Australian Government

Civil Aviation Safety Authority

Discussion Paper

Fatigue Management — suggested alternatives to prescribed Flight and Duty Times

Who this DP applies to

It is expected that this proposal will affect the following groups in the aviation industry:

Operators and aircrew involved in:

- Activities authorised by the proposed Operating Certificate (OC);
- Activities authorised by an Air Operator's Certificate (AOC) and operating within a maximum of three time zones;
- Transmeridian Air Transport operations (depending on results of a large field study currently in progress).

Operators and individuals involved in flight training including:

- Flight instructors and flight examiners;
- Those undertaking flight training for the issue of a licence, rating or other flight crew authorisation.

CASA employees involved in:

- Audit of any of the above operations.

Issued as part of the process of public consultation by
CASA's Standards and Administration Support Branch

Document DP 0404OS – August 2004

Foreword

Context of this DP

The purpose of this Discussion Paper (DP) is to consider the various methods of managing fatigue in aircrew available, including the current system of prescribed flight and duty times.

In particular, the DP offers a more scientifically based and legally defensible alternative to the current regulatory system. It seeks to better manage the fatigue risk across the full spectrum of the aviation industry – from ballooning to airlines – in a more flexible manner, appropriate to the level of fatigue risk exposure and nature of the operation. This alternative is referred to as a Fatigue Risk Management System (FRMS).

This DP also proposes new, baseline prescriptive limits that are scientifically, rather than historically – or industrially – derived. These are expected to better contain the fatigue risk inherent in any operation that conducts its business outside normal working hours, where the operator does not have the resources to implement their own Fatigue Risk Management System.

This DP has been issued under CASA's Regulatory Reform Programme (RRP), which aims to develop regulations and standards that are clear, concise, unambiguous and aligned with international standards and practices. The revised regulations are called Civil Aviation Safety Regulations (CASRs) and the standards are published in CASA-produced Manuals of Standards (MOSs).

Meeting International Obligations

Australia is a signatory to the Convention on International Air Transport (the Chicago Convention). Section 11 of the Civil Aviation Act 1988 (the Act) requires CASA to perform its functions in a manner consistent with Australia's obligations under the Chicago Convention. One of those functions is based on Annex 6 of the Standards and Recommended Practices (SARPS) published by the International Civil Aviation Organization (ICAO) and requires the establishment of regulations that "ensure that fatigue occurring either in a flight or successive flights or accumulated over a period of time due to these and other tasks, does not endanger the safety of flight".

Currently, CASA complies with its obligation in this respect through Civil Aviation Order (CAO) 48. CAO 48 is empowered by regulation 5.55 of the Civil Aviation Regulations 1988 (CAR) which limits the flight time and duty periods of all flight crew. These longstanding limitations have been increasingly criticised for their complexity, inflexibility, inappropriateness to new types of aviation operations, and lack of scientific basis.

The Proposal

To address these criticisms, an outcome-based alternative to the prescriptive measures of CAO 48 is proposed in this DP. Consistent with modern systems-based approaches to aviation safety, this alternative takes the form of an operation-specific system of fatigue management. The proposed FRMS approach would seek to manage the fatigue risk by ensuring that the operator has a system that ensures flight crew do not operate aircraft while performance-impaired to the point where safety is compromised due to excessive fatigue. It also would ensure that operators do not require flight crew to comply with work practices which may lead to the accrual of an unsafe level of fatigue.

In considering this approach, CASA has been mindful of the recommendations of the House of Representatives Standing Committee on Tourism, Transport and the Arts in their (2000) report “Beyond the Midnight Oil” which forms government policy.

CASA has also considered its new approach to fatigue management in aviation in the light of the major Australian road transport fatigue reforms being adopted by State and Territory transport portfolios as part of the national road transport reform process being implemented by the Australian Transport Council and National Transport Commission. In road transport, state and territory jurisdictions have legislated new maximum driving hours and minimum rest periods (scientifically based) as well as optional fatigue management schemes.

This new approach to managing fatigue is also permeating the occupational health and safety regulatory area, with fatigue being recognised as a work hazard to be managed by employers in order to meet their duty of care.

Given that the research community has gained much knowledge in the area of fatigue management in recent times and that this knowledge has been demonstrated to be as applicable to aviation as much as any other sector in the transport industry, it is appropriate that any new aviation standards also reflect contemporary science.

If accepted, the changes proposed by this DP would be incorporated in new CASR Parts pertinent to air transport and aerial work operations. However, any proposals to change air transport operations involving transmeridian travel across more than three time zones (specifically international rather than domestic operations) will not be finalised until the results of current studies relating to multiple time zone travel are known, so that any recommendations arising from this study may be considered.

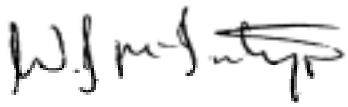
How you can help us

There is growing industry support for an operator-managed approach to controlling the risks of fatigue in aviation as evidenced by the increasing number of operators developing and implementing, with CASA approval, their own fatigue risk management systems with exemption from CAO 48. This DP presents options to build on this industry experience.

I must emphasise that no action will be taken on the proposals in this DP until all responses and submissions have been considered. A DP is essentially an options paper and as such contains suggested proposals only, not draft regulations. Draft regulations will be developed and incorporated in any future Notice of Proposed Rule Making (NPRM) resulting from this initial consultation, together with the necessary manuals and other supporting material. This is expected to occur prior to formal legal drafting of any resulting amendments to new CASR Parts and the NPRM phase of consultation on this subject.

To ensure clear and relevant safety standards, we need the benefit of your knowledge as an aviator, aviation consumer and/or provider of related products and services **by completing the DP Response Form and returning it to CASA by 8 October 2004**.

I would like to thank you in advance for taking the time to review and respond to the options presented in this DP.



Bill McIntyre
Executive Manager
Aviation Safety Standards

10 August 2004

Contents

**** YOU CAN RESPOND ONLINE OR BY FAX, POST OR E-MAIL ****

An **online response form** is offered as an alternative to the printed form in this Discussion Paper and is the preferred method of submitting comments to CASA. If you are connected to the Internet, access the online form by clicking on this website address: rrp.casa.gov.au/respond, or if you are working from a paper copy of this document, type that address into your web browser.

INTENTIONALLY LEFT BLANK

Abbreviations

AC	Advisory Circular
AOC	Air Operator's Certificate
AS	Australian Standard
CAANZ	Civil Aviation Authority New Zealand
CAO	Civil Aviation Order
CAR	Civil Aviation Regulation (1988)
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulation (1998)
DP	Discussion Paper
GA	General Aviation
ICAO	International Civil Aviation Organization
IT	Information Technology
FAA	Federal Aviation Administration (of the US)
FLOT	Flying Operations and Training
FRMS	Fatigue Risk Management System
HCRPT	High Capacity Regular Public Transport
LCRPT	Low Capacity Regular Public Transport
MOS	Manual of Standards
NASA	National Aeronautics and Space Administration
NFRM	Notice of Final Rule Making
NPRM	Notice of Proposed Rule Making
NSW	New South Wales
OC	Operating Certificate
OH&S	Occupational Health and Safety
OLD	Office of Legislative Drafting (at the Attorney-General's Department)
ORR	Office of Regulation Review (at the Productivity Commission)
RRP	Regulatory Reform Programme (CASA)
SARPs	Standards and Recommended Practices (ICAO)
SCC	Standards Consultative Committee
SOR	Summary of Responses
US	United States

INTENTIONALLY LEFT BLANK

1. Objective

1.1 The basis of the existing prescriptive aviation fatigue management legislation is found in Annex 6 of the Standards and Recommended Practices (SARPs) published by the International Civil Aviation Organization (ICAO) which states:

> "The State of the Operator shall establish regulations specifying the limitations applicable to the flight time and flight duty periods for flight crewmembers. These regulations shall also make provision for adequate rest periods and shall be such as to ensure that fatigue occurring either in a flight or successive flights or accumulated over a period of time due to these and other tasks, does not endanger the safety of a flight".

1.2 In conforming to that standard, ICAO member States have traditionally adopted a prescriptive approach to limit flight time and duty periods for flight crew. Civil Aviation Order (CAO) 48 is Australia's method of conformance. However, the Australian aviation industry has for some time criticised CAO 48 for its complexity, its lack of suitability to some sectors of the industry (for example, ballooning), and its lack of scientific basis. Likewise, in other transport modes, similar regulatory approaches have met with comparable criticisms while providing little evidence that fatigue risk was being adequately managed.

1.3 Current prescriptive hours provided in CAO 48 are largely based on industrial practices that existed 50 years ago. Because these longstanding "absolute" limits cannot meet all contemporary operator requirements in all situations, exemptions from compliance have been requested and authorised by CASA. The conditions imposed on operators under these exemptions, although based on experience, may not be scientifically-defensible and also may not effectively manage the fatigue risk.

1.4 The objective of this DP is to present information regarding a contemporary method of managing fatigue in flight crew – Fatigue Risk Management Systems (FRMSs) – as an alternative to current prescriptive flight and duty times as legislated in CAO 48, for consideration and comment by interested parties. It also presents alternative options to FRMSs, and the benefits and drawbacks associated with each of these alternatives.

2. The Consultation Process

2.1 Publication of this DP constitutes the first stage of formal public/industry consultation on the possible introduction of FRMSs, in lieu of adherence to the prescriptive flight and duty times outlined in CAO 48.

2.2 CASA will consider comments made in response to this DP during any rule-making process, prior to publication of any specific change proposals in any subsequent Notice of Proposed Rule Making (NPRM).

2.3 Once responses to this DP have been received by CASA, they will be consolidated and considered. The outcomes from the evaluation of comments received may then lead to development of a NPRM that would set out the necessary draft regulations. The NPRM, if developed, will then be issued conjointly with associated supporting material such as MOS extracts and advisory material. A summary of the responses to this DP will be incorporated in that NPRM.

2.4 CASA is committed to working cooperatively with the aviation industry to maintain and enhance aviation safety. The Standards Consultative Committee (SCC) is a joint industry/CASA forum that brings together CASA staff and representatives from a diverse range of aviation industry organisations to jointly develop regulatory change material. The SCC examines proposed regulatory changes to determine if they are worth pursuing and assists CASA in establishing and servicing change projects. CASA and industry experts work together in SCC sub-committees and project teams to develop regulatory material (both new regulations and amendments).

Reason for change

2.5 The changes proposed in this DP arise from general dissatisfaction with CAO 48 encountered over a number of years, as reflected by the number of exemptions requested by industry, and a consideration of more scientifically-based alternatives for the management of fatigue in the context of risk management principles. Further, the response of the Federal Government to the 2000 Report of the House of Representatives Standing Committee on Communications, Transport and the Arts following an inquiry into managing fatigue in transport recommended that:

> "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."

2.6 In 2001, CASA adopted a policy of no longer issuing general CAO 48 exemptions because it could be argued they were legally indefensible by not being substantiated by a safety case. Aviation industry participants were informed at the time that, should they consider it impractical to operate to the constraints of either CAO 48 or the eight Standard Industry Exemptions developed by CASA's predecessor (the CAA) in the early 1990's, then they would have to develop their own safety case as to why they should be permitted to operate outside the mandated prescriptive limits.

2.7 This resulted in a field validation trial of Fatigue Management Systems involving some 21 General Aviation (GA) and low capacity regular public transport (LCRPT) operators across Australia. The trial was evaluated by the Centre for Sleep Research at the University of South Australia and was reported on in *Moving Towards a Non-prescriptive Approach to Fatigue Management in Australian Aviation: A Field Validation* by Kirsty McCulloch, Dr Adam Fletcher and Professor Drew Dawson (2003). That report, while critical of some of CASA's early implementation processes, found widespread industry support for the concept and identified a number of possible benefits, including better awareness of fatigue risk and improved operational flexibility. These findings have been reinforced by the fact that there are now 31 GA operators working to an FRMS, with ten to twenty more systems currently under development including three high-capacity regular public transport (HCRPT) operators.

2.8 The field study found that 90% of managers and 85% of aircrew participating in FRMSs believe that an FRMS has a positive impact on operations. However, the concept has yet to be validated in HCRPT.

2.9 Through forums such as articles in CASA's Flight Safety Australia magazine, its website, and face-to-face industry briefings at the 2003 Flying Operations and Training (FLOT) Conference and the 2004 national safety seminar program, CASA has made it widely known that it views FRMS as a viable alternative to CAO 48.

2.10 Discussions to address these issues have taken place within CASA by specialist staff responsible for the development of operational standards and for the performance of compliance functions. A Fatigue Management Committee was formed within CASA comprising cross-divisional staff. Their mandate was to work directly with different individuals and organisations across the country to further address fatigue management issues. To date, at least 30 organisations have been working with CASA and their research partner, the University of South Australia, to identify the ideal parameters for the management of fatigue in civil aviation in Australia. The SCC operational standards sub-committee has been briefed a number of times on progress during the development of this DP and have provided pre-issue clearance for its distribution.

2.11 CASA now seeks comments on the proposals from the aviation industry before proceeding further.

What CASA does with your comments

2.12 At the end of this DP's response period for public comments, all submissions will be analysed, evaluated and considered. After the comment period closes, all responses will be consolidated, CASA's responses and disposition actions will be documented/prepared and made publicly available in conjunction with release of an NPRM.

2.13 CASA is required to register each comment and submission received but will not individually acknowledge a response unless specifically requested. However, the name of every contributor will be published in a consolidated summary of responses in the subsequent NPRM unless a respondent specifically asks CASA not to.

3. Issues for Consideration

3.1 Background

3.1.1 Traditionally, fatigue has been managed in aviation and other transportation industries solely through the prescriptive regulation of hours of work. This approach was based on the premise that fatigue is a function only of the amount of time spent working. However, it has for some time been widely recognised that there are many factors that contribute to fatigue and to the associated declines in performance and alertness. Generally, these factors form three groups:

- work-related factors, which include the type of work being performed, workload, and the duration of the duty period;
- sleep-related factors, which relate to the physiological requirement for an optimal daily amount of good quality sleep and the time since the last sleep occurred; and
- circadian factors, which refer to the underlying physiological processes that effectively programme individuals to be asleep during the night and awake during the day.

3.1.2 The contribution of intrinsic sleep- and circadian-related factors to fatigue means that fatigue is inevitable in any occupation where individuals are required to work when they would normally be asleep (Gander et al, 1998). Thus fatigue management will, in transportation industries, generally entail the minimisation, rather than elimination, of fatigue.

3.1.3 Within the road transport industry, such insights have led to changes in regulations aimed at managing fatigue. For example, under the national road transport reform process, State and Territory transport portfolios have replaced traditional driving hours limitations with more scientifically defensible maximum driving times and minimum rest times. The NSW Road Transport (Driver Fatigue) Regulation 1999 incorporates new prescriptive rest and driving hour limits as well as optional fatigue management schemes.

3.1.4 Fatigue is also gaining acceptance as an identified work hazard under Occupational Health and Safety (OH&S) legislation within Australia. Currently, New South Wales has already identified fatigue as a work hazard, with other states and territories monitoring the issue. Once fatigue is specifically recognised as a work hazard, employers are legally responsible to meet their duty of care by providing staff with a shift system that does not require excessive periods of wakefulness and permits sufficient opportunity to rest and recover. Under OH&S provisions, lack of attention to the risks of fatigue can result in considerable fines and even jail sentences for both employers and employees.

3.1.5 It has frequently been argued that prescriptive regulation in terms of hours of work has had limited success in minimising fatigue because this only addresses one part of the problem (Fatigue Expert Group, 2001). Therefore, more recent approaches to fatigue management have attempted to take a broader approach and address all three areas of fatigue-related factors (work, sleep and circadian) on the basis that "…better results (both in terms of safety and productivity) might be obtained from approaches that are more comprehensive, more flexible, and better tuned to current scientific understanding of key factors in fatigue prevention" (Fatigue Expert Group 2001, Report page 1). This new approach is consistent with the widespread acceptance and implementation of safety management systems in managing aviation risks.

3.1.6 Such approaches, i.e. FRMSs, are comprised of elements related to good rostering practices, an informed work group, active management involvement and effective monitoring of safety-related outcomes. It must be made explicit that work schedules (developed on the precept that work-, sleep-, and circadian-related factors contribute to fatigue and the associated declines in performance) are only one component of FRMSs.

Elements of the FRMS

3.1.7 Commitment/Joint Ownership

3.1.7.1 Management are openly committed to the establishment, implementation and maintenance of an FRMS in order to assign a level of importance that encourages operational staff to attach similar significance to this area. Management must support the concept of fatigue risk management as a safety management tool that is routinely applied to day-to-day company operations. Without such commitment there is a possibility the FRMS will be seen simply as a tool for increasing rate of effort.

3.1.7.2 Ownership of an FRMS implies responsibility for its use. An FRMS is jointly owned by staff and management. Accordingly, each is jointly responsible and accountable for the effective implementation, operation and administration, maintenance and improvement of the system. All have a duty of care to ensure that the information recorded is timely, accurate and honest. Management must ensure the FRMS is applied fairly, consistently, and within acceptable limits commensurate with OH&S legislation so that staff work under a shift system that does not require excessive periods of wakefulness and permits sufficient opportunity to rest and recover.

3.1.7.3 As fatigue may be influenced as much by choices and activities outside of work, staff are responsible for presenting for duty as rested as possible and must undertake to abide by fatigue risk management principles. This means that staff have an obligation to report fatigue risk factors such as adverse operational conditions or illness or sleep disorders which may have an unfavourable effect on individual fatigue levels.

3.1.8 Developed in consultation using a risk management approach

3.1.8.1 Management have to put in place appropriate mechanisms for consultation with their staff. This will actively involve staff and management in the identification, analysis, evaluation and treatment of fatigue. These consultation pathways are transparent and open. Staff consultation is seen as necessary to determine an acceptable level of risk in light of consequences particular to their operation, as outlined in the Australian/New Zealand Standard for risk assessment, AS4360. Here, scores must be assigned within a qualitative risk analysis matrix of likelihood and consequences. Similarly, a participatory approach is essential to provide well-considered justifications for processes and the development of procedures to manage their unique fatigue risks. Hence, an FRMS is unique to the operation in which it was developed and must be considered a “living process” which is continually evolving to meet changes in the work context.

3.1.8.2 Both management and staff are therefore involved in the development of strategies to mitigate the effects of fatigue in their organisation. Consideration may be given to such factors as:

- the provision of suitable rest or sleep facilities;
- the provision of transport;
- the availability of catering;
- the provision of adequate support staff;
- upgrading of equipment;

- the availability of operational support such as flight planning;
- reduction of duty periods; and
- augmenting of flight crews.

3.1.9 The work group is informed

3.1.9.1 To make informed decisions about their own safe practices, all staff with potential to impact on safety outcomes need to be educated in the causes and consequences of fatigue and strategies which can be employed to decrease the risk of fatigue-related errors. Those using an FRMS must be educated in all aspects of the system and the means by which their organisation meets their FRMS responsibilities.

3.1.9.2 As well as pertaining to work-related factors, it has been argued that such education is the only legitimate way of addressing activities outside work that may contribute to fatigue (Gander et al, 1998). On this basis, education of family members of workers is also encouraged.

3.1.9.3 In viewing a FRMS as a "living process" with a need for continual improvement, education must be regularly undertaken to ensure knowledge is up-to-date and accurate, taking into account staff turnover. The operator should provide staff with education covering topics that include:

- basic physiology of sleep and circadian rhythms for shiftworkers and for those crossing time zones;
- implications for performance, health and personal life;
- practical countermeasures and personal fatigue management strategies;
- FRMS principles and components;
- identification and examination of FRMS procedures that exist within their organisation including risk analysis, reporting requirements and compliance issues.

3.1.10 Principles of good roster design are followed

3.1.10.1 "Absolute" outer limits for flight and duty times have been the sole means for distinguishing between safe and unsafe practice. There is still, and will always be, inadequate scientific evidence to set clear and precise outer limits which separate times of low risk from times of unacceptably high risk of fatigue-related errors. This is because of the wide degree of individual and operational variation and the enormous number of influences, other than just work hours, which can contribute to fatigue. Thus, the determination of flight and duty limitations remains an arbitrary business.

3.1.10.2 Despite this, it is necessary for the operator to identify work schedules that both enhance safety and allow economic viability. While clear outer limits for flight and duty times may not be able to be based on definitive scientific evidence, evidence-based critical factors have been identified which need to be considered when designing rosters. Essentially, these critical factors provide the guiding principles for good roster design.

3.1.10.3 Work schedules based on good roster design principles aim to:

- ensure adequate opportunities for sleep and therefore also recovery from both short term and accumulated sleep debt;
- take account of the circadian biological clock which dictates that individuals cannot work or sleep equally well at all times of the day and night;
- address the fatiguing aspects of work demands particular to the type of work and work environment, the duration of work and the availability of breaks during work; and
- recognise that life consists of more than just work and sleep. Reasonable time is provided for other activities so that staff are not forced into sacrificing sleep in order to participate in other life activities.

3.1.10.4 Thus, outer limits for flight and duty periods need to be considered not only in terms of the length of work hours, but also in terms of the length of rest periods and the opportunities for sleep and recovery that they afford. There is an enormous amount of information (both good, bad and unenlightening) that is available to assist operators in the design of rosters. It is important that good roster design principles, and the critical factors which need to be considered when designing rosters, are made explicit. Further, it is necessary that these are not so complex as to make roster design a logistic "Mount Everest".

3.1.10.5 Although yet to be validated, some work schedule guidelines have been proposed by scientists from the University of South Australia which aim to provide operators with a "Minimum Prescriptive Zone" (that is, rules of thumb for determining safe hours of work), as well as a simplified means of determining those "absolute outer limits" which could reasonably by considered unsafe and unacceptable. This point is discussed further in sections 3.2.15-16.

3.1.10.6 Various rostering software products have been developed which attempt to take into consideration at least some of the above principles. In the main, these computer-based tools estimate levels of fatigue in an "average" individual during and on completion of a roster period. None of the rostering software currently available to industry considers the fatiguing aspects of job specific factors such as workload, the work environment, or the nature of each activity performed in a roster cycle. Thus, on its own, such software does not adequately meet the requirements of an FRMS and must be used in conjunction with risk management procedures to account for factors such as these. Nor are computer-based rostering tools essential to an effective FRMS. However, they may be important and necessary inclusions in operations where the number of workers and/or the frequency of changes made to scheduled hours make it impossible to assess every individual's schedule at any given time.

3.1.10.7 It should be stressed that the wide range of individual variability means that there is no perfect roster that will suit every person, and an important principle for the design of rosters is to include the "buy-in" of operational staff required to work the rosters. This allows "ownership" and active participation in all aspects of their FRMS. Open discussion of the rostering process should result in operational staff feeling able to discuss concerns about their fatigue levels and issues impinging on their performance.

3.1.11 Contingency planning is undertaken

3.1.11.1 An FRMS must include clear information and transparent processes regarding action in the event of contingency circumstances. Such circumstances may include the following:

- action in the event that an employee considers him/herself fatigued and therefore unfit to work;
- action in the event of unavoidable extensions of duty;
- failure of computer-based rostering facilities.

3.1.11.2 Such contingency plans, when they are needed and how they are identified, as well as their effectiveness, would be accompanied by appropriate reporting procedures.

3.1.12 Safety-related outcomes are monitored

3.1.12.1 One measure of the effectiveness of an FRMS is via examination of fatigue-related operational consequences. A common means of assessing the operational consequences of fatigue is through the collection and analysis of accident/incident reports and the operational responses to such analyses. This allows constant monitoring of an FRMS.

3.1.12.2 However, the value of such monitoring is dependent on the quality of the data collected. There is much evidence to suggest that many assessments of how fatigue contributes to accidents and incidents is largely inaccurate. This is related to a variety of factors including:

- typically, individuals are poor estimators of personal fatigue-related performance impairment (Åkerstedt & Gillberg, 1990; National Transportation Safety Board, 1994). Therefore, reliance on self-reported assessments of the contribution of fatigue to an incident is unlikely to produce an accurate analysis;
- contributing factors may be determined by means other than accurate and insightful assessment by the reporter whose opinion may be influenced by personal attitudes, fear of consequences, lack of knowledge of preceding events, or by the rather unattractive option of identifying perceived personal shortcomings (Millar, 2001); and
- when tired, individuals may be less inclined to make the effort of reporting an accident/incident (Millar, 2001).

3.1.12.3 More objective assessments of the likely contribution of fatigue to an accident/incident are obtained by collecting data relating to prior sleep, prior history of work hours and time of day of the incident being reported (Millar, 2001; National Transportation Safety Board, 1994). Hence, monitoring of safety-related outcomes in a FRMS require quality data collection, a willing workforce who recognise the importance of adherence to FRMS principles, and management who are committed to continuous improvement in safety outcomes and who provide open, transparent processes related to accident/incidents.

3.1.13 Are subject to external and internal audit

3.1.13.1 Audit, both internal and external, is an essential element of a safety system. The FRMS must therefore have the capacity for retrospective analysis. Adequate record keeping is essential to ensure that the performance of the FRMS can be monitored and to provide evidence of measures implemented to improve performance. Record keeping will also show whether or not the reporting obligations of an FRMS have been met and allow for examination of trends in performance over time.

3.1.13.2 The internal audit aims not only to ensure compliance with the prescribed processes of a FRMS but also to ensure effectiveness by identifying inadequate or absent risk mitigation strategies, or any other areas that would benefit from improvement. Thus, internal audit by appropriately qualified personnel will assist the operator to assess the effectiveness of its FRMS and will also provide a sound basis for external audit.

3.1.13.3 The external audit aims to assess whether the operation remains faithful to the principles of fatigue risk management (i.e. that all elements of a FRMS are demonstrable), and that business is always conducted with safety outcomes in mind. CASA auditors would check whether the FRMS appears to be managing the fatigue risks of that particular operation and that the operator is complying with its own system.

3.1.14 A process of continuous improvement is undertaken

3.1.14.1 Inherent in the FRMS approach is the need for continuous improvement. As the FRMS concept is driven by current research, it is expected that future developments will continue to improve its effectiveness. Moreover, operators are required to not just review and monitor their fatigue management processes, but also to make changes for improvement. It is not enough to examine accident and incident trends without striving to improve the processes by which the data is collected. It is not adequate to build a roster according to good rostering principles without “tweaking” it in response to feedback from employees. It is not suitable for an operations manual to outline an operator’s FRMS without evidence of it being a “living process”, continually evolving to meet the changing conditions of the staff that own it.

3.1.15 A field study, commissioned by CASA in 2002, was undertaken by researchers at the Centre for Sleep Research at the University of South Australia. Whilst recognising early problems experienced by some operators who agreed to implement an FRMS the study supports the adoption of an FRMS approach as a viable alternative to current prescriptive aviation legislation, for operators authorised by:

- an Operating Certificate (OC), and
- an Air Operator’s Certificate (AOC) within a maximum of three time zones for Australian domestic zones.

3.1.16 Studies are currently being undertaken in transmeridian air transport operations to examine the fatigue-related effects associated with multiple international time zone crossings. In relation to such operations, CASA believes that consideration of the alternatives to current prescribed flight and duty time limitations examined in this DP should be deferred until the results and recommendations of these studies become available.

3.1.17 Whilst the identification of appropriate prescribed minimum limits remains a contentious issue amongst scientists, the scientific community has widely embraced the FRMS concept - it follows principles related to evidence-based critical factors and is consistent with current knowledge. This is in sharp contrast to the prescriptive limitations currently offered by CAO 48. Even so, some conservative members of the scientific community believe that the FRMS approach requires further scientific validation and CASA supports ongoing research and development of this methodology. While scientific understanding will continue to grow, in the meantime it is imperative that the aviation industry benefits from contemporary developments and the current state of knowledge be applied to the management of fatigue risk in the aviation industry.

References

- Åkerstedt, T. and Gillberg, M. (1990) Subjective and objective sleepiness in the active individual. *International Journal of Neuroscience, 52* (1-2), 29-37.
- Fatigue Expert Group (2001) *Options for Regulatory approach to fatigue in Drivers of Heavy Vehicles in Australia and New Zealand.* Report commissioned by the Australian Transport Safety Bureau, the Land Transport Safety Authority and the National Road Transport Commission, February 2001.
- Gander, P. H., Waite, D., McKay, A., Seal, T. and Millar, M. A. (1998) An integrated fatigue management programme for tanker drivers. *Proceedings from the Third International Conference on Fatigue and Transportation,* Fremantle, 9 – 13 February.
- McCulloch, K., Fletcher, A. and Dawson, D. (2003) *Moving towards a non-prescriptive approach to fatigue management in Australian aviation: A field validation.* Paper prepared for The Civil Aviation Safety Authority, Australia, August, 2003.
- Millar, M. A. (2001) *Hours of Work, Sleep Loss and Performance of Anaesthetists: Implications for safety in Medical Practice.* Unpublished Doctoral Thesis, Department of Public Health, University of Otago, New Zealand.
- National Transportation Safety Board (1994) *Uncontrolled Collision with Terrain: American International Airways Flight 808, August 18, 1993.* Washington, D.C.

3.2 Options for consideration

3.2.1 This DP presents to industry six principal options with several variations:

- **Option 1** – Retain and enforce current Australian regulatory requirements specified in CAO 48 (no exemptions);
- **Option 2** – Maintain status quo, i.e. retain current Australian regulatory requirements specified in CAO 48 with exemptions;
- **Option 3** – Revise content of CAO 48 and provide more scientifically-based prescriptive flight and duty limitations;
- **Option 4** – Replace CAO 48 with another country's regulatory requirements;
- **Option 5** – Replace CAO 48 with the requirement for an operator-developed FRMS.
- **Option 6** – Retain CAO 48 with operators working to an exemption from compliance with CAO 48 to develop a FRMS.
- **Option 7** - Replace CAO 48 with either new prescriptive limits or an operator-developed FRMS.

3.2.2 Non-regulatory options were not considered due to the imperative for CASA to implement the ICAO Annex 6 SARP. Each of the above options will now be explained in more detail. Readers should note that a DP is essentially an options paper and no further action will be taken by CASA on implementing changes to current regulatory requirements until all industry responses and submissions to this DP have been considered.

Option 1 – Retain and enforce current Australian regulatory requirements specified in CAO 48 (no exemptions)

3.2.3 CAO 48 provides a set of rules that can be readily understood and for which compliance can be readily measured. It also has the benefit of not requiring extra work to establish it. Further, measurable compliance procedures are currently in place.

3.2.4 However, retention of CAO 48 does not address industry concerns regarding lack of suitability or the lack of a scientific basis for existing fatigue management legislation. Further, CAO 48 has been proven to be inadequate by virtue of the number of exemptions issued. With the removal of all exemptions to CAO 48, some operators may become economically unviable. It also fails to implement the recommendations of the "Midnight Oil" report and does not recognise Federal and State government commitment to new approaches to fatigue being implemented in Australian transport regulation.

3.2.5 Despite its relative simplicity (although it has also been argued that CAO 48 is cumbersome and confusing), this option is seen by CASA as unworkably stringent.

Option 2 – Maintain status quo, i.e. retain current Australian regulatory requirements specified in CAO 48 with exemptions

3.2.6 This is the easiest of all options and may be seen as practical given that there would be no establishment costs or increased workload and that compliance measures have already been established. However, some of the elements of CAO 48 and many of the exemptions fall outside scientifically-derived, evidence-based critical safety parameters. This option does not allow the aviation industry to take advantage of the progress that has been made in the area of fatigue risk management, nor of the flexibility and safety enhancement such progress offers. This option also means that there is not a "level playing field" pursuant to which all persons are subject to the same standards. Further, it is inconsistent with good regulatory practice to regulate by exemption as it leads to inconsistencies and is not time efficient.

3.2.7 While the "do nothing" option gives Australia the chance to take a back seat and let other countries become the driving force giving us the opportunity to learn from their mistakes, this would be, at best, a delaying tactic. The Australian transport sector and its regulators have been at the forefront of new approaches to managing fatigue risks, reflected in the innovative approaches to fatigue in road transport legislation. These are now showing some signs of success in reduced heavy vehicle accident rates. If the status quo was maintained in aviation and the latest scientific developments were not embraced, CASA and the aviation industry could be criticised for failing to ensure that the risk of fatigue-related performance decrements, operational inefficiencies and compromises to safety had not been minimised.

Option 3 – Revise content of CAO 48 and provide more scientifically-based prescriptive flight and duty limitations

3.2.8 The provision of scientifically-defensible prescriptive limits may be an attractive option for operators who lack the resources to formulate their own FRMS. Operators could be confident that their work schedules reflected conservative safety limits, the establishment workload would be low and compliance procedures relatively simple. However, a new prescriptive rule set could result in additional costs to some operators arising from either possible lost income (as a result of restricted work periods) or increased labour costs associated with any additional staff.

3.2.9 As for any prescriptive flight and duty time limitations, drawbacks relate to lack of flexibility and the potential for undetected fatigue risks. However, if "absolute" limits on flight and duty times continued to be accepted as the sole means of distinguishing between safe and unsafe practice, CASA would need to develop these using evidence-based critical factors by ensuring that the focus is on prior sleep opportunities rather than hours of work. Thus, any "absolute" flight and duty time limitations would be determined by the prior sleep opportunities they afford. A revision of CAO 48 to reflect current scientific thinking, and to accommodate even the highest risk type of operation, is likely to result, in some instances, in more conservative flight and duty time limits.

3.2.10 While other examples of minimum prescribed limits based on sleep opportunities can be found in the road transport fatigue regulations, researchers from The Centre for Sleep Research at the University of South Australia have proposed the following list for constructing rosters for the aviation industry which, when all points are adhered to, is **unlikely** to result in a fatigue-inducing work schedule:

- In any 7 day period, a flight crew member does not exceed 48 hours of duty of any nature associated with his or her employment.
- In any 24 hour period, a flight crew member is not rostered for duties that exceed 12 hours.
- Duty periods are separated by a minimum rest period of 12 hours.
- In any 7 day period, a flight crew member does not work more than a total of 12 hours between 2100 and 0900.
- In any 7 day period, a flight crew member has at least one continuous period of 36 hours free from all work-related duties.

It is possible that any revised prescriptive flight and duty time limitations could reflect similar guidelines.

3.2.11 In terms of disadvantages, this option (i.e. providing new prescriptive flight and duty limitations) lacks flexibility and does not address the issue of unsuitability across various operation types. It also fails to recognise the significant safety management capabilities of some larger operations and, if applied strictly to all operations, would stifle some best practice approaches to fatigue management currently being taken.

Option 4 – Replace CAO 48 with another country's regulatory requirements

3.2.12 This option yields a readily ascertainable and measurable set of standards for prescriptive limits. However, the basis of all foreign aviation fatigue legislation reviewed by CASA is similar to that in CAO 48 — it is prescriptive and lacks scientific basis. There has been no agreement on prescribed flight and duty time limits between nations in the last 50 years. By and large the prescribed flight and duty time limitations for nations has been set by industrial agreement rather than by specific safety cases. There is now a plethora of different prescribed flight and duty time limitations across nations:

- FAA: The US uses prescriptive limits only in a variation of CAO 48. Changes to FAA's regulatory requirements have been deferred awaiting changes to Australia's regulatory arrangements in the hope that it could be applied to the US aviation industry.
- CAANZ: CAANZ have adopted a FRMS option and allowed the previous Civil Aviation Safety Orders (CASO) prescribed flight and duty time limitations to meet the standard by being acceptable to the Director. In essence they have grandfathered in the prescribed flight and duty time limitations by default while allowing for an FRMS. Within the FRMS, outer flight and duty time limitations have been identified. The New Zealand Civil Aviation Authority has some advisory material in place and is still working on developing further advice but considerable work is still required.
- Transport Canada: Uses prescriptive limits only in a variation of CAO 48.
- JAA: With input from 32 countries, their CAP 32 (the equivalent of CAO 48) comprises many aspects that do not have widespread support of the aviation industries from the represented countries. In reality, CAP 32 is nothing more than a variant of CAO 48.

3.2.13 CASA's previous proposal to replace CAO 48 with another country's regulatory requirements was rejected following consultation with the aviation industry in 2000. Discussion Papers DP 9904RP and DP 9906RP proposed the introduction of operator-formulated flight time and duty limits derived from an industrial agreement between operators and staff. However, mirroring similar experiences in the US and Europe, the proposal failed to achieve Australian aviation industry acceptance. Although those proposals offered a degree of flexibility while retaining prescriptive legislation, the Australian aviation community rejected them on the grounds that they remained unacceptably complex and scientifically indefensible. Operators were concerned that they could not meet their duty of care to employees and passengers as a result. At the time, CASA indicated it would investigate the option of fatigue risk management.

3.2.14 Given the developments in fatigue research, it is CASA's view that replacing CAO 48 with another country's regulatory requirements is simply "changing the numbers" related to flight and duty time limitations rather than managing fatigue. This only delays the implementation of a safer system.

Option 5 – Replace CAO 48 with the requirement for an operator-developed FRMS

3.2.15 All operators would be required to develop their own unique FRMS with all of the components of a FRMS established according to parameters set by CASA. It would be expected that each FRMS would reflect the fatigue risk exposure of the respective operator. Hence, in relation to the rostering component of a FRMS, very small operators with minimal risk exposure would be expected to develop relatively simple scheduling "rules" based on good roster design principles, i.e. the focus is not on hours worked, but on prior sleep opportunities. While work is still in progress, researchers from The Centre for Sleep Research at the University of South Australia have offered an initial format for such "rules of thumb". Termed "Prior Sleep and Wake Rules", they take the following form:

- *The Start Rule:* The affected crew member must obtain at least **X** hours sleep in the last 24 hours and **Y** hours sleep in the 48 hours prior to commencing work;
- *The Finish Rule:* The period from wake-up to the end of a particular shift or work period should not exceed the amount of sleep obtained in the 48 hours prior to commencing that shift or work period; and
- *The Action Rule:* If either rule is broken, fatigue is a potential problem and the individual should notify the operator and the operator should engage in an auditable risk reduction action, e.g. late start, early finish, countermeasures such as caffeine, napping or alternative task, or taking sick leave.

3.2.16 It must be stressed that whatever values an operator attributes to X and Y, these would need to be justified in terms of scientific evidence (provided in any subsequent AC's), the operator's risk exposure, and the consequences for the operator's specific situation.

3.2.17 Commensurate with their increased risk exposure, more sophisticated means of developing rosters would be expected of larger operators implementing FRMSs. Clearly, simple rules of thumb will not adequately help devise rosters that aim to manage fatigue in operations with large staff numbers. It is anticipated that those operators would need to develop computer-based systems to manage their rosters. These systems would have the benefit of being able to utilise the various software options which have been developed (and that continue to evolve) with the aim of assessing and predicting the level of fatigue associated with different work schedules. These products use a maximum predicted level of fatigue beyond which an employee cannot be reasonably expected to work safely. In using such applications, operators would be required to set and justify their own particular "fatigue benchmark" in terms of their specific risk exposure and consequences. As fatigue management software applications are only able to assess whether a work schedule is, on average, able to provide sufficient opportunity for adequate sleep, the simple "rules of thumb" outlined above should still be used by individuals for means of personal fatigue risk assessment.

3.2.18 It must be emphasised, however, that for a FRMS to be considered effective, all components must be evident. Good rostering techniques or reliance on software models alone do not constitute an adequate FRMS. Operators would also need to develop the other components, such as evidence of commitment, joint ownership and continuous improvement, an informed work group, and monitoring of safety-related outcomes, in consultation with their work group.

3.2.19 The benefits of operator-developed FRMSs include:

- improved operational flexibility;
- increased safety through better awareness and understanding of fatigue;
- improved rostering efficiency;
- clearer sharing of responsibility for fatigue management; and
- a scientific basis for fatigue management.

3.2.20 However, FRMSs have some disadvantages, including:

- not so easy to implement in resource poor businesses;
- temptation to rely on fatigue management software and to disregard or downplay other components of a FRMS;
- poor user-friendliness of some existing fatigue management software;
- potential of FRMS for abuse; and
- high establishment workload.

Option 6 – Retain CAO 48 with operators working to an exemption from compliance with CAO 48 to develop a FRMS (a combination of Options 2 and 5).

3.2.21 Essentially, Option 6 maintains the status quo, but replaces any exemptions with the requirement to develop and implement a FRMS according to guidelines provided by CASA. The combination of Options 2 and 5 allows operators to take the opportunity to "sit back and wait" or to pursue "best practice" and has the following benefits:

- For those operators who currently abide by CAO 48 flight and duty limitations without exemptions, there would be no need for any changes, extra workload or further costs (i.e. the disadvantages of adopting a FRMS). Many operators conduct operations under the safeguards of CAO 48 and believe that their fatigue risk is already managed adequately. Further, clear compliance measures already exist for CAO 48.
- For those operators who currently work to an exemption from compliance with CAO 48, more flexible and efficient operations may be achieved by developing a FRMS that suits their individual requirements, rather than be constrained by the standing exemptions.

3.2.22 However, the retention of CAO 48 in parallel with a FRMS approach still means that some operators will continue to inadequately manage their fatigue risk in the face of more current knowledge. As has been argued earlier, the absence of data which provides evidence of fatigue-related incidences or errors does not mean that there is no fatigue-related risk, simply that these have not been recognised and/or acknowledged. Given that current scientific knowledge indicates that some aspects of CAO 48 limitations may not allow for adequate rest, it is likely that many operators who operate under CAO 48 are unaware of the true fatigue-related risks as there is no requirement for them to monitor this under current regulations. In light of progress made in terms of prescribed limits in other parts of the Australian transport sector, it is believed that the retention of CAO 48 can only be short term.

Option 7 - Replace CAO 48 with either new prescriptive limits <u>or</u> an operator-developed FRMS (a combination of Options 3 and 5).

3.2.23 Option 7 offers a combination of Options 3 and 5 above, allowing operators to choose between implementing their own FRMS according to guidelines provided by CASA, or abiding by more scientifically-derived, prescribed minimum limits. Essentially, those electing to abide by prescriptive limits are choosing to relinquish the flexibility and fit of an operator-specific system to avoid the cost and time involved in implementing an FRMS, whilst still operating within a 'safe envelope' for managing fatigue risk. Those operators who need flexibility to achieve operational efficiency and want to operate outside prescribed limits would need to develop an FRMS.

3.2.24 At this stage, Option 7 is CASA's preferred option, given that it avoids the relative impermanence of retaining CAO 48 (associated with Options 2 and 6) and overcomes many of the disadvantages posed by Option 3 and Option 5 by offering operators a choice based on self-assessment of their own resources. Thus, operators who do not require the flexibility offered by implementing a FRMS, or who wish to avoid the preparation required for instituting a FRMS, could take advantage of simple, more scientifically defensible, safety-directed flight and duty time limitations which are expected to be far less complicated and cumbersome than CAO 48. Apart from the advantages outlined for Option 3, for those operators who elect to follow revised prescriptive limits, there is also the ability to implement a FRMS in the future without having to adopt new rostering practices because the CASA-provided minimum limits would also be primarily based on prior sleep opportunities rather than hours worked.

3.2.25 On the other hand, operators wanting to operate outside of the revised flight and duty limitations can implement a FRMS. While there may be an initial, increased workload related to the establishment of a FRMS, these operators can benefit from more effectively managing their fatigue and improving safety outcomes while still having the flexibility to ensure their particular type of operation is productive and economically viable.

3.3 Probable costs to industry and/or CASA of implementing any option which includes a FRMS approach

3.3.1 As for implementing and maintaining safety management systems, the cost associated with managing fatigue would be variable depending on the complexity of the system adopted by any operator. Costs will depend on many factors, including:

- the quality of current systems in place;
- the sophistication of the operator's safety management system;
- whether or not a consultant is hired;
- the complexity of the rostering system;
- the size of the operation;
- the cost of a licence authorising use of a proprietary fatigue model (if one is used); and
- the cost of initial and recurrent training.

3.3.2 For large operations, there would be some significant additional costs to implement a sophisticated FRMS, although it could be integrated into the existing SMS rather than set up as an entirely new safety system. There is some anecdotal evidence suggesting a sophisticated FRMS start-up cost of somewhere between $10,000 and $50,000 per operator, assuming that expensive software is purchased. This is unlikely to be the case for very small operators. The size of an operator and the level of risk associated with that operation should be reflected in its FRMS and ultimately its cost. The 'rules of thumb' approach (see paragraph 3.2.15) is being specifically developed in association with the scientific community with the intent of reducing implementation costs for those smaller businesses who would only require a basic FRMS by virtue of the nature and size of their operation, e.g. a sole owner-operator aerial agriculture business.

3.3.3 CASA is seeking more accurate cost estimates from industry participants who have already implemented FRMSs through responses to this DP, as well as any ideas as to how to implement an FRMS in a cost effective way. CASA is also interested to hear of any measured benefits from experience with FRMS, including improved rostering efficiencies and decreases in reported fatigue-related incidents. Following consideration of the results of this DP, should further development of these regulatory proposals proceed, CASA will investigate more fully the costs and benefits of the recommended approach.

3.3.4 It is anticipated that start-up costs would be amortised over time through reduced accidents and incidents – the expected result of more effectively managing fatigue. Each operator would be able to monitor this by examining trends in their own fatigue-related outcomes, something that is not widely and appropriately undertaken currently. Costs may also be assimilated in IT system upgrades and in other compliance budgets, e.g. OH&S. Some operators may be able to realise rostering efficiencies and better utilise better rested flight crew.

3.3.5 Should changes to regulations proceed, CASA would incur costs to produce and publish new training materials and advisory publications, assist operators to transition to the new regulations and to train CASA staff.

3.4 Probable transitional arrangements

3.4.1 CASA recognises that considerable time and effort will be required from both industry and the regulator to transition to any new arrangements. Neither group is resourced to the level necessary to allow rapid change. For this reason, it is envisaged that it may take 2-5 years for industry to transition to whatever arrangements are agreed. In the meantime, subject to any clear safety case to the contrary, it is suggested that current arrangements remain, i.e. during the interim period, both the standard industry exemptions and CAO 48 in its current form will remain valid.

INTENTIONALLY LEFT BLANK

DP Response Form

Fatigue Management — Proposed alternatives to prescribed Flight and Duty Times

Please complete your response by *8 October 2004* and return it by one of the following means:

Online (preferred method) rrp.casa.gov.au/respond

Fax 1800 653 897 (free call)

Post (no stamp required)
CASA Standards Administration & Support Branch
Reply Paid 2005
Canberra ACT 2601, Australia

E-mail DP0404OS@casa.gov.au

An online response form is offered as an alternative to the printed form below and is the preferred method of submitting comments to CASA. If you are connected to the Internet, access the online form by clicking on this website address: rrp.casa.gov.au/respond, or if you are working from a paper copy of this document, type that address into your web browser.

Please provide relevant information and indicate your acceptance or otherwise of the proposal presented in this Discussion Paper by ticking [✓] the appropriate box below.

Your name: _____ ARN* (if known): _____

Organisation: _____ ARN* (if known): _____

Address: _____

_____

* Aviation Reference Number, usually your CASA-issued licence or certificate number

Your telephone number (optional): …….…… (to enable the Project Manager to contact you if necessary)

Do you consent to have your name published as a respondent to this DP? YES [ ] NO [ ]

Signed: …….. Date: ……..…

Your affiliation:

☐ Private ☐ Industry Association ☐ Airline ☐ Union ☐ Government ☐ Other

Your involvement in the aviation industry:

☐ Consumer ☐ Pilot or Flight Crew ☐ Ground or Support Staff ☐ Product or Service Provider ☐ Owner ☐ Operator

How satisfied are you with the current CAO 48 on Fatigue Management?

☐ Very satisfied ☐ Satisfied ☐ No opinion ☐ Dissatisfied ☐ Very Dissatisfied

Please present your responses to this DP in the following sections:

- **Your opinion on each of the options presented in this DP**
- **Additional general comments on fatigue management**

Attach additional information if the space provided below is insufficient.

CASA invites you to provide an opinion on the options presented in this DP by indicating your preferences and comments below:

Option 1 – Retain and enforce current Australian regulatory requirements specified in CAO 48 (no exemptions)

[ ] proposal is acceptable without change
[ ] acceptable but would be improved if changes were made
[ ] not acceptable but would be acceptable if changes were made
[ ] not acceptable under any circumstances

Comments (including an estimate of additional costs/impacts): _____

Option 2 – Maintain status quo, i.e. retain current Australian regulatory requirements specified in CAO 48 with exemptions

[ ] proposal is acceptable without change
[ ] acceptable but would be improved if changes were made
[ ] not acceptable but would be acceptable if changes were made
[ ] not acceptable under any circumstances

Comments (including an estimate of additional costs/impacts): _____

Option 3 – Revise content of CAO 48 and provide more scientifically-based prescriptive flight and duty limitations

[ ] proposal is acceptable without change
[ ] acceptable but would be improved if changes were made
[ ] not acceptable but would be acceptable if changes were made
[ ] not acceptable under any circumstances

Comments (including an estimate of additional costs/impacts): _____

Option 4 – Replace CAO 48 with another country's regulatory requirements

[ ] proposal is acceptable without change
[ ] acceptable but would be improved if changes were made
[ ] not acceptable but would be acceptable if changes were made
[ ] not acceptable under any circumstances

Comments (including an estimate of additional costs/impacts): _____

Option 5 – Replace CAO 48 with the requirement for an operator-developed FRMS
[ ] proposal is acceptable without change
[ ] acceptable but would be improved if changes were made
[ ] not acceptable but would be acceptable if changes were made
[ ] not acceptable under any circumstances

Comments (including an estimate of additional costs/impacts): _____

Option 6 – Retain CAO 48 with operators working to an exemption from compliance with CAO 48 to develop a FRMS (a combination of Options 2 and 5)
[ ] proposal is acceptable without change
[ ] acceptable but would be improved if changes were made
[ ] not acceptable but would be acceptable if changes were made
[ ] not acceptable under any circumstances

Comments (including an estimate of additional costs/impacts): _____

Option 7 – Replace CAO with either new prescriptive limits or an operator-developed FRMS
[ ] proposal is acceptable without change
[ ] acceptable but would be improved if changes were made
[ ] not acceptable but would be acceptable if changes were made
[ ] not acceptable under any circumstances

Comments (including an estimate of additional costs/impacts): _____

Any additional general comments on fatigue management:

_____

Your response will ensure balanced consideration by CASA of the interests of the industry and consumers.

Thank you

INTENTIONALLY LEFT BLANK

Please forward your response to CASA by

8 October 2004

by one of the following means:

Online (preferred method)
rrp.casa.gov.au/respond

Fax
To: Regulatory Documentation Coordinator
1800 653 897 (free call) or international +612 6217 1691

Post (no stamp required in Australia)
Reply Paid 2005
Regulatory Documentation Coordinator
CASA Standards Administration & Support Branch
Canberra ACT 2601, Australia

E-mail (use the response format in this DP)
DP0404OS@casa.gov.au

Additional information is available from:

Stephen Phillips, Project Manager

Post (no stamp required) Reply Paid 2005
Operational and Flight Crew Licensing Standards Branch
Civil Aviation Safety Authority
Canberra ACT 2601, Australia

E-mail stephen.phillips@casa.gov.au

Telephone 02 6217 1654 or 131 757 (for the cost of a local call)
International +612 6217 1654

Fax 02 6217 1664
International +612 6217 1664