatory basis for any entity providing, or proposing to provide ATS and related services".

appointed to ensure that the proper management of fatigue is considered as a key part of this new regulatory environment.¹⁰⁴

- 2.125 The development of this new regulatory environment is a crucially important task, with profound consequences for aviation safety in Australia. The introduction of competition into the provision of air traffic services must only proceed if a rigorous process is in place to ensure that all providers meet the highest standards of operational accuracy, reliability and safety. From the fatigue management perspective, there are two matters that must be a part of the new regulatory environment:
- first that comprehensive hours of duty rules, based on sound fatigue management principles be established; and
 - second, that air traffic service providers be required to implement scientifically-based fatigue management systems and that CASA be required to audit these systems on a regular basis.
- 2.126 In addition, as recommended previously in relation to maintenance engineers, we firmly believe that one of the key elements of the fatigue management systems required of air traffic service providers should be that they routinely test shift roster patterns for their employees against reputable computer-based fatigue management models.

Recommendation 10

2.127 The Civil Aviation Safety Authority should:

- **develop comprehensive hours of duty regulations for air traffic controllers, incorporating basic fatigue management principles;**
- **require all air traffic service providers to maintain auditable fatigue management systems; and**
- **in determining whether an air traffic service provider has implemented an adequate fatigue management system, consider whether shift rosters for air traffic controllers are routinely tested against reputable computer-based fatigue modelling packages.**

2.128 We also think it appropriate that Airservices Australia and other providers take action to ensure that, in the interim, they manages their fatigue risk more effectively.

2.129 Airservices Australia and other providers should test the shift rosters for their current staff against one of the computer-based fatigue management

104 Transcript of evidence, 9 November 1999, Canberra, pp.701, 702 (Mr Mick Toller—CASA)

models that are currently available. This would provide a base line of information in response to which a fatigue management plan could be developed. It is remarkable that such action appears not yet to have been taken.

Recommendation 11

- 2.130 **Airservices Australia and other providers of air traffic services should, as a matter of urgency, test the shift rosters for air traffic control staff against a reputable computer-based fatigue modelling package and develop an interim fatigue management plan to mitigate the risks of a fatigue related air traffic control incident.**
- 2.131 Further to this, we note that the New Zealand government is introducing a non-prescriptive system whereby agencies providing air traffic control services must have a proper and approved fatigue management regime in place. This approach, as described in the following box, may prove to be informative for those preparing the new regulatory environment in Australia.

Box 2.2 The New Zealand approach to fatigue management in air traffic control

In June 1999 the New Zealand Civil Aviation Authority (CAA) released a draft Rule that moved from a prescriptive hours of work approach to allowing air traffic service providers to implement their own fatigue management schemes, subject to acceptance by the Director.

In conjunction, a Technical Study Group was established by the CAA comprising of representatives from the service provider, union, major domestic airlines, CAA and the scientific community. The group was responsible for developing a Circular that would provide an example of an acceptable means of complying with the new rule.

Advice was drafted in six key areas:

- Typical traffic for shifts
- The availability of rest, refreshment and meal breaks
- Circadian rhythms
- Short term and accumulated sleep deficit
- The shift rotation in use
- Specific duty limitations

A proposal was also drafted on measures to manage fatigue through workload monitoring, investigation of fatigue in safety incidents and accidents, education of operational staff, and proactive management policies and procedures. The Technical Study Group has recommended that fatigue and sleep related issues should be addressed in fitness for duty medical examinations for air traffic control staff.

Source P.Gander,2000, *Fatigue Management in Air Traffic Control: The New Zealand Approach*, Proceedings, Fourth International Conference on Fatigue and Transportation, Fremantle, 19-22 March 2000.

Cabin crew and fatigue

- 2.132 The working hours of cabin crew, like air traffic control and aircraft maintenance staff, are regulated through industrial agreements. This has resulted in a diverse range of flight and duty time limitations across the industry.¹⁰⁵ Fatigue is an issue due to the safety sensitive nature of cabin crew duties and the often high workloads and stress experienced by flight attendants.¹⁰⁶ The Flight Attendants Association of Australia believe that, despite some companies recognising fatigue as an issue, 'the current trend is to ignore fatigue and related matters and only be motivated by what is productive and efficient'.¹⁰⁷
- 2.133 The lack of any flight and duty time limitations contravenes international aviation agreements. The association makes the point that CASA has an obligation under International Civil Aviation Organisation (ICAO) Annex 6 'to establish regulations specifying the limits applicable to flight time, flight duty periods and rest periods for cabin attendants'.¹⁰⁸
- 2.134 We understand that CASA is considering the regulation of cabin crew flight and duty times as part of the proposed rewrite of CAO 48, the progress of which has been described above. This would provide an appropriate basis for regulating the duty times for cabin crews.¹⁰⁹

Auditing for aviation safety

- 2.135 During the course of the inquiry serious questions emerged regarding the effectiveness of CASA's auditing and policing of the regulations covering all aspects of safety in the aviation industry.
- 2.136 The BASI *Regional Airlines Safety Study* identified a number of safety deficiencies in relation to the current system of regulating flight and duty times in the regional airline sector. The report found that regional airline operations have a greater potential for fatigue than operations over longer routes or in controlled airspace.¹¹⁰ The report outlined a number of fatigue related safety deficiencies:
- not all regional airlines complied with limitations on flight and duty times;
 - the time scheduled for some turnarounds may not be sufficient for flight crews to safely complete all required duties and inspections; and

105 Submission No 35, Vol 2, p. 437 (Flight Attendants Association of Australia).

106 Submission No 35, Vol 2, p. 436 (Flight Attendants Association of Australia).

107 Submission No 35, Vol 2, p. 438 (Flight Attendants Association of Australia).

108 Submission No 35, Vol 2, p. 435 (Flight Attendants Association of Australia).

109 Submission No 83, Vol 6, p. 1290 (Dept. Transport and Regional Services).

110 Exhibit 7, *Regional Airlines Safety Study*, Bureau of Air Safety Investigation, p.18.

- the minimum rest periods specified in CAO 48.1 are inadequate for an overnight rest period unless accommodation close to the airport is provided.¹¹¹
- 2.137 For example, the findings of a CASA investigation of a small regional airline (Whyalla Airlines) revealed a number of safety problems that reflect concerns raised in the BASI report, including high pilot workloads during ground turnarounds and the inaccurate maintenance of flight and duty records.¹¹²
- 2.138 CASA claims that it audits operators on a continual basis.¹¹³ In particular, small companies are audited closely for irregularities in pilot's logbooks to make sure they are staying within the limits.¹¹⁴
- 2.139 Evidence to the Committee questions the regularity, and thus the effectiveness of the CASA auditing program. In regard to General Aviation (GA), the Australian Federation of Air Pilots (AFAP) argues for increased and more robust auditing of operators by CASA, particularly in regional and remote areas.¹¹⁵
- 2.140 The general aviation sector is characterised by an oversupply of young pilots wanting to get into the industry, intense competition, low profit margins and often difficult working conditions. The AFAP is strongly of the view that 'it is in the general aviation area where [fatigue management and rostering issues are] quite critical'.¹¹⁶
- The focus so far has been on the regional airline sector and airlines generally, which by and large we would have to concede—given a few problems—work within fairly stringent regulation and the safety issues are not really there. But underlying that we have a vibrant general aviation industry. That is where the problems are and that is where the high demand is for prescriptive regulation to level the playing field.¹¹⁷
- 2.141 This view is supported by the Director of CASA, Mr Mick Toller, who acknowledged that it is at the non-commercial transport part of the industry where there are particular problems. By way of example, Mr Toller referred to the mustering industry, stating that the 'underrecording of hours or non-recording of hours seems endemic within that part of the
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111 Exhibit 7, *Regional Airlines Safety Study*, Bureau of Air Safety Investigation, p.49

112 CASA Media Release, Sunday 11 June, 2000. This investigation was not related to the crash of a Whyalla Airlines aircraft on 31 May 2000.

113 Transcript of evidence, 9 November 1999, Canberra, p.696 (Mr Mick Toller—CASA).

114 Transcript of evidence, 9 November 1999, Canberra, p.693 (Mr Mick Toller—CASA).

115 Transcript of evidence, 10 September 1999, Melbourne, p.211 (Mr Laurie Cox—AFAP).

116 Transcript of evidence, 10 September 1999, Melbourne, p. 213 (Mr Mike Vaughan—AFAP).

117 Transcript of evidence, 10 September 1999, Melbourne, p. 220 (Mr Mike Vaughan—AFAP).

industry'.¹¹⁸ The Department of Transport and Regional Services too noted that many operators in regional and remote areas have a 'less than well developed safety culture' and that occupational health and safety legislation and industrial agreements may not provide adequate protection against fatigue.¹¹⁹

- 2.142 The BASI *Regional Airlines Safety Study* found that a significant percentage of respondents did not find CASA's auditing and surveillance process acceptable. For example, 48 per cent of pilots thought that the current level of flight operations surveillance by CASA needed to be increased. Similarly, 50 per cent of aircraft maintenance personnel surveyed indicated that they would like to see increased CASA surveillance of maintenance operations.¹²⁰
- 2.143 Two specific audit issues were raised in the BASI *Regional Airlines Safety Study*. It was felt that the CASA surveillance processes lacked depth, which resulted in problems and evidence of non-compliance being overlooked, and that, in addition, there was a feeling that there was inconsistent enforcement of the regulations by CASA.¹²¹
- 2.144 The Australian National Audit Office (ANAO) similarly found deficiencies in CASA's Aviation Safety Surveillance Program (ASSP), concluding that the 'potential exists for the regime to be strengthened with consequential increased confidence of all stakeholders'. In addition, the ANAO concluded that CASA did not adhere to its own safety surveillance procedures, which impacted on the effectiveness of CASA as a regulator.¹²²
- 2.145 We consider that effective surveillance and auditing, and the consistent application of the regulations, to be critical in managing fatigue in aviation. If less prescriptive 'outcome' based regulations, as proposed by CASA, are to be introduced effectively, it will require in-depth and thorough surveillance and auditing practices to be implemented to ensure that fatigue management programs in all sectors of the aviation industry are properly implemented and adhered to. Further, an effective safety culture can only evolve if all persons involved in an industry adhere to the same standards.
- 2.146 In this regard, CASA must lead by example. Our current practices, as highlighted by the ANAO and BASI reports, do not live up to the

118 Transcript of evidence, 9 November 1999, Canberra, p.692 (Mr Mick Toller—CASA).

119 Submission No 83, Vol 6, p. 1314 (Dept. Transport and Regional Services).

120 Exhibit 7, *Regional Airlines Safety Study*, Bureau of Air Safety Investigation, p.39.

121 Exhibit 7, *Regional Airlines Safety Study*, Bureau of Air Safety Investigation, p.40.

122 Australian National Audit Office, 1999-2000, *Aviation Safety Compliance: Civil Aviation Authority*, Audit Report No.19, Canberra, p.12-13.

standards we claim. By not maintaining stringent auditing and monitoring procedures and practices we put at risk our international reputation as a world leader in aviation safety.

Recommendation 12

2.147 The Civil Aviation Safety Authority should:

- **take immediate steps to address the concerns raised by the Bureau of Aviation Safety Investigation and the Australian National Audit Office regarding the effectiveness of its aviation safety auditing; and**
- **within three months of this report being tabled in Parliament, report back to this committee on the steps that have been taken to address those concerns and improve its aviation safety auditing, with particular reference to fatigue management.**

Fatigue management in rail

2.148 During the course of the last Parliament, the former House Transport Committee conducted an extensive inquiry into rail reform in Australia, producing a report entitled *Tracking Australia: An inquiry into the role of rail in the national transport network*.¹²³ That report canvassed a number of the issues raised in the submissions we received to our current inquiry, such as national accreditation of rail operators¹²⁴ and the need for fairer competition between rail and road transport.¹²⁵

2.149 The Commonwealth Government responded to the report in April 2000 by putting the States and Territories on notice that unless nationally consistent arrangements for track access, accreditation and safety standards are in place by mid-2001 'it will consider establishing a Commonwealth regulatory body for accreditation, standard setting and safety regulation on the national network'.¹²⁶

123 House of Representatives Standing Committee on Communications, Transport and Microeconomic Reform, 1998, *Tracking Australia: An inquiry into the role of rail in the national transport network*, The Parliament of the Commonwealth of Australia, Canberra.

124 Submission No 26, Vol 2, p. 314 (National Rail Corporation Limited).

125 Submission No 69, Vol , pp. 1126-31 (Rail 2000 Inc).

126 Department of Transport and Regional Services, 2000, *Response of the Federal Government to Reports of the House of Representatives Standing Committee on Communications, Transport and Microeconomic Reform 'Planning Not Patching' and 'Tracking Australia'; Report of the Rail Projects Taskforce, 'Revitalising Rail', and; Report of the Productivity Commission 'Progress in Rail Reform'*, Department of Transport and Regional Services, Canberra, p.32.

- 2.150 Although we are frustrated at the extremely slow pace of rail reform, we are pleased that the Commonwealth has signalled its intention to act decisively if clear progress is not made by mid-2001. We intend to closely monitor progress in this area.
- 2.151 There is greater potential to manage fatigue in the rail industry in comparison to the road transport industry, due to the nature of the transport task. Routes and schedules are predominantly fixed, and the train driving task is not subject to as many variables as truck driving.
- 2.152 One element of the rail reform package that bears very directly on the management of fatigue is the development of draft *National Codes of Practice for Railways*.

National Codes of Practice for Railways

- 2.153 The draft National Codes of Practice have been prepared by industry on a joint funding basis with the Commonwealth Government, the State and Territory Governments and the Australian Railway Association. The Codes cover management of the interface between different transport modes, operations and safeworking, rollingstock and track, and civil and electrical infrastructures.
- 2.154 The development of national codes of practice is a positive step towards the harmonisation of operational practices throughout the rail industry. We note that train crew fatigue is being addressed in the draft national codes.¹²⁷ This too is a positive development although there is scope for the sections of the current draft to be improved.
- 2.155 While dealing in broad terms with fatigue in the workplace, the current draft does not take into account prior patterns of work and/or rest, the length of the work period (rostering) or 'time-of-day' considerations. Moreover, it places the onus on crew to detect and report fatigue without outlining the responsibilities of management in regard to preventing crew fatigue. These matters should be incorporated into the draft National Codes of Practice.

127 See section 211 of Department of Transport and Regional Services, *Draft National Codes of Practice for Railways*, at www.dotrs.gov.au/atc/railcode/railcode.htm.

Recommendation 13

2.156 **The Minister for Transport and Regional Services should propose amendments to the current draft of the *National Codes of Practice for Railways* to incorporate:**

- **more detailed hours of work rules for train crew, taking into account prior patterns of work and rest, the length of time on duty and the time of day of the work period; and**
- **a clear statement of the obligations that employers have to manage fatigue in the workplace.**

Australian Rail Consortium National Shiftwork and Workload Study

2.157 Another industry based initiative under-way is a program of work commenced in 1995 by a consortium of rail operators, rail unions and regulators. The consortium commissioned the Adelaide Centre for Sleep Research to conduct a study into the effects of shiftwork and fatigue on rail employees, particularly operational train crews.¹²⁸

2.158 The study is in two phases. The first phase involved over 250 drivers from 14 rail depots across Australia. The two key outcomes of the first phase of the study were the development of a fatigue modelling software package to analyse shifts and rosters for their fatigue potential (see below) and a comprehensive training and education package to help deal with both work and non-work related fatigue factors.¹²⁹

2.159 The second phase of the study began in 1999 and has three main aims:

- evaluate the relative effectiveness of different implementations of fatigue management training programs;
- evaluate the effectiveness of the fatigue modelling software developed in phase one of the study, with the specific aim of developing national guidelines for the use of the software;
- develop quantitative models to determine some of the social and economic costs of fatigue to the rail industry.¹³⁰

2.160 A number of rail operators involved in the study have been actively developing and implementing fatigue management programs based on

128 The consortium includes National Rail Corporation, West Rail, Queensland Rail, FreightCorp, NSW State Rail Authority and the Public Transport Union (Submission No 92, Vol 6, p. 1496). The consortium also included WorkSafe Australia (Submission No 19, Vol 2, p. 256).

129 Submission No 19, Vol 2, p. 257 (Centre for Sleep Research).

130 Submission No 19, Vol 2, p. 257 (Centre for Sleep Research).

the tools, and education and training materials developed through the study. The measures being implemented include the testing and implementation of fatigue management software, staff training and education programs, fitness for duty testing and the recognition that fatigue management is a significant risk within the operators overall risk management strategy.¹³¹

- 2.161 The fatigue management programs being developed and implemented by some rail operators have not been without problems and criticism. The Public Transport Union (PTU), a member of the rail consortium, is concerned about how the fatigue modelling software will be used. While supporting the use of the fatigue modelling software (and the associated fatigue management index) as a tool for regulating rosters and working time, the PTU opposes any attempt to substitute the fatigue management index for consultation and negotiation about rosters.¹³² Submissions from the NSW Train Drivers Association indicate that there is scepticism on the part of unions about the sincerity and motivation of management in developing fatigue management plans.¹³³
- 2.162 As we have indicated elsewhere in the report, we believe there are compelling reasons for transport companies to develop auditable fatigue management programs, not the least of which is that, when properly implemented, they make explicit that management has a responsibility to identify and mitigate fatigue risks. The effective integration of fatigue management principles into standard operating procedures is to the advantage of both employees (in that they are presented with a safer workplace) and employers (in that the risk of damage to equipment, compensation claims and exposure to legal liability is managed in a commercially prudent manner). It is in the interests of employees and employers to work cooperatively to achieve these ends.

Fatigue management in maritime transport

Maritime regulations

- 2.163 There are a number of Australian legislative instruments that cover aspects of the maritime working environment. At the Commonwealth level the *Occupational Health and Safety (Maritime Industry) Act 1993* creates a general duty on the operator of a ship covered by the Act to protect the health and safety at work of employees. The *Federal Maritime Industry*

131 Submission Nos 26, 79, 92, Vols 2, 5, 6, pp.312–3, 1220, 1498–1502.

132 Submission No 63, Vol 4, p. 900 (Australian Rail, Tram and Bus Industry Union—National Office).

133 Submission No 24, Vol 2, p. 297-300 (NSW Train Drivers Association).

Seagoing Award 1998 establishes award conditions in respect to hours of work and leave, and rates of pay.¹³⁴

- 2.164 The Commonwealth has also legislated to give effect to the International Safety Management Code (ISM), which requires all passenger ships, tankers, bulk carriers and high speed craft over 500 gross tonnes to have approved safety management systems in place. The ISM Code requires that all ship operators to have written safety instructions and procedures that can be audited by appropriate authorities. The ISM Code is given force of law in Australia by Marine Orders made under the *Navigation Act 1912*.¹³⁵
- 2.165 In addition, the Australian Maritime Safety Authority (AMSA) has given effect to the hours of rest provisions of the *Standards of Training and Certification of Watchkeepers 1978* (as amended in 1995). AMSA is closely observing industry practices, principally through a program of occupational health and safety audits.¹³⁶
- 2.166 States also have legislation covering marine operations within their jurisdiction. For example, the Queensland *Transport Operations (Marine Safety) Act 1994* is performance based legislation which requires a person involved with a ships operation (including owner, master, pilot and crew member) not to cause a ship to be operated unsafely. The maximum fine is \$375 000 or two years imprisonment.¹³⁷
- 2.167 The general issue of fatigue for Australian mariners was investigated as part of the former Committee's *Ship Safe* inquiry in 1998. We support all of the conclusions and recommendations in that report.¹³⁸
- 2.168 Two new issues were raised during the course of this inquiry: whether the current regulatory regime caters adequately for marine pilots; and the impact on crew fatigue of decreasing turnaround times for ships in port.

Fatigue in marine pilotage

- 2.169 There are two categories of marine pilot: port or harbour pilots working in Australian ports and coastal pilots working in the Great Barrier Reef. The Commonwealth, through the Australian Maritime Safety Authority, licenses coastal pilots. Port pilots are licensed and regulated by the

134 Submission No 29, Vol 2, p. 373-4 (Australian Shipping Federation).

135 Submission No 29, Vol 2, p. 372 (Australian Shipping Federation).

136 Submission No 18, Vol 1, p. 244 (AMSA).

137 Submission No 88, Vol 6, p. 1451 (Qld Government).

138 House of Representatives Standing Committee on Communications, Transport and Microeconomic Reform, 1998, *Ship safe: An inquiry into the Australian Maritime Safety Authority Annual Report 1996-1997*, The Parliament of the Commonwealth of Australia, Canberra.

relevant State government transport authorities. Marine pilots generally work for an organisation (private, government or port authority) which is responsible for providing marine pilotage services in a particular port or district.¹³⁹

- 2.170 It has been argued in submissions to our inquiry that existing general maritime regulations, such as the Standards of Training and Certification of Watchkeepers (STCW), are either unsuitable or do not apply to marine pilots. Fremantle Pilots argue that, although some pilotage companies use STCW as a guide, the prescriptive nature of the rules and the lack of recognition of 'time of day' effects means that they are unsuitable for harbour pilotage and could in fact compromise safe fatigue management.¹⁴⁰ The lack of clear and relevant guidance on hours of duty has, in the view of Fremantle Pilots, led to a lack of consistency in relation to fatigue management:

There has been an ad hoc, piecemeal and highly subjective individual approach to manning, the number of jobs per pilot per shift, length of shifts, number of days off, type of piloting and allowances for the cyclical nature of shipping.¹⁴¹

- 2.171 A submission from the Australian Marine Pilots Association (AMPA) tended to confirm this view, describing the response of pilotage companies to fatigue and fatigue management as being a 'mixed bag'.¹⁴² It was also apparent that some marine pilots believe that the pressure exerted by port authorities on pilotage companies to cut costs can lead to staff reductions, increased workloads and corresponding risks to safety.
- 2.172 In response to concerns about marine pilot fatigue, AMSA has commissioned a series of five reports on marine pilotage in the Great Barrier Reef from the Queensland University of Technology.¹⁴³ Following these general studies AMSA commissioned Det Norske Veritas to undertake a detailed risk analysis of pilotage in the Great Barrier Reef.¹⁴⁴

139 Submission No 37, Vol 2, p. 471 (AMPA).

140 Submission No 23, Vol 2, p. 289 (Fremantle Pilots).

141 Submission No 23, Vol 2, p. 288 (Fremantle Pilots).

142 Submission No 37, Vol 2, p. 475 (AMPA).

143 1) *The Work Practices of Marine Pilots: A Review*; 2) *An Analysis of the Work Schedules of Great Barrier Reef Pilots*; 3) *The Impact of Great Barrier Reef Pilotage Work on Wives and Families*; 4) *A Survey of the Work and Rest Patterns of Great Barrier Reef Pilots*; 5) *On Tour Analyses of the Work and Rest Patterns of Great Barrier Reef Pilots: Implications for Fatigue Management*, Australian Maritime Safety Authority, Canberra.

144 Submission No 18, Vol 1, p. 245 (AMSA).

It was this analysis which revealed that between 10 and 25 per cent of accidents can be attributed to pilot fatigue.¹⁴⁵

- 2.173 While AMSA did not indicate to us whether it proposed to develop specific responses to these studies, we note that a number of related initiatives have been taken in the industry, some by sponsored by government and some by operators themselves.

Moving towards national standards for pilotage

- 2.174 The most significant of the initiatives has been the development by the Australian Association of Ports and Marine Authorities and the National Marine Safety Committee of *Guidelines for Australian Marine Pilotage Standards*. These guidelines, which have been endorsed by the Australian Transport Council, are the first step in developing uniform national legislation for the pilotage of commercial vessels in Australia.
- 2.175 The guidelines propose standards for licensing, medical fitness, training and examination, and the establishment of a general code of conduct for pilotage operations that may be modified by pilots, port authorities and service providers to reflect their specific operational environments. It is intended that the guidelines be reviewed every two years as a means of encouraging the implementation of national standards.¹⁴⁶
- 2.176 The moves toward national standards for marine pilotage are without doubt positive, but it is important that measures to ensure the proper management of fatigue are given adequate coverage in the guidelines and any standards ultimately developed. At present there is no clear mention of fatigue or effective fatigue management strategies, nor is there a definition of what constitutes 'time on task'.
- 2.177 The Commonwealth should ensure that when the guidelines are next reviewed, consistent standards of fatigue management are described as being essential for pilotage companies. The guidelines should be seen as a means of disseminating information throughout the industry about the fatigue impact of rostering, hours of duty, time of duty and rest breaks; and about the responsibility that employers and employees share for managing fatigue risks.
- 2.178 This type of information could then be reflected in the national standards which may ultimately emerge from the guidelines. The standards themselves might require that pilotage companies maintain fatigue

145 Det Norske Veritas, 1999, *Great Barrier Reef Pilotage Fatigue Risk Assessment*, Australian Maritime Safety Authority, Canberra, p. 27.

146 National Marine Safety Committee, 1999, *Guidelines for Australian Marine Pilotage Standards*, Australian Transport Council.

management programs and that those programs be subjected to regular audits by relevant authorities.

Recommendation 14

2.179 The Minister for Transport and Regional Services should ensure that the Guidelines for Australian Marine Pilotage Standards are amended:

- **to include detailed information and requirements on fatigue and fatigue management; and**
- **to require that marine pilotage service providers implement and maintain auditable fatigue management programs.**

2.180 We note that there are no timeframes attached to the implementation of nationally consistent standards for marine pilotage operations. While the initiative seems well supported in most States and Territories, we believe it would be appropriate for the Commonwealth to indicate that unless consistency is achieved on a voluntary basis by early 2002, a national regulatory framework will be established to force the pace of reform.

Recommendation 15

2.181 If, by early 2002, there has not been demonstrable progress towards national consistency in standards for marine pilotage operations, including fatigue management, the Minister for Transport and Regional Services should establish a national regulatory regime imposing standards for marine pilotage in the areas of accreditation, operational requirements and safety regulation.

The Australian Maritime Safety Authority's model code of conduct

2.182 In a separate initiative, AMSA has released a Model Code of Conduct for Coastal Pilots,¹⁴⁷ that applies to marine pilots operating in the Great Barrier Reef (Inner Route, Great North East Channel and Hydrographers Passage).

2.183 The Model Code contains a sophisticated set of work and rest guidelines, incorporating provisions which recognise the importance of night time sleep in combating fatigue.¹⁴⁸ Key elements of the Model Code are

147 Coastal pilots differ from port pilots in that they predominantly operate in waters outside of State jurisdiction and therefore come under Commonwealth jurisdiction. Much of the pilotage in the Great Barrier Reef area is out side of the jurisdiction of the Queensland Government and is the only area of coastal pilotage in Australia.

148 Submission No 18, Vol 1, p. 245 (AMSA).

reproduced in Box 2.3. All three of the pilotage companies operate in the Great Barrier Reef have implemented codes of conduct based on AMSA's Model Code.¹⁴⁹

Box 2.3 Coastal Pilotage Rest Periods—Australian Maritime Safety Authority

Pilots must be adequately rested and mentally alert in order to provide undivided attention to pilotage duties for the duration of the passage.

It is a requirement that pilots adhere to the following minimum rest breaks:

Guidelines for taking rest periods:

Rest to be taken ashore as far as practicable

Rest periods are exclusive of travel

Rest periods begin when travel is completed and finish when travel commences

Inner Route:

A minimum period of 24 hours which must include uninterrupted rest between the hours of 2200 and 0600, before and after the pilotage.

On return voyages, pilots are to take the guidelines into consideration when assessing their quality of rest time and whether they are adequately rested prior to commencing the return leg. Should there be circumstances whereby the pilot has not had sufficient rest then the onus is on the pilot to report himself unfit to pilot.

Great North East Channel:

A period of 8 hours uninterrupted rest between the hours of 2200 and 0600 before the pilotage.

Hydrographers Passage:

A period of 12 hours uninterrupted rest, before the pilotage.

Source: Model Code of Conduct for Coastal Pilots, Australian Maritime Safety Authority

- 2.184 In addition to developing its Model Code, AMSA provides companies and pilots with a 'ready reckoner' table for calculating rest periods and runs a computer-based system known as the Pilotage Application System (PAS) to record the number of passages undertaken by pilots and their embarkation and disembarkation times. PAS is programmed to provide monthly reports on any violations of required rest periods, which are automatically investigated by AMSA.¹⁵⁰
- 2.185 While this is an impressive package of measures, any approach can be improved upon. In this case, it has been put to us that the Model Code should do more to encourage companies to recognise that the long tours of duty that are typical in Great Barrier Reef pilotage can lead to 'chronic fatigue'.¹⁵¹

149 Correspondence received from Mr David Harrod, Australian Maritime Safety Authority on 27 January 2000.

150 Transcript of evidence, 8 November 1999, Canberra, p.651 (Mr Patrick Quirk—AMSA).

151 Individual pilotage operations in the Great Barrier Reef can last up to 42 hours, whereas pilotage in ports is typically of much shorter duration. The fatigue effect of these long operations can be compounded by back to back tours of duty.

- 2.186 Mr Perry Sutton of Queensland Coastal Pilots states that 'there does not appear to be any specific recognition of the need to limit tours of duty nor the rest breaks after such tours'. As a result, Queensland Coastal Pilots has, of its own volition, decided to require its marine pilots to take rest breaks of 7 and 10 days after tours of 21 and 28 days respectively.¹⁵²
- 2.187 This seems a useful initiative and AMSA should consider whether similar requirements should be incorporated in its Model Code of Conduct.

Recommendation 16

- 2.188 The Australian Maritime Safety Authority should consider whether its Model Code of Conduct for Coastal Pilots should be amended to incorporate guidance about the maximum acceptable duration for tours of duty and the length of rest breaks appropriate to recover from such tours.**

Other company-based initiatives

- 2.189 A number of marine pilotage companies have, or are in the process of implementing, fatigue management programs within their organisations which reflect the nature of the task within their area of responsibility.
- 2.190 Sydney Sea Pilots, for example, have implemented a fatigue management regime based on the recognition of their responsibilities under the NSW Occupational Health and Safety Act. The initiatives include:
- monitoring of rosters using a quantitative model;
 - assessment of an alternative roster by the Adelaide Centre for Sleep Research;
 - allocating resources to develop a fatigue management plan;
 - establishing a code of conduct by management;
 - setting a retirement age at 61 years;
 - allocating resources to build better facilities; and
 - implementing an OH&S Management System.¹⁵³
- 2.191 Sydney Sea Pilots report that they are continuing to work with the Adelaide Centre for Sleep Research. They are developing education programs to tackle issues such as sleep inertia, commuting, fatigue related

152 Submission No 20, Vol 2, p. 262 (Queensland Coastal Pilots Service/Torres Pilots).

153 Submission No 14, Vol 1, p. 226-7 (Sydney Sea Pilots Pty Ltd).

illness and weather conditions, and families will be included where possible.¹⁵⁴

- 2.192 We commend the proactive and responsible approach that has been taken by Sydney Sea Pilots and consider this an example of best practice, which ought to be emulated by others in the industry.

Turn around times for ships

- 2.193 The other maritime related issue raised in submissions to our inquiry was the fatigue impact of the reduced turn around times for ships in port and the corresponding reduction in shore leave for ship crew.

- 2.194 We were told that the majority of ships now spend less than 24 hours in port.¹⁵⁵

Due to the technological revolution, you are also seeing very quick turnarounds, particularly in this country due to some of the issues in stevedoring. Where ships used to be alongside for seven days, and there would be a period where people could relax, they are now turning around in eight hours or 12 hours or 18 hours.¹⁵⁶

- 2.195 Time in port was traditionally a time for crews to rest ashore prior to leaving port. In many cases crews are now expected to unload/load a vessel, prepare the vessel to sail and then sail the vessel from port all within a very short time frame. A factor in the *Exxon Valdez* grounding was that the third mate had worked a demanding shift loading the vessel prior to navigating the vessel out of the port.¹⁵⁷ A comprehensive British study of fast turnaround shipping concludes that:

There can be no argument that the curtailment of shoregoing has seriously diminished the quality of life for seafarers but this might not be the limits of its effects. It is at least plausible to suggest that confinement to the ship is a likely contributor to fatigue, stress and other physical and mental health conditions.¹⁵⁸

- 2.196 Captain Robert Hall, a marine pilot, told the committee that:

My observation is that the fatigue level is worse on departure than it is on arrival, in general terms. That is the nature of loading

154 Submission No 14, Vol 1, p. 227 (Sydney Sea Pilots Pty Ltd).

155 Submission No 18, Vol 1, p.237 (AMSA).

156 Transcript of evidence, 7 October 1999, Sydney, p. 392, (Mr Paddy Crumlin—MUA).

157 National Transportation Safety Board, *Marine Accident Report: Grounding of the US Tankship Exxon Valdez on Bligh Reef, Prince William Sound Near Valdez, Alaska, March 24 1989*, NTSB/MAR-90/04, Washington DC, p.128.

158 Kahveci.E, 1999, *Fast Turnaround Ships and their Impact on Crews*, Seafarers International Research Centre, Cardiff, p.63.

ships very quickly and sailing them again.... Certainly, out of the Alcoa berth fatigue is a major issue with crews, with helmsmen making mistakes, with exempt Australian masters making mistakes when they have taken out ships because they have been so busy throughout the loading program. Then as soon as they have completed loading they are expected to sail, whether they are rested or not. I believe fatigue is a major problem.¹⁵⁹

- 2.197 A related trend is the decrease in the size of ship crew. The 1992 *Ships of Shame* report highlighted the problem of reduced crew sizes and the consequent impact on ship safety.¹⁶⁰ Evidence to this inquiry indicates that inadequate crew size and demands for a quick turnaround in port can contribute to marine accidents. The combination of fewer crew and demands for a quick turnaround time were key factors in the 1989 *Exxon Valdez* accident. Professor Dinges told the us that:

...the demanned vessel meant that there were fewer crew on board to do the work. On the high seas, that worked out well, but when you pulled into the *Valdez* port and had to load out and were under terrific time pressure, it meant that the first officer was awake 36 hours, could not go any more and finally went to bed. It meant that the second officer had been awake too long, well past the hours of service. He went to bed. And it meant that the man at the helm at the critical time as they left the port through Prince William Sound was a third officer, with limited experience.¹⁶¹

- 2.198 Demands for quick turnaround times for ships in port, combined with inadequate crew levels, clearly have the potential to present a significant fatigue risk for crews, particularly those who have been engaged in loading and unloading duties. It is a risk that requires further analysis and we believe that the Commonwealth Government should investigate the matter, with a view to developing an appropriate regulatory response should the risk be considered significant.

Recommendation 17

- 2.199 **The Minister for Transport and Regional Services should commission the Australian Maritime Safety Authority, in conjunction with the National Marine Safety Committee, to investigate the risk to crew and public safety of quick turnaround times in port and consider whether it is appropriate to regulate for adequate rest times in port for seafarers.**

159 Transcript of evidence, 26 July 1999, Adelaide, p. 23 (Capt. Robert Hall—Fremantle Pilots).

160 House of Representatives Standing Committee on Transport, Communications and Infrastructure, 1992, *Ships of Shame: Inquiry into Ship Safety*, AGPS, Canberra, pp. 35, 89-90.

161 Transcript of evidence, Friday 10 September, Melbourne, pp. 200-1 (Prof. David Dinges).

Non-regulatory fatigue management initiatives

- 2.200 During our inquiry we took evidence about various non-regulatory initiatives that have been taken to better manage the risks of fatigue in the transport industry.
- 2.201 The initiatives range from measures taken within companies to carefully plan and manage transport needs, to governments building more and better road side heavy vehicle rest stops; and from industry based safety training programs to developing fatigue monitoring technologies. It is perhaps not surprising, given that most of the transport task undertaken on roads, that many of these initiatives have been developed for application in the road transport industry
- 2.202 In this section we describe some of the more significant of the non-regulatory approaches that have been developed.

BHP's Logistic Management Model

- 2.203 BHP has provided a significant contribution to fatigue management through the development and phased introduction of the BHP Logistics Management Model. The significance of the model is that it aims to manage fatigue across the entire supply chain from consignor via transporter to end customer. This differentiates the model from the Fatigue Management Program (FMP) being trialed in Queensland which only addresses the transport component of the supply chain and does not actively involve consignors or customers.¹⁶²
- 2.204 BHP is planning the phased introduction of the model in all road transport deliveries managed by BHP Transport and Logistics. The model will consist of three modules: 'supplier', 'transporter' and 'customers'. The fatigue management program standards being trialed by Queensland Transport as part of the *Road Transport Reform (Driving Hours) Regulations* will be incorporated into the 'transporter' section of the supply chain. Similar standards are being developed for the 'supplier' and 'customer' sections of the supply chain. These will have been assessed and approved prior to commencement of the pilot program. The effectiveness of the standards will be tested before they are integrated with the 'transporter' module.¹⁶³
- 2.205 The trial was set to start in early 2000, with a twelve-month evaluation and monitoring period. Stage one of the model consists of participants being provided with a manual which contains instructions on FMP Logistics

162 Submission No 109, Vol 7, p. 1739 (BHP).

163 Submission No 109, Vol 7, p. 1740 (BHP).

Management Standards and guidelines, conduct of the pilot, audits, training and communications. Each participant will be required to operate in accordance with the instructions contained in the manual. A driver risk analysis was conducted and remedial action agreed upon between suppliers, transporters and customers to reduce fatigue related problems. All participants will be subject to external audits to confirm that an FMP is in place and meets the requirements of the standards guidance manual. BHP is also working towards the development and integration of FMP standards into customers' ISO 9000 management systems.¹⁶⁴

- 2.206 We strongly support BHP in its endeavours and are very interested in the progress of this important initiative. It is the only practical initiative that we have seen that incorporates all of the players in the transport chain. We believe that it can be seen as a potential model for other sectors of the transport industry.

TruckSafe

- 2.207 Truck Safe is an industry initiated safety accreditation scheme managed by the Australian Trucking Association. Industry standards have been developed in four areas: health, vehicle maintenance, management and training. Operators must meet the standards set in these four areas for accreditation, be audited by an external auditor, and reviewed and accepted or rejected by an accreditation council. To date, over three hundred transport companies have achieved Truck Safe accreditation and a further three hundred are undertaking the accreditation program.¹⁶⁵
- 2.208 The Truck Safe program is seen as a positive and worthwhile move by the road transport industry to try and come to terms with the problem of fatigue. Mr Dean Croke from MMI Insurance Limited believes that it is 'arguably the best initiative industry has introduced' and that the program has 'helped many operators become better business people and in turn improved their long term viability'.¹⁶⁶
- 2.209 However, Mr Croke does raise a serious caveat regarding the usefulness of the program in managing fatigue. According to Mr Croke, 'MMI have found that TruckSafe operators are not better risks than any other group of operators, some are in fact the highest risk operators in the industry with the worst accident records to date'.¹⁶⁷

164 Submission No 109, Vol 7, pp.1740-2 (BHP).

165 Submission No 76, Vol 5, p. 1190 (ATA).

166 Submission No 112, Vol 7, p. 1817 (MMI Insurance).

167 Submission No 112, Vol 7, p. 1823 (MMI Insurance).

- 2.210 Mr Croke believes that the key problem is that the TruckSafe audit process does not audit many aspects of road transport law such as driving hours, driver schedules and vehicle compliance. In addition, the program will only effectively address fatigue when the standards are widened to include the standards of the fatigue management program being trialed in Queensland as part of the *Road Transport Reform (Driving Hours) Regulations*.¹⁶⁸
- 2.211 We commend the initiative taken by the industry with the TruckSafe program and believe that the effectiveness of the Trucksafe program would be enhanced by the inclusion of driving hours, driver schedules and vehicle compliance in the Trucksafe audit process.

National Route 39 Driver Fatigue Strategy

- 2.212 Although the National Route 39 Interstate Driver Fatigue Strategy is not specifically aimed at heavy vehicle drivers, it does have some impact on road transport. The program focuses on Route 39, which is the main inland route from Melbourne to Brisbane with an average of 1240 heavy vehicle movements each day.¹⁶⁹ The Commonwealth and the governments of NSW, Victoria and Queensland manage the strategy.¹⁷⁰ The primary aims of the project include:
- increasing community awareness and understanding of driver fatigue;
 - encouraging the use of rest stops and variants of the 'driver-reviver' type of programs;
 - promotion of improved signage, such as signs for rest stops and distance signs; and
 - improvement of facilities such as rest stops and truck parking bays along the route.¹⁷¹
- 2.213 The Department of Transport and Regional Services argues that a small extra investment in the Commonwealth roads program targeted at fatigue management measures such as audible line edging, additional truck parking bays and 'hardstand' areas, improved signage and improved rest areas would allow the Route 39 management committee to achieve its goals sooner and allow for earlier evaluation of those measures that work

168 Submission No 112, Vol 7, p. 1818 (Dean Croke–MMI Insurance).

169 National Interstate Driver Fatigue Committee, *National Route 39 Interstate Driver fatigue Strategy and Action Plan 1998-2001*, p.2.

170 Submission No 83, Vol 6, p. 1310 (Dept. Transport and Regional Services).

171 National Interstate Driver Fatigue Committee, *National Route 39 Interstate Driver fatigue Strategy and Action Plan 1998-2001*, p.2 .

for application elsewhere on the National Highway and on rural arterial roads throughout Australia.¹⁷²

Recommendation 18

- 2.214 **The Minister for Transport and Regional Services should negotiate with his counterparts in Queensland, New South Wales and Victoria to ensure that sufficient funding is available to implement the fatigue management measures identified by the *National Route 39 Driver Fatigue Strategy*.**
- 2.215 Members of the Committee attended a meeting of the Route 39 Committee and were impressed by the effective inter-jurisdictional cooperation at this level. We recommend that similar committees be established for other major interstate transport routes.

Recommendation 19

- 2.216 **The Minister for Transport and Regional Services should negotiate with his counterparts in each of the States and Territories to establish working groups similar to the National Route 39 Driver Fatigue Committee, with a view to developing driver fatigue strategies for each major interstate transport route.**

The road environment

- 2.217 A safe and well designed road environment is an important factor in managing fatigue on our roads. Groups such as the Route 39 Management Committee are in a good position to address problems with the road environment which impact on driver fatigue.
- 2.218 There are a number of technologies that can be built into road design and construction that can assist in addressing driver fatigue. The use of 'audible' lines and rumble strips (with adequate verge width) may assist in alerting a driver that they are deviating from the road in time for them to take evasive action. Keeping the roadside clear of obstructions and increasing the verge width may also assist in reducing fatigue related fatalities. An associated measure is the development of impact absorbing or slip based roadside power poles.¹⁷³

172 Submission No 83, Vol 6, p. 1310 (Dept. Transport and Regional Services).

173 Submission Nos 40, 51, 61 Vols 3, 4, pp.571, 749, 876.

- 2.219 These should never be considered first order solutions to driver fatigue but as measures that support comprehensive fatigue management programs.

Audible Line Marking

- 2.220 The application of road engineering solutions such as audible line markings has had an impact on road safety. The Queensland Department of Transport has been undertaking a program of upgrading line markings, including the use of audible 'rumble strips'. An evaluation of the Audible Edgeline program estimates that in the six years from 1993, over 170 casualty crashes have been avoided as a result of the program, saving the community an estimated \$8 million per year.¹⁷⁴ Transport SA is also trialing a system of audible edge marking which is cheaper than the currently available Audio Tactile Edge Marking System.¹⁷⁵
- 2.221 While we recognise that 'rumble strips' are expensive and not suitable for all roads¹⁷⁶, the benefits for road users of this type of initiative are clear. We recommend that all roads and traffic authorities seriously consider extending the use of this type of road engineering technology.

Divided Highways

- 2.222 The more extensive use of divided highways may also assist in reducing fatigue-related fatalities. Australia has the world's highest percentage of heavy vehicle traffic on two lane roads. Research indicates that accidents would drop to one-third of their present rate with the use of divided highways.¹⁷⁷ This is significant when it is considered that in 84 per cent of multi vehicle fatal accidents involving heavy vehicles, the other vehicle is at fault.¹⁷⁸ We agree as to the benefits of divided roads but are also cognisant that the high cost of divided roads will mean that they will only be built on high traffic density main highway routes.

Rest facilities

- 2.223 The issue of rest facilities was raised in a number of modes of transport. The most obvious need for rest facilities is in road transport, but the issue

174 Submission No 88, Vol 6, p. 1462 (Queensland Government).

175 Submission No 86, Vol 6, p. 1416 (Transport SA).

176 The Northern Territory Department of Transport and Works argues that the 'sporadic nature of road crashes on their road network and difficulties in determining fatigue as a primary determining factor, has meant that the use of audible line marking on roads has not been considered.' See Submission No 87, Vol 6, p. 1431.

177 Information provided by Dr John Cox, 8 March 2000.

178 Submission No 76, Vol 5, p.1183 (ATA).

of rest facilities for aircraft pilots and marine pilots was also raised.¹⁷⁹ The effectiveness of fatigue management strategies relies on the provision of appropriate rest facilities.

- 2.224 Of particular concern is the provision of heavy vehicle rest areas and pullover areas on the National Highway, for which the Commonwealth has majority funding responsibilities. The better location and use of heavy vehicle rest areas is an important issue in light of the Commonwealth policy to construct bypasses of major towns on the national highway.
- 2.225 In particular, we are concerned about the number of parking spaces available for heavy vehicles. Evidence we received indicates that, based on American research and statistics, Australia could be approximately 2400 truck parking spaces short.¹⁸⁰
- 2.226 A significant number of submissions indicated that rest areas for heavy vehicles were inadequate, both in quantity and quality. The facilities available were often poor, lacking shade, toilets, garbage bins and water. They also had poorly designed exit and entry paths and the sites were not properly designed for heavy vehicles and lacked space. It was also indicated that enforcement officers often targeted drivers while they were parked at rest stops. Further problems include the use of rest areas by road authorities to store gravel and other material.¹⁸¹ The provision of trees is particularly important for heavy vehicle rest areas on the western side of highways in order to provide adequate shade for vehicles. Our own observations during the course of the inquiry were that the provision of road side rest areas for heavy vehicles appeared to be an afterthought compared to the well planned road side rest areas provided for motorists.
- 2.227 Despite the poor quality of most heavy vehicle rest areas we inspected, some rest areas are well designed and of high quality. We are particularly impressed with a type of roadside rest area found on the Hume Highway in Victoria. The rest area provided parking areas for cars and trucks, separated by an 'island' with toilets, water, tables and shade. The rest areas have very good access and exit roads and were sited away from the main road and screened by trees and an earth bank. We commend this design. The NSW Roads and Traffic Authority informed the committee that they had established two similar rest areas north of Yass.¹⁸²

179 Submission Nos 21, 59, Vols 2, 4, pp. 274, 853.

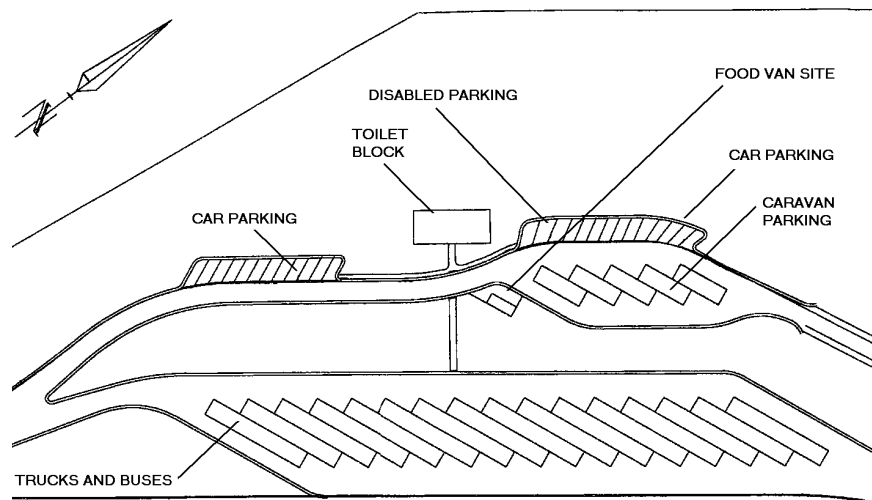
180 Transcript of evidence, 10 September 1999, Melbourne, p. 189 (Prof. David Dinges).

181 Submission Nos 50, 64, 68, 93, 112, Vols 3, 4, 5, 7, pp.716, 973 1120 and 1123, 1551, 1822. Transcript of evidence, 16 September 1999, Kempsey, p. 345-7.

182 Department of Transport and Regional Development, *Rest and Survive: National Highway Rest Area Policy Final Discussion Paper*, July 1997, Canberra, p.4

We believe that this design provides an excellent model for future rest areas on the along major transport routes. We recommend that the Department of Transport and Regional Services and State road authorities work towards developing a standard design for rest areas.

Figure 2: Combined car and heavy vehicle rest area, Hume Highway, Victoria



Source Vic Roads

2.228 Most State and Territory road transport authorities have developed rest area policies and guidelines for the location of rest areas and the facilities that should be provided.¹⁸³ A National Highway Rest Area Policy was released by the then Department of Transport and Regional Development

183 Submission Nos78, 87, 88, 105.01, Vols 5, 6, 7, pp.1209, 1428, 1463, 1759.

in 1997 as a first step in developing a nationally consistent approach to roadside rest areas.

Box 2.4: NSW Roads and Traffic Authority Truck Stop Guidelines

Frequency of Stops

Major truck stops every 100km to 160km. Minor truck stops every 50km to 80km.

Location and Design

Located at the top of hills. Locations near towns will facilitate the practice of stopping in town for food and then proceeding to the truck stop. Adequate provision will be made for decelerating and accelerating vehicles and merging with through traffic according to the RTA's Road Design Guide.

Truck parking areas at major rest areas should be separated from the rest areas for light vehicles users.

Facilities

Major truck stops should include a full range of facilities, including all-weather level surfaces, shade, toilets and cold water. Minor truck stops will ensure safe stopping opportunities.

Source Sub 105.01, Submissions, p. 1763, NSW Roads and Traffic Authority.

- 2.229 However, the Department of Transport and Regional Services told us that the Commonwealth does not have a clear indication from the States and Territories as to how their rest areas strategies translate into a program of works for the National Highway. In addition, it is not clear how much Commonwealth money is spent each year on providing and maintaining rest areas along roads that are principally funded by the Commonwealth. It is suggested that an audit of rest area locations and stopping facilities is required, with the view to developing a plan for heavy vehicle rest and stopping areas on each national highway corridor. The Commonwealth also needs a clear indication of the expenditure on the development and maintenance of rest areas, which should be listed as a separate item in the works program and not just included in maintenance and/or rehabilitation works.¹⁸⁴
- 2.230 The distance between rest areas is an important factor in ensuring the effective utilisation of rest areas. The Department of Transport and Regional Services has suggested that rest stops be spaced 20 to 30 minutes apart on major rural highways, whether that be commercial service centres, towns or remote location, and that a mix of facilities should be available within a distance of 200km. A national audit of rest stops would be required to implement this type of policy.¹⁸⁵
- 2.231 The design and siting of rest areas should, as far as possible, alleviate the need for traffic to cross lanes in order to enter or exit a rest area. The need to cross opposing lanes of traffic poses a risk to highway traffic as well as the vehicle entering or leaving the rest area. We are aware that in some

184 Submission No 83, Vol 6, p. 1307-8 (Dept. Transport and Regional Services).

185 Submission No 83, Vol 6, p. 1306-7 (Dept. Transport and Regional Services).

areas of the United States, authorities sometimes utilise the area between the carriageways on divided highways to site commercial facilities. This means that exit and entry access is available to both lanes of traffic without the need to cross opposing lanes and reduces the need to duplicate facilities on each side of the road. On dual carriageways this example may provide an efficient alternative to the current strategy for the siting of commercial and non-commercial rest areas and is worthy of consideration by road transport authorities.

- 2.232 We believe that the private sector, particularly major fuel companies, should contribute to the establishment of major commercial service centres. We inspected a proposed site for a major service centre at Guyra on the New England Highway in NSW. We were impressed by the scope of the proposal. We also inspected a private commercial site at Marulan in NSW and were impressed by the facilities provided for long distance truck drivers.
- 2.233 A major problem is in the siting of these centres on the major transport routes. For commercial reasons, they cannot be located close together. Also, there have been instances where permission has been granted to major oil companies to establish service centres with attached fast food chain outlets close by established truck service centres. This creates an oversupply of services in one area and is an example of poor planning. We believe that local council planning authorities and State and Territory road authorities must coordinate the siting of commercial service centres.

Recommendation 20

- 2.234 **The Minister for Transport and Regional Services should provide funding for a national audit of heavy vehicle roadside rest areas, focussing in particular on facilities available on the national highway. The audit should report on the number of rest areas, the quality of facilities, the distance between rest areas, and the role of all tiers of government in planning and funding the development of rest areas, with the aim of developing national guidelines for the provision of heavy vehicle rest area facilities.**

Managing fatigue through technology

- 2.235 New technologies that can be used to detect or monitor fatigue, predict the potential fatigue level of certain shift patterns and assist in the enforcement of regulations are seen as valuable additions to the suite of fatigue management strategies.

- 2.236 An indication of the importance placed on emerging technologies overseas is indicated by the series of public hearings held by the US National Transport Safety Board into advanced safety technologies in 1999. The aim of the hearings was to identify 'advanced technologies that can improve the safety of trucks and buses and to discuss the benefits of such systems and the future needs'. The hearing included a specific reference to driver fatigue.¹⁸⁶
- 2.237 An important caveat to the use of technology to manage fatigue is the danger of people becoming dependent on the technology. Mr Jim Hall, Chairman of the US National Transport Safety Board, has cautioned that while advanced technologies 'present an attractive solution', technology is 'not a panacea'.¹⁸⁷ A reliance on technology may encourage people to work long after they are impaired by fatigue because they believe the technology will protect them from having an accident.¹⁸⁸ Professor David Dinges told us that studies of driver monitoring and warning devices show that drivers do not stop driving when warned of fatigue, but they drive 'a little more carefully'.¹⁸⁹ A recent National Road Transport Commission report concludes that 'Hardware technologies only have the potential to be a last ditch safety device'.¹⁹⁰ This highlights the fact that technological devices must be seen as an adjunct to effective rostering, education and training and must not be seen as a stand alone strategy.
- 2.238 There is a wide range of technologies available and in the process of being developed. The evidence presented to us suggested that there are three primary ways in which technology can be used to assist in managing fatigue: as an enforcement tool, an organisational tool or as a fatigue countermeasure.

Enforcement

Safe-T-Cam

- 2.239 Safe-T-Cam is an automated monitoring system based on digital camera technology that can take pictures of heavy vehicle numberplates as the vehicle passes the camera site. This is a non-realtime system that can identify trucks that are travelling beyond prescribed hours or at excessive

186 National Transportation Safety Board at www.nts.gov/events.

187 Hon Jim Hall, Opening Statement, public hearing, 31 August–2 September 1999, National Transport Safety Board, www.nts.gov/events/1999/techapps/open.htm, downloaded 4 May 2000.

188 Dinges, D., 1995, 'An overview of sleepiness and accidents', *Journal of Sleep Research*, vol.4, supplement 2, p.11.

189 Transcript of evidence, 10 September 1999, Melbourne, p.196 (Prof. David Dinges).

190 Hartley, L., Horberry, T., Mabbot, N., Krueger, G. 2000, *Review of Existing Fatigue Detection Technologies: Final Report*, National Road Transport Commission, Unpublished report, p. 3.

speeds by comparing information from specific sites along a trucks route. There are currently 21 Safe-T-Cam sites in NSW, which is the only State to use the system.¹⁹¹

2.240 Operators detected breaching the regulations are sent a letter seeking an explanation for the incident and a statement of what actions will be taken to ensure there is no recurrence. If incidents continue the Roads and Traffic Authority of NSW may conduct office audits or review the operator's right to operate vehicles in NSW.¹⁹² As evidence of the effectiveness of the system, in October 1999 fifty Demands to Vehicle Owner were sent in regard to speed, fatigue and avoidance incidents.¹⁹³

2.241 Evidence to the inquiry indicates a broad acceptance of the system by operators, drivers and enforcement officers. Nolan's Transport told us that they thought that Safe-T-Cam was very effective inasmuch as 'no one gets away with anything because everything is monitored'.¹⁹⁴ Similarly, a member of the NSW Police believed that 'one of the good areas is the use of Safe-T-Cams which are appearing across NSW'.¹⁹⁵ A truck driver observed that:

The RTA has us covered left, right and centre with these cameras. They can tell exactly where you are.¹⁹⁶

2.242 In an effort to broaden the application and utility of the system, the NSW Roads and Traffic Authority is trialing a system that allows enforcement officers to have access to Safe-T-Cam information on the roadside. For example, when checking a driver's logbook officers will have access to Safe-T-Cam information to check if the logbook is correct.¹⁹⁷

2.243 We have received evidence supporting the extension of Safe-T-Cam into other states. MMI Insurance recommends that the technology should be applied nationally, which would assist in the national process of driving hours regulation reform.¹⁹⁸ The South Australian police state that 'intelligent highway surveillance' technology, such as Safe-T-Cam, can 'greatly assist compliance and enforcement strategies'.¹⁹⁹

191 Submission No 105, Vol 7, p.1718 (NSW Department of Transport).

192 Submission No 105, Vol 7, p.1718 (NSW Department of Transport).

193 Exhibit 39 *Management of Heavy Vehicles in NSW: Industry Report to Road Freight Industry Council, October 1999*, Roads and Traffic Authority of NSW.

194 Transcript of evidence, 2 August 1999, Brisbane, p.105 (Mr Terry Nolan).

195 Transcript of evidence, 15 September 1999, Armidale, p.254 (Sgt Stuart Bartholomew).

196 Transcript of evidence, 16 September 1999, Kempsey, p.339 (Mr Leslie Snape).

197 Transcript of evidence, 9 November 1999, Canberra, p. 737 (Ms Margaret Crawford).

198 Submission No 112, Vol 7, p. 1819 (MMI Insurance).

199 Submission No 100, Vol 7, p. 1646 (South Australia Police).

- 2.244 We inspected a Safe-T-Cam site and observed a demonstration of the systems capabilities, and were impressed by the possibilities that the Safe-T-Cam system has to offer as a tool to assist in managing fatigue. Given the trend towards flexible driving hours regimes such as the Transitional Fatigue Management Scheme and the well known deficiencies of logbooks, what is missing is a way of ensuring compliance with either the basic regulations or the requirements of the Fatigue Management Program across jurisdictional boundaries while the vehicle is on the road. At present drivers only have to be concerned within NSW, yet there is no real way of being certain of the driving hours prior to entering and after leaving NSW.
- 2.245 While on one hand increased flexibility is desirable, on the other hand flexibility must come with responsibility and regulators must be able to ensure that safety is not being compromised. We believe that a national Safe-T-Cam system would provide consistency in being able to track and monitor vehicles across jurisdictions and would be a useful adjunct to the national *Road Transport Reform (Driving Hours) Regulations*. While we recognise that expanding the Safe-T-Cam system may well entail substantial cost, we believe that the public safety advantages of a national system outweigh this cost.
- 2.246 An interesting proposal was put to the committee by Mr Rodger Walker, a subcontract truck driver. He highlighted the fact that the Safe-T-Cam system only identifies the truck, not the driver. A driver may, theoretically, drive a number of vehicles during a particular time period, and as long as the system only picks up the vehicle, the driver may be inadvertently allowed to work well beyond the allowable hours.
- 2.247 He proposed a system of personal electronic tags, or 'E-Tags', which would work in conjunction with the Safe-T-Cam system. The driver would attach the E-Tag containing the drivers license information to the inside of the windscreen when they entered the vehicle. The E-Tag would be read by sensors at Safe-T-Cam sites and weigh stations and would allow the regulatory authorities to not only track vehicles but also the drivers to ensure that they adhere to hours of duty requirements.²⁰⁰
- 2.248 We believe that this proposal has merit and deserves further consideration by the National Road Transport Commission and the Australian Transport Council.

Recommendation 21**2.249 The Minister for Transport and Regional Services should:**

- **examine the feasibility of issuing drivers with a personal electronic tag to complement the Safe-T-Cam system; and**
- **seek Australian Transport Council approval for the Australia-wide introduction of the Safe-T-Cam system.**

2.250 A related issue concerns heavy vehicles registered under the Federal Interstate Registration Scheme (FIRS).²⁰¹ The NSW Roads and Traffic Authority (RTA) argued that, due to the FIRS regulations, they are unable to act on Safe-T-Cam incidents involving FIRS registered vehicles. This means that while the RTA is able to identify FIRS registered vehicles that are committing driving hours offences through Safe-T-Cam, they are not able to take action.²⁰² The Department of Transport and Regional Services acknowledges that there are anomalies in the FIRS regulations. They have advised us that appropriate amendments to the FIRS regulations are being developed that will remedy the situation.²⁰³

2.251 We fully support this move to bring consistency to Commonwealth and State road transport legislation, particularly where it allows for better consistency in the enforcement of road safety regulations.

Fitness for Duty

2.252 Fitness for duty is a key element in most fatigue management programs. It includes being fit for duty prior to commencing work, while on the job, and , importantly, a high degree of individual responsibility to use rest periods appropriately. Therefore, fitness for duty includes both the means of testing whether someone is fit to begin or continue work and engendering the appropriate culture of individual responsibility.

2.253 The purpose of this section is to describe technological developments in fatigue and fitness for duty testing. The issues of cultural change and individual responsibility for ensuring fitness for duty, and testing for drugs in the workplace is discussed in detail in Chapter 3.

201 The Federal Interstate Registration Scheme (FIRS) commenced in 1987 with the aim of providing uniform charges and operating conditions for heavy vehicles of at least 4.5 tonnes, engaged solely in interstate operations.

202 Correspondence received from the Roads and Traffic Authority of NSW, 16 March 2000.

203 Correspondence received from the Department of Transport and Regional Services, 21 March 2000.

- 2.254 Just as there are tests for alcohol, there are an increasing number of technologies that can 'detect' fatigue. We were provided with hands on demonstrations of both the Occupational Safety Performance Assessment Test (OSPAT) developed by the Adelaide Centre for Sleep Research and the two part reaction time and vigilance tests developed by Williamson and Feyer. These technologies can be used to test for fatigue prior to beginning work or during the work period.
- 2.255 The Occupational Safety Performance Assessment Test (OSPAT) allows fatigue (as well as drugs and alcohol) related impairment to be practically and reliably measured.²⁰⁴ Prior to commencing a shift the employee is required to track, using a trackball, a randomly moving target for a prescribed length of time. This is compared to the individuals baseline, or 'normal', performance and can indicate whether a person is impaired relative to their normal level of performance.
- 2.256 Dr Ann Williamson and Associate Professor Anne Marie Feyer have been developing a portable fatigue testing system, comprising of two tests using a small palmtop computer. The first test is a simple Reaction Time (RT) test lasting two minutes. Subjects are required to quickly press a key on the keypad whenever the outline of a circle, moving about the computer screen, changes from a solid to a dotted line. The second test is based on the Mackworth Clock Vigilance Task. In this test twenty-four points in a circle flash consecutively in a continuous circuit for five minutes. The subject is required to press a key on a keypad as quickly as possible whenever one of the points fails to flash in its turn.²⁰⁵
- 2.257 These tests can be done before duty and after a break and the difference between the two results is compared. According to Williamson and Feyer, 'the tests have been standardised against the effects of alcohol on performance which makes it possible to interpret the effects of fatigue on performance against an accepted performance standard for safety'.²⁰⁶ Dr Williamson indicates that this test could be applied to all modes of transport.²⁰⁷
- 2.258 We believe that fitness for duty and fatigue tests are an important fatigue management tool, particularly in a more flexible operating environment. We are particularly interested in the possibility of having roadside fatigue tests similar to roadside breath tests for alcohol. Such tests could be linked to possible penalties or sanctions, as proposed in Recommendation 34, or would allow an officer to suggest, or force if need be, a driver take

204 Submission No 19, Vol 2, p.256 (Centre for Sleep Research).

205 Information received from Dr Anne Williamson, 13 March 2000.

206 Information received from Dr Anne Williamson, 13 March 2000.

207 Transcript of evidence, 7 October 1999, Sydney, p.418 (Dr. Ann Williamson).

appropriate steps to address their fatigue. In response to a question regarding potential roadside fatigue tests using the technology, Dr Williamson told the Committee that she thought it was possible, although the test would need additional validation.²⁰⁸ Intuitively, these types of fatigue tests could also be used in other areas of transport such as marine pilotage and aircraft maintenance.

- 2.259 The use of effective roadside fatigue testing by enforcement agencies is not without precedent. Traffic and public safety officers in the US State of Arizona use the *Truck Operator Proficiency System* (TOPS) to determine if a driver is too fatigued to continue driving. If a driver fails the TOPS test he or she is required to stop driving. The system has been rigorously tested and validated and as yet has not faced any legal challenges to its validity when a driver is stopped from driving after failing the TOPS test.²⁰⁹
- 2.260 We believe that if we are going to progress along a less prescriptive regulatory path, those responsible for ensuring compliance with existing regulations and guidelines require effective tools. As discussed in Chapter 3 we believe that research needs to be conducted by the Australian Transport Safety Bureau to validate roadside fatigue testing technologies and processes. Further, the applicability of this technology to other sectors of the transport industry should also be investigated

Black Box information recording systems

- 2.261 There are a number of developments in vehicle mounted recording devices, or 'black boxes'. The primary function of black box recorders is to monitor driver performance, such as speed, braking, over-revving and rest breaks. A number of road transport companies currently use on board monitoring and recording devices in this capacity.²¹⁰
- 2.262 The National Road Transport Commission is trialing the use of 'electronic log books' as an alternative means of record keeping under the *Road Transport Reform (Driving Hours) Regulations*. The National Road Transport Commission believes that electronic logbooks will allow for more flexibility than the current logbook system.²¹¹
- 2.263 Professor David Dinges noted that in the American experience, some drivers tended to see this as an enforcement action rather than a fatigue management strategy and as a consequence damaged or disconnected the

208 Transcript of evidence, 7 October 1999, Sydney, p.419 (Dr. Ann Williamson).

209 Transport Engineering Research New Zealand Ltd, 1998, *Review of Fatigue Management Strategies in the Transport Industry*, Land Transport Safety Authority, Wellington, pp.52-54.

210 Transcripts of evidence, 2 August 1999, p. 102 (Nolan's Interstate Transport) and 10 September 1999, p. 226 (Finemore Holdings Ltd).

211 Transcript of evidence, 8 October 1999, Melbourne, p.476 (Mr Barry Moore—NRTC).

black boxes.²¹² Finmore Holdings Ltd told us that their drivers similarly felt electronic monitoring 'was restrictive and had privacy concerns' when it was first introduced.²¹³ This highlights the need to fully involve and educate employees in the process of implementing and using this type of technology in order to allay suspicion and promote acceptance and cooperation. In the absence of this involvement the charge of intrusion or breach of privacy can be sustained.

- 2.264 Anecdotal evidence suggests that ways have already been found to circumvent the system. For example, drivers are given two pin numbers. On entering the vehicle the driver enters the first number and drives for the prescribed length of time. The driver can then enter the second pin number, which tricks the system into logging a new driver. The same driver can then continue with their journey. The fact that avoidance strategies appear to have been developed indicates to us that there are operational and organisational problems forcing drivers to bypass the system and work long hours. Such technological tools are ineffective unless the underlying causes of fatigue are addressed and drivers understand and respect the system.
- 2.265 We recognise that companies have introduced this technology for both commercial and safety reasons and support their efforts. We are very interested in the results of the National Road Transport Commission's trial of 'electronic logbooks' and would like the NRTC to keep us informed of developments in this area.

Organisational

Software based fatigue modelling systems

- 2.266 A number of computer based fatigue modelling packages have been developed, or are in the process of being developed. In the United States for example, Circadian Technologies has developed a commercially available software package which identifies when fatigue risks or costs go outside set limits, which then requires the appropriate adjustment of work schedules or procedures.²¹⁴
- 2.267 The most commonly used system in Australia is the fatigue modelling software package developed by the Adelaide Centre for Sleep Research as part of the *National Shiftwork and Workload Study*.

212 Transcript of evidence, 10 September 1999, Melbourne, p.196 (Prof. David Dinges).

213 Transcript of evidence, 10 September 1999, p.227 (Mr Laurence Brothers—Finmore Holdings Ltd).

214 M. Moore-Ede, 2000, 24/7 Alertness Management: Software Tools for the Transportation Industry, paper presented to Fourth International Conference on Fatigue and Transportation, Fremantle, 19–22 March 2000.

- 2.268 A mathematical algorithm has been developed whereby fatigue 'scores' are derived from inputting the time of the day worked (start and finish times), the time of the previous days work, and the length of time off in between. Days off give 'recovery time' and reduce accumulated effects. No account is taken of 'social' effects, for example, Mondays and Sundays are scored the same. The software produces an output of relative fatigue scores for each hour of the shift schedule.
- 2.269 Fatigue is scored in three bands, using an index of 0 - 100.
- 0 - 40 is 'normal' fatigue expected for someone working 9 to 5, five days per week.
 - 40 - 80 is higher level fatigue, typically encountered by afternoon and regular shift workers
 - 80+ is considered high and results in increasing performance impairment similar to a blood alcohol content of 0.5 per cent and over as the score increases.
- 2.270 The 'fatigue index' is a measure of fatigue expected to be induced by working in the roster being evaluated.²¹⁵ By inputting the relevant shift and roster data into a related software package, organisations can use this score to compare the relative fatigue 'value' of different shift systems against a standard working week.
- 2.271 Organisations undertake a risk assessment of their transport task to ascertain the acceptable level of risk for particular tasks. This is then correlated against the fatigue index. For example the relative risk of driving at night is higher than undertaking office administration duties. Therefore, the level of acceptable fatigue generated by a roster of work for a truck driver (as per the fatigue index) would be lower than that accepted as appropriate for an office worker.
- 2.272 The system has now been commercially developed. According to evidence received by the committee, it appears to have gained widespread acceptance in the Australian transport industry. For example, the National Rail Corporation assesses all master rosters for locomotive drivers against the fatigue index and adjusts them so that the 'fatigue score' is below 90, which is considered the acceptable limit under their Risk Management Strategy.²¹⁶
- 2.273 While the basic principles of the software appear to be widely accepted further work is being conducted on the model to improve its effectiveness
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215 Information supplied by Professor Drew Dawson, Adelaide Centre for Sleep Research, 26 July 1999.

216 Submission No 26, Vol 2, p.313 (National Rail Corporation Limited).

in various transport environments. Queensland Rail has been conducting tests to validate the model to determine how fatigue scores relate to train driving performance. These tests are a world first in determining driver performance at specific rostering intensity.²¹⁷ Other sectors of the transport industry have identified modifications to make the software suitable for their specific operational environments.²¹⁸ The National Road Transport Commission believes that the system has a place in the road transport industry, although validation of the index against fatigue measurements taken in operational conditions would increase the usefulness of the index. The National Road Transport Commission and the Australian Transport Safety Bureau are investigating options for undertaking this task.²¹⁹

- 2.274 Despite the positive feedback we received about the use of fatigue modelling software some criticisms were raised in regard to the use of the fatigue index and rostering software.²²⁰ In particular it was claimed that the software was designed to protect the employer rather than determine operator fatigue. In response to this criticism, Professor Dawson conceded that some employers had misused the software. However, he argued that the problem centred on the lack of guidelines on how to use the software. He urged that industry based guidelines for the proper use of fatigue modelling software were required and that the Australian Transport Safety Bureau would be an appropriate body to assist in this process.²²¹
- 2.275 We also note that it is not enough to merely test current or 'standard' rosters or shift patterns. Testing should be conducted on a regular basis and needs to take into account variations such as overtime (regular and irregular) and working on rostered days off. These variations, if taken into account, will naturally increase the 'fatigue level' of a standard shift.
- 2.276 We were provided with an impressive demonstration of the software at the Centre for Sleep Research in Adelaide. We are concerned that there is no real agreement as to what is an acceptable level of 'fatigue score' for various transport tasks. We believe that given the obvious benefits of fatigue modelling software as a management tool and its acceptance by the transport industry, it should be a matter of priority for the Australian Transport Safety Bureau to establish an expert working group to work closely with regulators, the transport industry and researchers in developing guidelines for the use of the software across all modes of transport.

217 Submission No 92, Vol 6, p.1499 (Qld Rail).

218 Submission No 23, Vol 2, p.293 (Fremantle Pilots).

219 Submission No 73.01, Vol 7, p. 1752 (NRTC).

220 Submission No 23, Vol 2 p. 293 (Fremantle Pilots).

221 Transcript of evidence, 26 July 1999, Adelaide, p. 56 (Prof. Drew Dawson).

Recommendation 22

2.277 The Australian Transport Safety Bureau should establish guidelines for the use of computer-based fatigue modelling packages in all modes of transport.

Global Positioning Satellite (GPS) systems

2.278 There is an increasing use of Global Positioning Satellite (GPS) systems to monitor where vehicles are, their speed and other information. For example, Nolan's Transport told us that they were in the process of putting GPS units in all their trucks.²²² The possibilities of this technology are yet to be fully realised.

2.279 An extension of this type of system could be used to guide drivers to designated rest areas and record the duration and location of the rest stops. These systems also could automatically alert dispatch operators as to which vehicles have been on the road for long periods and allow the operators to contact the drivers.²²³ It is conceivable that these systems could also be used by customers to find out the location of a vehicle and advise the driver of any delays so that the driver could stop and rest rather than being held up in a queue.

2.280 We recognise there may be benefits to operators of using this system to monitor vehicles and manage the risk of fatigue.

Countermeasures

2.281 Fatigue countermeasures are vehicle mounted devices designed to monitor driver performance and alert the driver if impairment reaches a dangerous level.

2.282 Professor David Dinges briefly described a number of technological fatigue countermeasures being trialed in the United States:

- a device that records activity and has a mathematical model in it that integrates sleep time and gives a warning light on whether a person has had enough sleep;
- a device that attaches to a truck steering wheel that stops the wheels and stabilises the steering system; and

222 Transcript of evidence, 2 August 1999, Brisbane, p.102 (Mr Terry Nolan—Nolan's Interstate Transport).

223 Submission No 54, Vol 4, p.818 (Dr Alex Zelinsky).

- Perclose technology in which infrared eye reflections give feedback on how alert a person is as they are driving.²²⁴
- 2.283 There are systems being developed which provide warning of an impending collision by using on board radar and/or computer vision technology which can sense obstacles at distances up to 100 metres.²²⁵
- 2.284 We are concerned at the lack of attention being given to investigating the possible use of safety technologies in Australia, the validation of devices under Australian conditions, and the development of national guidelines or policy on in-vehicle fatigue related technologies. We believe that the Australian Transport Safety Bureau needs to undertake a study to ascertain the appropriate application of vehicle based safety technologies in Australia, with particular reference to fatigue related technologies.

Driver Vigilance System

- 2.285 The Australian National University, Department of Systems Engineering, is working with Volvo on a driver vigilance system with the potential to be incorporated into Volvo vehicles. The system uses a vision based human-computer interface, in which a pair of video cameras monitor and track the driver's face and gaze direction. The duration and timing of a driver's gaze are automatically measured and logged. It can detect whether a driver is looking at the road or has fallen asleep.²²⁶ We were provided with a demonstration of the system and were very impressed by its potential.
- 2.286 Major car manufacturers such as Mitsubishi and Toyota are developing 'Advanced Safety Vehicles' (ASV) which incorporate driver warning systems which monitor the driver and provide warning signals if drowsiness is detected. In both cases the sensor is mounted in the steering wheel, with the Toyota system also incorporating a pulse sensor.²²⁷ We await with interest the commercialisation of this technology.
- 2.287 While we recognise the safety benefits of these types of systems and support their development and introduction, we believe that they do not provide an adequate substitute for proper organisation and monitoring of driving hours, and education in recognising and managing fatigue.

224 Transcript of evidence, 10 September 1999, Melbourne, p.199 (Prof. David Dinges). In tests conducted on six technologies based on eye movement and eye closure, the Perclose system was the only technology that showed an acceptable level of effectiveness in detecting fatigue. See Hartley, L. Horberry, T. Mabbot, N. Krueger, G. 2000, *Review of Existing Fatigue Detection Technologies: Final Report*, National Road Transport Commission, Unpublished report, p. 20.

225 Submission No 54, Vol 4, p.818 (Dr Alex Zelinsky).

226 Submission No 54, Vol 4, p.821-2 (Dr Alex Zelinsky).

227 Submission No 84, Vol 6, p.1342 (Intelligent Transport Systems Australia).

Car Cabin Gas Monitor

- 2.288 Reduced levels of oxygen and increased levels of carbon dioxide may lead to fatigue related behavioural impairment in drivers.²²⁸ The Sensor Technology Laboratory at RMIT University has been developing a Car Cabin Gas Monitor able to detect the build up of detrimental gases such as Carbon Monoxide, Carbon Dioxide and decreased levels of oxygen in a vehicle cabin. Although the device was primarily developed to prevent suicides, it also has applications in road safety by warning drivers of the potential build up dangerous gases that may lead to drowsiness. The device can warn the driver via an alarm if gases reach a dangerous level.²²⁹ In light of recent evidence regarding cabin emissions in BAE 146 aircraft, this technology also has potential uses in the aviation industry.
- 2.289 We were provided with an impressive practical demonstration of the technology. We feel that Australia is at the cutting edge of this type of research and the government should take a leadership role, not only from a safety perspective but also from a commercial perspective in ensuring the technology stays in Australia. We feel that government financial assistance should be provided to enable the further development and refinement of the technology, leading to its commercial application.

Recommendation 23

- 2.290 **The Commonwealth should provide research funding for the further development of vehicle cabin gas monitor devices, with a view to establishing Australia at the leading edge of this technology.**

Vigilance Control Systems

- 2.291 The rail industry uses a vigilance control system that ensures that the driver, or drivers, remains alert. The driver is required to press a button at set time intervals. If the driver fails to do so a light will flash followed by an alarm signal being activated. If this fails to arouse the driver the train is stopped automatically.²³⁰
- 2.292 A similar alertness warning system is available on Boeing 747-400 and 767 aircraft. The flight crew is alerted if no interaction with the flight deck computers occurs during a set time period. If there is no response in the

228 Submission No 51, Vol 3 p.751 (RACV).

229 Exhibit 1, Mr Brian Wells.

230 Transcript of evidence, 26 July 1999, Adelaide, p.31 (Mr Vincent Graham—National Rail Corporation Limited) and 2 August 1999, Brisbane, p.115 (Mr Gregory Coughlan—Qld Rail).

given interval the signal increases in intensity until a response is recorded.²³¹

- 2.293 We are disturbed by studies that have shown that train crew can operate these devices while asleep or without paying attention. Research indicates that 'the vigilance control system can be operated in a largely automatic manner and does not require conscious attention or vigilance to respond to the system'. Drivers are able to pre-empt the warning light and the fixed interval cycle (60 seconds) of the system is also a major design flaw.²³² This is a serious concern given that such devices are in widespread use in the rail industry and are a key safety device. It highlights the need to address driver fatigue through effective rostering, training and education as technology alone cannot be relied upon to prevent fatigue related accidents.

Summary

- 2.294 While the causes of fatigue in the transport industry are plain (time of day, hours of work and inadequate rest), fatigue presents itself as a multi-faceted problem requiring sophisticated management. It is not just a matter of limiting hours of work (although this is often part of an appropriate response to fatigue), but is a matter of ensuring that rostering arrangements are sensitive to optimal time of work and time of rest considerations. It is a matter of shared responsibility: employers establishing safe working environments and practices; employees presenting themselves in a fit state for duty; and other players in the transport chain not imposing unreasonable timeframes and schedules.
- 2.295 Many of the approaches that have been taken to fatigue management to date recognise and respond to one or other of these matters. Very few tackle all of them successfully.
- 2.296 The challenge facing the transport industry now is to maintain the momentum that has been developed (especially in the areas of regulatory reform and standard setting); fill in the gaps (in the areas of research and education); and select good practice from bad (promoting the former and dispensing with the latter).
- 2.297 It is important also that governments and the industry recognise that although there are differences within the transport industry and, in some cases, particular circumstances that require specific responses, there is

231 Submission No 83, Vol 6, p. 1294 (Dept. Transport and Regional Services).

232 Haworth.N, Regan.M, and Larsson.T, 2000, *The Effectiveness of Driver Vigilance Control Systems on Locomotives*, paper presented to Fourth International Conference on Fatigue and Transportation, Fremantle, 19-22 March, 2000.

much to be gained by sharing experiences and developing nationally coordinated cross-modal responses.

2.298 In the next chapter we take these issues further by discussing what more should be done to better manage fatigue in transport.