Transport Canada Transports Canada

Advisory Circular

Subject: **Development and Implementation of Fatigue Risk Management Systems in the Canadian Aviation Industry**

Issuing Office:	Standards	Document No.:	AC SUR-001
File Classification No.:	Z 5000-34 U	Issue No.:	02
RDIMS No.:	6154579-V9	Effective Date:	2011-03-22

TABLE OF CONTENTS

1.0 INTRODUCTION

This Advisory Circular (AC) is provided for information and guidance purposes. It may describe an example of an acceptable means, but not the only means, of demonstrating compliance with regulations and standards. This AC on its own does not change, create, amend or permit deviations from regulatory requirements, nor does it establish minimum standards.

1.1 Purpose

(1) The purpose of this AC is to introduce the Fatigue Risk Management System (FRMS) toolbox commissioned by Transport Canada Civil Aviation (TCCA) from the University of South Australia Centre for Sleep Research.

(2) The intent of this AC is to explain each component of the FRMS toolbox and to provide advice as to how the components can be utilized to develop and implement an effective FRMS.

1.2 Applicability

(1) This document applies to certificate holders who will be required to have a FRMS in accordance with the subpart 573 of the *Canadian Aviation Regulations* (CARs).

(2) The information contained herein can be used by any organization to implement a FRMS on a voluntary basis.

1.3 Description of Changes

Reference for online training changed.

2.0 REFERENCES AND REQUIREMENTS

2.1 Reference Documents

(1) It is intended that the following reference materials be used in conjunction with this document:

(a) Notice of Proposed Amendment (NPA) 2004-047, CAR 573.16 - *Safety Management System*;

(b) NPA 2004-049, Standard 573.16 - *Safety Management Systems*;

(c) Transport Canada Publication (TP) 14572E— *Fatigue Risk Management System for the Canadian Aviation Industry: An Introduction to Managing Fatigue*,;

(d) TP 14573E— *Fatigue Risk Management System for the Canadian Aviation Industry: Fatigue Management Strategies for Employees*;

(e) TP 14574E— *Fatigue Risk Management System for the Canadian Aviation Industry: Employee Training Assessment*;

(f) TP 14575E— *Fatigue Risk Management System for the Canadian Aviation Industry: Developing and Implementing a Fatigue Risk Management System*;

(g) TP 14576E— *Fatigue Risk Management System for the Canadian Aviation Industry: Policies and Procedures Development Guidelines*;

(h) TP 14577E— *Fatigue Risk Management System for the Canadian Aviation Industry: Introduction to Fatigue Audit Tools;*

(i) TP 14578E— *Fatigue Risk Management System for the Canadian Aviation Industry: Trainer's Handbook*;

(j) Staff Instruction (SI) SUR-007 issue 02, dated 2011-03-22 — Fatigue Risk Management System Assessment Guide;

(k) The Fatigue Audit InterDyne (FAID® Version 2.0) Program at http://www.interdynamics.com—an automated program for determining the fatigue propensity of specific work schedules.

Note:

The aforementioned toolbox components, including the Fatigue Audit InterDyne, are deliverables as per the specified contract between TCCA and the University of South Australia. The tools provided are examples of how to meet the FRMS regulatory requirements, however, they are not the only tools available. Organizations are encouraged to explore other options that might be more appropriate for their operating environment.

2.2 Cancelled Documents

Not applicable.

Note:

By default, it is understood that the publication of a new issue of a document automatically renders any earlier issues of the same document null and void.

2.3 Definitions and Abbreviations

(1) The following definitions and abbreviations are used in this document:

(a) **Fatigue risk management**: an integrated set of management policies, procedures and practices for monitoring and improving the flight safety aspects related to fatigue within your organization;

(b) **Fatigue**: an increased level of sleepiness associated with impaired cognitive and/or physical functioning that may, as a consequence, result in an elevated risk of error or accident. For the purpose of this policy, fatigue is due primarily to increased duration of wakefulness and/or reduced duration of sleep.

(c) **Fatigue audit**: an electronic or manual tool is used to calculate the relative sleep opportunity for an “average” individual using work schedules as the primary data source.

(d) **Fatigue Audit InterDyne (FAID)**: a commercial software package that calculates the relative sleep opportunity for a hypothetical “average” individual using scheduled working hours as the primary data input. The sleep opportunity (or FAID) score at any particular time is a weighted aggregate based on the timing and duration of work and non-work periods, the time of day when these occur, and social and family factors that may influence the propensity to sleep. Typically the result is expressed as a score between 0-150. Scores below a task-specific threshold are generally considered to provide an adequate sleep opportunity. Scores over the threshold are generally considered to provide a reduced sleep opportunity and require significant additional levels of hazard control. In general the level of control required is proportional to the degree to which the FAID score exceed the threshold.

3.0 BACKGROUND

3.1 Regulatory Requirements

(1) In 2004, TCCA promulgated a NPA to the CARs introducing FRMS requirements into subpart 573 of the CARs. It is expected that these requirements will come into force in 2011 and will apply to all approved maintenance organizations in Canada. The FRMS toolbox was developed in response to requests by members of the civil aviation industry for assistance in complying with the proposed regulatory requirement. This toolbox provides one, but not the only, means of complying with the regulation.

(2) The development of the FRMS toolbox is a joint initiative between TCCA's Maintenance Standards and the Operational and Certification Standards divisions. It is intended for use in all areas of civil aviation and should be adjusted in accordance with the size and complexity of the certificate holder.

(3) The FRMS toolbox provides a comprehensive approach to the development, implantation and maintenance of a FRMS. The toolbox comprises seven technical publications and a website application for training. They are part of the *Fatigue Risk Management System for the Canadian Aviation Industry* comprised of the following documents:

(a) TP 14572E— *Fatigue Risk Management System for the Canadian Aviation Industry: An Introduction to Managing Fatigue*, introductory material intended to raise awareness about fatigue;

(b) TP 14573E— *Fatigue Risk Management System for the Canadian Aviation Industry: Fatigue Management Strategies for Employees*, provides the knowledge and skills required to apply appropriate fatigue management strategies at the individual level;

(c) TP 14574E— *Fatigue Risk Management System* for the Canadian Aviation Industry: Employee Training Assessment, an optional module intended to assess employee competence in topics covered in the Fatigue Management Strategies for Employees workbook;

(d) TP 14575E— *Fatigue Risk Management System for the Canadian Aviation Industry: Developing and Implementing a Fatigue Risk Management System*, explains how to manage the risks associated with fatigue at the organizational level within a safety management system framework;

(e) TP 14576E— *Fatigue Risk Management System for the Canadian Aviation Industry: Policies and Procedures Development Guidelines*, proposes a policy structure while providing examples and guidelines to help organizations through the process of designing fatigue risk management policies and procedures;

(f) TP 14577E— *Fatigue Risk Management System for the Canadian Aviation Industry: Introduction to Fatigue Audit Tools,* provides an overview of tools available to employers to help determine whether scheduling provides employees with adequate opportunities to get sufficient sleep; and,

(g) TP 14578E— *Fatigue Risk Management System for the Canadian Aviation Industry: Trainer's Handbook*, in addition to a training presentation on fatigue, fatigue management systems, and individual fatigue management strategies, the package includes background information for delivery of the workshop, learning outcomes, and questions frequently asked by participant.

3.2 Why a Fatigue Risk Management System approach to managing fatigue?

(1) In general, fatigue has traditionally been managed using a single layer of defence (i.e., limits on work hours). The assumption is that compliance with the limits on working hours is evidence that an employee is adequately rested and fit for work and will not make any fatigue related errors. This may not always be the case. Without supplementary defensive layers it is entirely possible for an employee to comply with working hour limits but to be too tired to work safety (e.g., had a 12 hour break from work but didn't get enough sleep due to a sick child or a night out on the town). Each of the five levels of control is discussed in TP 14575E, but a brief description of the theory is provided below.

(2) The hazard control model illustrated in the figure above shows the controls in place for reducing fatigue-related risk. In theory, if each level of control is in place, the “holes” in the management system along the incident trajectory should become smaller, minimizing the likelihood of a fatigue-related incident.

(3) Briefly, a fatigue related incident is preceded by a fatigue-related error. In turn, a fatigue-related error is generally preceded by fatigue-related behaviours. Fatigue related behaviours or symptoms in turn indicate that an employee has either not had adequate sleep (not enough or not enough good sleep), or has been awake for an excessive period of time. Finally inadequate sleep or excessive time awake may occur as a result of inadequate sleep opportunity (i.e., too short a break between work shifts).

(4) There are five major levels of control for managing fatigue risk:

(a) *Level 1 (organizational)*: making sure scheduling give employees adequate opportunity to sleep;

(b) *Level 2 (individual)*: making sure employees actually get sufficient sleep;

(c) *Level 3 (behavioural)*: monitoring for symptoms that indicate employees are fatigued;

(d) *Level 4 (error)*: strategies to ensure that fatigue in the workplace does not result in errors or incidents;

(e) *Level 5 (incident)*: determining the role of fatigue in workplace errors or incidents.

(5) A successful FRMS addresses each of these levels by organizing defence systems around these layers. Most fatigue countermeasures (either formal or informal) can be assigned to one of the five defensive layers. The FRMS should be developed and implemented using a risk-based approach. Organizations should determine the specific level of fatigue-related risk associated with their operations. Organizational risk should be assessed in terms of the type of work being conducted as well as the environment in which the work takes place. After identifying high-risk areas for fatigue within the workplace (by work group or by specific tasks), systems can be put in place to either reduce or eliminate fatigue through processes such as schedule reform (fatigue reduction) or through the implementation of mitigating strategies such as napping and task rotation (fatigue proofing).

(6) TCCA's FRMS toolbox provides mechanisms for addressing all levels in the error trajectory.

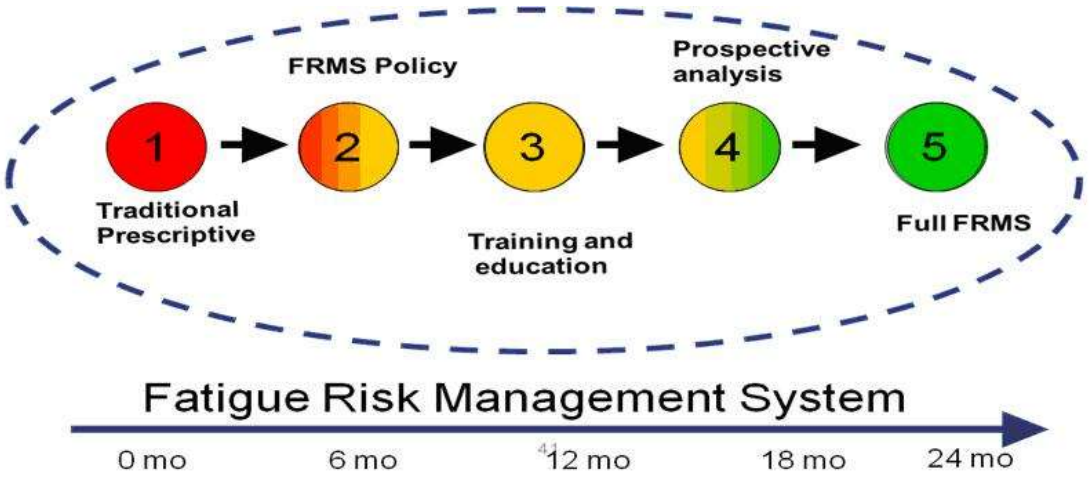
3.3 Using the Fatigue Risk Management System Toolbox

The FRMS toolbox is designed for use in the development and implementation of an organization's FRMS and should be used, in conjunction with existing Safety Management System(SMS) components, to maintain the FRMS. The FRMS is integral to an organization's SMS, as such some certificate holders may already have many of the components and elements required for a FRMS. TCCA's SI SUR-007—*Fatigue Risk Management System Assessment Guide* and gap analysis tool can be used to assess what you have and what you need to develop to implement an effective FRMS.

3.4 Getting Started

(1) Read the FRMS toolbox materials to familiarize yourself with the contents. TP 14572E— *Fatigue Risk Management System for the Canadian Aviation Industry: An Introduction to Managing Fatigue* is a good place to start as it explains the basic concepts of fatigue and the FRMS.

(2) Conduct a gap analysis of your existing systems based on the *TCCA's FRMS assessment guide* (SI SUR-007) and the gap analysis tool (appendix A of this document). Once you have determined what you have and what you need to implement to complete your FRMS, develop a project plan to close the gaps. The diagram below demonstrates one approach to implementation.



(3) The next step is to develop your fatigue policy. TP 14576—*Policies and Procedures Development Guidelines* can help. This document will give you all the information you need to develop effective policies and procedures relating to the management of fatigue. The aim of implementing a FRMS is to institute a change in organizational culture that results in enhanced flight safety and a safer working environment. It is essential that organizations do not simply paraphrase generic FRMS policy statements but take the time to write their own. FRMS documentation should be used as the primary means of communicating to employees the FRMS policies and procedures to be followed as part of regular operations.

(4) TP 14575—*Developing and Implementing a Fatigue Risk Management System* contains information that will help you formulate what components and elements are required to manage fatigue within your organization.

(5) Implementing a FRMS does not mean you need to create another set of documents. Some aspects of the policy may already be covered in your SMS documentation. If this is the case, just cross-reference or copy the information in your FRMS documentation.

(6) The adoption of a FRMS approach to managing flight safety risks resulting from fatigue, involves an obligation on the part of the employer to do everything they can to minimise fatigue. It also requires a commitment on the part of the employee to do their part. Often times fatigue isn't seen as a threat to flight safety particularly when the "fatigue" impaired individual isn't working in an environment where a fatigue related error can lead immediately to a catastrophe. The link between fatigue and performance degradation has to be clearly understood and taken seriously. Education and awareness training relating to fatigue will help build this realization.

(7) The CARs require that all employees receive fatigue awareness training. This can be accomplished in many ways; the FRMS toolbox provides two acceptable methods of compliance. TP 14573—*Fatigue Management Strategies for Employees* can be used in conjunction with TP 14574—*Employee Training Assessment to enhance to employees' knowledge of fatigue and assess learning*. TP 14578—*Trainer's Handbook* provides trainers with the tools and strategies necessary to prepare and deliver the face-to-face component of the employee training. Alternately, TCCA has developed an on-line web based version of the paper based training tools. This can be made available on request. Contact CAIRS_NCR@tc.gc.ca.

(8) The final step in implementation will involve a prospective analysis of work schedules to determine if they might contribute to fatigue. TP 14573—*Fatigue Management Strategies for Employees* as well as TP 14575—*Developing and Implementing a Fatigue Risk Management System* offer various methods for assessing whether or not schedules offer adequate sleep opportunity.

(9) Alternately, TCCA has negotiated a trial period usage of six months with InterDynamics Pty Ltd to utilise their electronic database system to proactively assess your work schedules. FAID® Version 2 automates the paper-based methods found in TP 14573 and may simplify the process in larger organizations. Organizations interested in utilizing this program should contact InterDynamics Pty Ltd directly at enquire@interdynamics.com. Please reference TCCA's FRMS process when seeking permission to use the FAID® Version 2.0 for your FRMS project.

4.0 SMALL OPERATORS

(1) A FRMS can be implemented in any organization regardless of size. As with all management systems it must be tailored to meet the size and complexity of the organization and must consider the operating environment. For example, a requirement of the FRMS approach is to proactively consider risks associated with specific work schedules. If you are an organization that runs an 8-hour day shift schedule, with none or very little overtime, the requirement to analyze your schedule is probably less critical than the other aspects of fatigue management.

(2) There is probably very little chance that your employees are fatigued due to excessive hours of work. This doesn't mean that fatigue is not present in the workplace as other non work-related factors such as sleep disorders, family responsibilities, social and leisure engagements, and emotional stress—can all affect the amount and quality of sleep people obtain. These factors can also affect the length of time individuals are awake, which can also affect fatigue.

(3) The other elements of the fatigue management toolbox should be applied to offset these issues and to ensure that employees are fit for work, understand the impact fatigue and can report fatigue related issues to an appropriate manager. You should also consider these requirements in

respect to operating environment and may choose to adopt a program focused on addressing those fatigue related issues specific to your organization.

(4) In very small organizations, the components of the FRMS toolbox may appear too complex. In these circumstances, organizations should develop fatigue risk management principles that follow the basic components and elements of FRMS. TCCA's FRMS Assessment Guide (SI SUR-007) can be used to interpret the expectations for a compliant and effective FRMS. The components and elements are shown below in Table 1.

5.0 IMPLEMENTATION OF FATIGUE RISK MANAGEMENT SYSTEM FOR CERTIFICATE HOLDERS AS MENTIONNED IN SUBPART 573 OF THE CARS

(1) For a FRMS to be effective, the components and elements must be integrated into the organization's overarching SMS. Fatigue must be considered when considering contributing factors to all incidents and must be viewed as a hazard that should be managed appropriately. In keeping with this philosophy and to establish the FRMS as an integral part of the SMS, TCCA will be introducing the CARs requirements through a phased-in implementation process similar to that applied to the implementation of the SMS requirements. The regulatory implementation schedule shown in Table 1 highlights the proposed phases.

(2) Approved Maintenance Organizations (AMOs) with ratings to work on aircraft operated in Subpart 705 of the CARs that have already implemented a SMS, will be offered the opportunity to participate in the phased in approach to implementation. They will be required to meet the phase 1-3 requirements within the established timeframe. AMOs choosing not to accept this option will be required to demonstrate compliance upon publication of the regulatory requirements.

(3) For additional information concerning the CARs FRMS requirements please refer to NPA 2004-047 and NPA 2004-049.

(4) The following table highlights when each component and element of the FRMS is required.

Table 1—FRMS Framework

Component	Requirement/Element	Phase	TP Ref.
Fatigue Risk Management System	Compliance Document, Gap Analysis, Project Plan	1	
1. Fatigue Risk Management Plan	1.1 Fatigue Risk Management Policy	2	14572, 14575, 14576
	1.2 Roles, Responsibilities & Employee Involvement	2	14572, 14575, 14576
	1.3 Communication & Consultation	2	14572, 14575, 14576
2. Fatigue Risk Management Oversight	2.1 Hazard Identification & Reporting Processes	2,3	14575
	2.2Investigation and Analysis	2,3	14575

	2.3Risk Management	2	14575
3. Fatigue Risk Management Controls	3.1 Work Hours & Sleep Opportunity	3	14575
	3.2 Personal Fitness for Duty—Prior Sleep and Wake	3	14575
	3.3 Personal Fitness for Duty—Symptoms and Behaviours	3	14575
	3.4 Fatigue Proofing Strategies	3	14575
4. Training	4.1 Training, Awareness and Competence	2,3	14573, 14574, 14578
5. Documentation	5.1 Identification and Maintenance of Applicable Regulations	2**	
	5.2 FRMS Documentation	2**	14575, 14576
	5.3 Records Management	2**	

***** The Document Management and Training components are common to all phases and are implemented as they apply to the other components or elements in that phase.***

6.0 CONCLUSION

(1) Fatigue is widely recognized as a significant safety hazard, not just to the individual and other coworkers, but also to the general public. That's why TCCA commissioned a set of tools and guidelines to help the Canadian aviation industry set up a FRMS.

(2) FRMS recognize that it's everyone's responsibility to manage fatigue risk. TCCA’s FRMS toolbox has been developed with these principles in mind. This approach has been successfully utilised in multiple industries to manage fatigue related hazards and has been successfully implemented in the civil aviation environment.

(3) TCCA’s FRMS toolbox provides a wealth of information concerning fatigue and the management of fatigue and can be applied in any organization. The toolbox is intended to help you build effective fatigue risk management policies and procedures tailored to your specific operational requirements.

7.0 CONTACT OFFICE

For more information, please contact the:

Technical Program Evaluation and Coordination Division **(AARTT)**

Phone: **613-952-7974**
Fax: **613-952-3298**
E-mail: **CAIRS_NCR@tc.gc.ca**

Suggestions for amendment to this document are invited, and should be submitted via the Transport Canada Civil Aviation Issues Reporting System (CAIRS) at the following e-mail address: CAIRS_NCR@tc.gc.ca (or Internet address: http://www.tc.gc.ca/CAIRS).

[Original signed by Jacqueline Booth]

Jacqueline Booth
A/Director, Standards
Civil Aviation
Transport Canada

APPENDIX A— FATIGUE RISK MANAGEMENT GAP ANALYSIS TOOL

FATIGUE RISK MANAGEMENT REQUIREMENT		RESPONSE YES/NO	**If yes, state where the requirement is addressed, If no, record SMS processes that need further development**
Component	0. Fatigue Risk Management System		
Element			
The organisation has a FRMS, which has defined components that are established, maintained and adhered to. The FRMS management system is appropriate to the size and complexity of the organisation			
Component	1. Fatigue Risk Management Plan		
Element	1.1 Fatigue Risk Management Policy		
A fatigue risk management policy is in existence and appropriate to the size and complexity of the organisation. The organisation has based its fatigue risk management system on the fatigue risk management policy. The fatigue risk management policy is approved by the accountable executive The fatigue risk management policy is promoted by the accountable executive The fatigue risk management policy is reviewed periodically The fatigue risk management policy is communicated to all employees with the intent that they are made aware of their individual safety obligations. There is a clear declaration of commitment to managing fatigue-related risk.			

The fatigue risk management policy states the organisation's intentions, management principles and commitment to continuous improvement in managing fatigue-related risk. Senior Management have a clear commitment to managing fatigue-related risk and demonstrates it through active and visible participation in the fatigue risk management system. Personnel at all levels are involved in the establishment and maintenance of the fatigue risk management system. The policy is implemented at all levels of the organisation. The policy is clearly visible to all personnel and particularly throughout the safety critical areas of the organisation.			
Element	1.2 Roles, Responsibilities and Employee Involvement		
A person has been appointed to manage the operation of the FRMS. The person managing the operation of the FRMS fulfils the required job functions and responsibilities. Fatigue risk management authorities, responsibilities and accountabilities are promulgated to all personnel in key documentation and communication media. Fatigue risk management authorities, responsibilities and accountabilities of personnel and partners at all levels of the organisation are defined and documented. The role of the Certificate Holders, Applicant and Delegate should also be defined where applicable. There are documented organisational diagrams, including names, positions, specific FRMS responsibilities and duties and job descriptions. Fatigue risk management imperatives are clearly described in senior management duties and responsibilities. Evidence that FRMS procedures have penetrated all levels of the organisation.			

All personnel understand their authorities, responsibilities and accountabilities in regards to all fatigue risk management processes, decisions and actions.			
Element	1.3 Communication and Consultation		
There are communication processes in place within the organisation that permit the FRMS to function effectively. Communication processes (written, meetings, electronic, etc.) are commensurate with the size and scope of the organisation. Information is established and maintained in a suitable medium that provides direction in related documents. There is a process for the dissemination of fatigue risk management information throughout the organisation and a means of monitoring the effectiveness of this process.			
Component	2. Fatigue Risk Management Controls		
Element	2.1 Work Hours & Sleep Opportunity		
Work scheduled and rosters are planned and recorded for easy access by the organisation, employees and TC. Controlled copies are kept on file in chronological date order by the accountable executive. Actual work hours are recorded and are easily accessible by the organisation, employees and TC. They are simply coded for ease of understanding. Records should include the employee name, type of work being performed (e.g. trip log, type of maintenance duties, etc.), start and finish time of shift, and the date. Controlled copies of actual work hours are kept on file in chronological order by the accountable executive. The organisation has a validated process or system for ensuring that both planned and actual work hours provide sufficient sleep opportunity for employees. All planned work schedules and rosters are analysed for sleep opportunity prior to			

releasing them to employees A sample of worst-case actual work hours are analysed for sleep opportunity at minimum on a monthly basis[1]. Reporting systems and required actions upon discovering insufficient sleep opportunity within a given roster are clearly defined[2]. All analyses are documented, reported and kept on file in chronological order for review by the organisation, employees and TC. Employees are provided with guidelines of what they are expected to do if their shift runs over their rostered period to ensure they still obtain sufficient sleep opportunity. The process or system for assessing sleep opportunity is reviewed on a regular basis to ensure it is operating effectively.		
Element	2.2 Personal Fitness for Duty—Prior Sleep and Wake	
The organisation has a set of validated parameters defining minimum sleep and maximum wake thresholds required for the average employee to be considered fit for work.		

[1] The most extreme work hours should be selected and analysed using fatigue modelling software. Examples of extreme work hours would include long work shifts, more than 2 night shifts worked in a row, more than 2 early morning starts in a row, breaks of 12 hours or less between shifts, long blocks of shifts and few days off. If these analyses indicate that sufficient sleep opportunity was provided, with a fatigue score within an appropriate pre-defined range, it can be assumed that the remainder of work shifts will also be compliant. If any of the analyses indicate insufficient sleep opportunity was provided, the organisation should have documented actions to prevent reoccurrence, and further analyses of other recorded work hours should be undertaken to determine the extent of the problem.

[2] For example, if an analysis of planned rosters indicates the employee (s) will receive insufficient sleep opportunity, there should be a clear process to report the analysis results, and documented actions to either manage the risk of elevated fatigue likelihood, or to change the roster to ensure the employee (s) does get sufficient sleep opportunity. Similarly, if retrospective analysis of work hours indicates an employee (s) received insufficient sleep opportunity, there should be a clear process to document the results, and take action to prevent the likelihood of reoccurrence.

There is evidence of employee consultation during the development and review of these parameters The prior sleep and wake thresholds are reviewed periodically to determine whether they are effective. Reporting procedures are clearly defined for occasions when employees obtain insufficient sleep or experience extended wakefulness. Employees are provided with guidelines of what they are expected to do in these circumstances. Prior sleep and wake data is taken into account during the FRMS review and audit process. Reports of insufficient sleep are dealt with in a just manner.			
Element	2.3 Personal Fitness for Duty—Symptoms and Behaviours		
The organisation has provided easy reference tools for employees to assess fatigue-related symptoms and behaviours. Reporting procedures and required actions are clearly defined for occasions when employees exhibit fatigue-related symptoms, or observe fatigue-related symptoms in a colleague. Reports of fatigue-related symptoms and behaviours are dealt with in a just manner. Fatigue-related symptom and behaviour data is collected from employees on a periodic basis for review and audit purposes			

Element	2.4 Fatigue Proofing Strategies		
The organisation has a set of clearly defined fatigue proofing strategies for use by employees when experiencing mild or moderate levels of fatigue. There is evidence of employee consultation in defining the use of fatigue proofing strategies. The availability of fatigue proofing strategies is decided using a risk-based process. Employees receive competency-based training about the use and application of fatigue proofing strategies. Fatigue proofing strategies are periodically reviewed to determine their effectiveness.			
Component	3. Safety Oversight		
Element	3.1 Hazard Identification & Reporting Processes		
The FRMS reporting system is non-punitive. Employees are promoted to report any fatigue-related hazard or event without fear of unfair retribution. The organisation has a process or system that provides for the capture of fatigue-related information including fatigue-related hazards, fatigue occurrences, incidents, accidents or other data relevant to the FRMS. The reporting system is simple, accessible and commensurate with the size of the organisation. Reports are reviewed at the appropriate level of management. There is a feedback process to notify contributors that their reports have been received and to share the results of the analysis. There is a process in place to monitor and analyse trends documented. The organisation has planned self-evaluation processes, such as regularly scheduled			

reviews, evaluations, surveys, operational audits and assessments. The organisation has identified primary sources of information for fatigue risk assessment, including reports from employees, accident and incident data, performance on flight data monitoring programs (FDM) or Line Operations Safety Audits (LOSA), reports of fatigue-related symptoms and behaviours, individual sleep and wake data from employees, and analysis of rosters and actual work hours. The organisation has documented corrective and preventative actions to respond to event analysis. There are data collection processes throughout the safety critical areas of the organisation to permit organisation wide analysis of fatigue risk management issues. There is a process in place to investigate and analyse reported events. Corrective and preventative actions are generated in response to hazard and event analysis. The organisation conducts formal hazard analyses for: Introduction of new shift/roster systems; Introduction of new long range or ultra long range operations; Long duty hours for maintenance personnel; Changes in manning for high-risk tasks; Any work being performed between 2100h and 0600h.		
Element	3.2 Investigation and Analysis	
There are procedures in place for the conduct of investigations (Part V & VII only) Measures exist that ensure all reported occurrences and deficiencies are investigated. There is a process to ensure that occurrences and deficiencies reported are analysed to identify contributing and root causes Corrective and preventative actions are generated in response to event investigation		

and analysis. The organisation has a staff of technically competent investigators commensurate with the size and complexity of its operation. When identifying contributing and root causes, the organisation considers multiple aspects of how fatigue may have been related. Results of the analysis are communicated to the responsible manager for corrective/preventative action and to other relevant managers for their information. All reactive reports are subjected to a risk analysis process to determine the extent and priority of further action. Responsibility and timelines are established for each corrective action.		
Element	3.3 Risk Management	
There is a structured process for the assessment of fatigue-related risk associated with identified hazards, expressed in terms of severity, level of exposure and probability of occurrence. There are criteria for evaluating fatigue-related risk and the tolerable level of risk the organisation is willing to accept. The organisation has risk control strategies that include corrective/preventative action plans to prevent recurrence of reported occurrences and deficiencies. The organisation has a process for evaluating the effectiveness of the corrective/preventive measures that have been developed. Corrective/preventive actions, including timelines, are documented. There is a fatigue risk classification system that guides the organisation in developing fatigue related risk control strategies The organisation uses its fatigue risk assessment results to develop best practice guidelines that it shares with the industry. The results of the fatigue risk assessment program are built into the organisation's		

methods and procedures. The organisation is able to demonstrate the fatigue risk management process through records and is able to show periodic review documentation.			
Component	4. Training		
Element	4.1 Training, Awareness and Competence		
The organisation has a Fatigue Risk Awareness training program in place that covers: A basic overview of sleep, why we need it, and what happens if we don't get it; Definition of fatigue and fatigue-related risk; Examples of the consequences of fatigue, including performance, health and lifestyle factors; An overview of the reasons why fatigue-related risk needs to be managed—including legal liabilities; Personal fatigue risk management strategies—such as sleep hygiene, lifestyle, diet, stimulants, exercise and relaxation. The organisation has a competency-based Fatigue Risk Management training program in place that covers: A synopsis of the information covered in fatigue risk awareness training; An overview of the organisation's FRMS; Organisational and individual responsibilities in managing fatigue-related risk; A detailed explanation of each of the FRMS controls and management strategies; Fatigue-Reporting systems and expectations; Fatigue-risk management problem shooting. There is a documented process to identify training requirements so that personnel are competent to manage fatigue related risk.			

There is a validation process that measures the effectiveness of training The training includes initial, recurrent and update training as applicable. The organisation's fatigue risk management training is incorporated into indoctrination training upon employment. Training includes human and organisational factors.			
Component	5. Documentation		
Element	5.1 Identification and Maintenance of Applicable Regulations		
A documented procedure has been established and maintained for identifying applicable fatigue-related regulatory requirements (parts VI, VII only) Fatigue-related regulations, standards, exemptions and labour laws are periodically reviewed to ensure that the most current information is available (parts VI, VII only).			
Element	5.2 FRMS Documentation		
There is consolidated documentation that describes the FRMS and the interrelationship between all of its elements. This information resides or is incorporated by reference into approved documentation, such as the Design Approval Procedures Manual, Engineering Procedures Manual, Organisation Operations Manual, Maintenance Control Manual, as applicable, and where these approved documents are not required by regulation, the organisation includes the information in a separate, controlled document. Manuals or controlled electronic media are used to document the system. The consolidated documentation is readily accessible by personnel. There is a process to periodically review FRMS documentation to ensure its continuing suitability, adequacy and effectiveness, and that changes to organisational documentation have been implemented. Documentation reflects functional coordination within the management system that			

ensures the organisation works as a system and not as a group of separate or fragmented units.			
Element	5.3 Records Management		
The organisation has a records system that ensures the generation and retention of all records necessary to document and support FRMS requirements, and is in accordance with applicable regulatory requirements. The system shall provide the control processes necessary to ensure appropriate identification, legibility, storage, protection, archiving, retrieval, retention time, and disposition of records. Master copies of current FRMS policy and procedures documents contain a page with signatures of all relevant personnel stating they have read and understood the document.			