CAA Fatigue Workshop 29/30 June 2006

- Workshop notes
- Identification of fatigue issues
- Recommended solutions

Prepared by: Dave Park (Workshop Chairman)

29 September 2006
CWA Fatigue Management Workshop

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9.4 Fatigue issues and recommended solutions identified in Engineering and ATS

10. References
1. **The aim of the workshop**

To identify issues using fatigue management professionals and technical subject matter experts to review fatigue management in various aviation sectors and identify where regulatory or educational gaps exist and to workshop appropriate methods of solution.

2. **The CAA Sponsor**

- Tim Allen – GM Airline Operations CAA

3. **The panel:**

- Dave Park (Chair) – Independent aviation consultant, experience in Flight Operations Management.
- Prof. Philippa Gander – Director Massey Uni. Sleep/Wake Research Centre, wide research experience in fatigue/sleep issues, member ICAO fatigue management subgroup.
- Greg Fallow – B777 Captain, NZALPA/IFALPA fatigue SME, member ICAO fatigue management subgroup
- David Powell – Air NZ PMO – crew alertness study, commercial helicopter pilot licence

4. **Attendees:**

- Tim Allen, General Manager Airlines CAA
- John Lanham, General Manager General Aviation, CAA
- Peter Blackler – Manager Rules Technical CAA
- Andy Slater – Manager Rules Development CAA
- Jeff Rees – Flight Ops Inspector CAA
- Mike Haines – Rules Technical Specialist
- Bob Gilbert – Flight Ops Inspector Part 121/125 CAA
- Ken Wells – Flight Ops Inspector Rotary wing CAA
- John Bushell – Airworthiness Coordinator CAA
- Merv Falconer – Manager General Aviation- Fixed Wing
- Rex Kenny – Manager Sports and Recreation Flying
- Chris Kemp – Flight Ops Inspector Part 121/125 CAA
- Alan Roberts – Aeronautical Services Officer
- Nick Taylor Principal Advisor Safety and Security MOT
- Shane Carroll – ATC NZALPA Representative
- Janet Lammas – Health and Safety Inspector CAA
5. Opening remarks:

5.1 Tim Allen
- Findings from ICAO audit – lack of regulation of Cabin Crew fatigue
- Identify where the gaps are in fatigue regulation
- Need for an independent review
- Develop basic solutions
- Importance of ICAO alignment

5.2 John Lanham
- Large scale of general aviation (GA) in NZ
- Diversity of aircraft types and types of operation
- Largest commercial parachuting operation in the world
- Impact of technology on sport aircraft performance
- Lack of regulation of many commercial participants

5.3 ICAO Subgroup activity – Greg Fallow/Philippa Gander
- ICAO Annex dealing with limits for flight time, flight duty periods and rest periods is very dated
- The ICAO Operations Panel (OPSP) was tasked with providing the Air Navigation Commission (ANC) with updated proposals for amending Annex 6. The proposals submitted to the ANC were referred back to the OPSP for further work by industry group of specialists, and the original ANC task “to review available information from States relating to objective fatigue indices for flight crew, and develop proposals for Annex 6 SARPs and guidance material concerning limits for flight time, flight duty periods and rest periods for flight crew members” was further extended to include fatigue risk management regulations.
- A specialist Flight Time Limitations Sub Group (FTLSG) reviewed and revised the text of the original OPSP draft proposal dealing with prescriptive regulations for fatigue management from a scientific perspective. The work of the subgroup was recently accepted by OPSP after minor amendment and the revised proposals and recommendations will be considered again by the ANC later this year.
- Subject to final approval of the ANC, the revision to Annex 6 regarding flight times, duty periods, flight duty periods and rest periods for fatigue management should come into effect by the end of 2007.
- The FTLSG has now been reconstituted as the Fatigue Risk Management Sub Group (FRMSG) to carry out the second part of the ANC task relating to fatigue risk management regulations. A review of FRM processes, as developed by some operators in different countries, and regulatory approaches being developed by some States were discussed at a 3 day workshop in Seattle in June 2006. The FRMSG is currently drafting
proposals for consideration by OPSP on guidance material for fatigue risk management regulations to complete the second part of the task assigned by the ANC.

- The FRMS model developed at the last ULR Workshop has been as a starting point for developing an ICAO FRMS standard.
- Issue is how to put requirements into practice – prescriptive schemes or fatigue risk management systems (FRMS).¹
- Level of information required to develop a FRMS is very high
- CASA activity on hold due reorganisations
- Qantas has done a lot of research but has not implemented an FRMS as yet.
- ICAO initiatives do not include Engineers or ATS controllers
- NZ OSH rules include fatigue as a workplace hazard. Australia is also similar in this respect
- Current position is that States would have FRMS in addition to flight and duty time regulations, not FRMS as their only regulatory approach.

¹ A FRMS can be developed within a prescriptive regulatory approved scheme which is the current situation within Air NZ.
6. CAA Presentations

6.1 Chris Kemp:

(Part 121 operations) (see also handout reference 18)

- Fatigue management systems (FMS) vary between operators
- Some NZ operators have adopted UK CAP 371
- No consistency, operators all different also huge variation in operations, aircraft types and levels of automation
- No discretionary reports as required under CAP 371 so little feedback
- Issue of office hours of management pilots and also training pilots hours
- ULR operations coming up with B787
- Lack of limits on Part 91 business jet operations
- Swapping of operations between rule parts e.g. 121 to 91 to avoid limits
- 10 hours of rest often not adequate
- Commute time to get to work affecting fatigue
- Need for sector limits
- No provision in rules/AC to apply for variations for specific routes
- Lack of ability to provide controlled rest on flight deck, as under JAR.
- Minimum requirement will tend to become the maximum operators want to comply with
- Difficult for regulator to assess the effectiveness of diverse schemes.

6.2 Bob Gilbert:

(Part 121/125 operations)

- Excessive duty times on business jet operation
- Need for suitable definition of local night
- Adequate rest is the issue, not so much duty time
- Must have sensible crew scheduling
- Deadheading must be considered
- 5-6 sectors per day is realistic limit for domestic operations and 2 sectors trans-Tasman
- Issue with (lack of) reporting of exceedances
- Sector limits should relate to duty time
- Differences in daylight savings (local time) can cause flights to fall outside limits (e.g. NZ- Brisbane services).
- Affect of arduous duties/difficult airports e.g. Rotorua and Queenstown.
- Tendency of operators to now schedule more “red eye” flights
- Cabin crew should have the similar duty time limits to pilots.
- Scheduling of short aircraft turn arounds aggravates fatigue situation.
- (Lack of) fatigue reports, often verbal, no formal monitoring of use/reporting of discretion
• In Bob’s opinion some operations appear to work really well, e.g. night freighters when crew always work nights.

**General discussion**

• Agreed that cabin crew must have FMS, with flight time and duty limits similar to those of flight crew
• Agreed that persons doing crew scheduling must be trained in fatigue management and recognise fatigue issues when preparing crew schedules
• Agreed on the need to accommodate a diversity of different operations in a FMS (short haul high sectors, ULR, day/night, time zone transitions etc.)
• Agreed effective reporting systems are needed
• Agreed current accident/serious incidents investigation procedures in NZ do not adequately address identifying fatigue as a causal factor – Transport Canada has excellent model to assist
• Updated guidance material is essential to enable operators to develop their own schemes and avoid a reversion to the previous situation where the Director became involved in setting rules based on industrial negotiations, per the old CASO 3
• New draft AC (references 7 to 12) have been developed to replace AC119-2 and 119-3. These draft AC need to be reviewed and updated
• Agreed that there is a need to educate CAA staff on how to assess the effectiveness of FMS proposals (approval and audit).

6.3 **Mike Haines**

(ULR operations) (See also Power Point presentation reference 16):

• General acceptance of definition of ULR being flights of 16 or more hours.
• Lack of research on impacts on Cabin Crew
• Low cabin humidity is an issue
• Importance of quality of Cabin Crew in flight rest facilities – often much less comfortable than flight crew rest facility.
• Fatigue is a latent failure (can also be active failure)
• FRMS needs to be comprehensive and include both ground and air personnel.

**General discussion**

• Agreed ULR operations are not adequately covered by a prescriptive FMS – a comprehensive fatigue risk management system (FMRS) is essential for ULR
• Extended diversion time rule is currently under development in CAA. May be premature to include fatigue in this rule as fatigue issues are still evolving
• Flight Safety Foundation (FSF) document (reference 5) provides excellent industry guidance
• Issue of foreign operators operating ULR into NZ was raised, what controls could apply to these operators? Could be a checklist item in approving a foreign operator under Part 129
• Design of crew rest facilities is very important

6.4 John Lanham:
(General Aviation)
• GA includes all aircraft with 9 or fewer seats, all agricultural aircraft, all helicopters and all sport and recreation aircraft
• Technology has driven a lot of changes in recreational aviation
• Large scale of adventure aviation in NZ – the largest commercial parachuting operation in the world is at Taupo.
• Manned balloons are now capable of carrying 20+ passengers and 50+ passengers balloons are likely in the near future.
• Amateur built aircraft are now capable of speeds up to 250kts at heights up to 25,000ft.
• Many GA commercial operations are not certificated, only need a commercial pilot’s licence
• Adventure Aviation (Part 115) rules are under way but currently there is no consideration of fatigue management included

6.5 Merv Falconer:
(Part 135 fixed wing)
• Responsible for aircraft with 9 or less passenger seats and below 5700kg maximum certificated takeoff weight (MCTOW), also single engine IFR currently using aircraft up to 14 passenger seats.
• Much of Rule Part 135 subpart K (fatigue of flight crew) does not affect GA
• Crews want a FMS that balances work, days off, rest etc. Companies want to maximise crew utilisation.
• Most GA FMS follow the old CASO 3
• Part 135 operations include air transport ops, commercial transport ops (remote locations), IFR and VFR ops, ops on land, sea and snow but mostly consist of scheduled and charter freight and passenger operations.
• All types of operations should come under a FMS, not just certificated operations.
• The existing Part 135 fatigue of flight crew rules are reasonable, as are the associated AC. CAA is generally comfortable with the way the fatigue rules are working in Part 135 air transport operations although there is no certainty operators are conforming as there is a lack of pilot reports
• Many pilots are fearful of reporting due to possibility of employment repercussions. A confidential reporting system would help
• Operators operating 24/7 struggle to come up with adequate schemes.
• There is a difficulty with rules 135.803(a)(4) and (b) and also with 135.805(a). Rules are intended to give flexibility to fly on good weather days and have bad days off, however could fly 12 days in a row and there are no daily flight time limits under Part 135 subpart K (135K).
• There is an issue with (lack of) rest period prior to day off, split duties and suitable rest facilities.
• Tendency for air ambulance operators to use emergency flight provisions in rules to get around F&D limits.
• Recommends any changes are a simple as possible and avoid providing too much discretion.
• CAA could do with more guidance in assessing operators’ FMS.
• Concern over classification of operations and definitions e.g. bizjet - hire and reward operations or Part 91?, “cost share” schemes, definitions of “crew member”
• Recommended that there should be a generic rule in Part 91 that requires private owners, corporate aircraft etc. that operate under Part 91 to address fatigue issues. This could be a requirement for a flight and duty scheme if the pilots and aircraft are going to be flown more than a certain number of hours in any day.

6.6 Ken Wells
(Part 135 rotary wing operations)

• Rules overlook other crew e.g. helicopter winch operators.
• Rotary wing covers ATO and CTO. Existing 135K fatigue rules in CTO are very lax.
• 80% of ATO’s adopt the AC119-2 scheme but it does not adequately address some features of their operations e.g. split shifts, management, and other duties.
• CTO FMS requirements (lack of) are the big issue – some operations under CAA jurisdiction are very remote e.g. Antarctica and Laos. No reason why CTO F&D requirements should be different from ATO.
• “Emergency operations” are a major concern, especially days off which may be a day off flying but full of other fatiguing duties.
• Section 13 of the CAA Act would be the best way to manage emergency operations rather than the “emergency operation” exclusion provisions of Part 135 which are currently used. S13 is much more stringent in its definition of emergency operations and the associated requirements.
• Feature of emergency services flying is long duty periods with low flying hours. Boredom can be a problem, and also use of mission equipment such as night vision equipment which can be very tiring to use.
• Rotary wing agricultural operations have no F&D limits at all. One pilot has reputedly worked up to 55 days with no day off. 10% are doing up to 1500-1600 flying hours per year. Even loader drivers are dodging transport driver time limits.
- Off shore helicopter flying is generally well regulated e.g. Shell Oil off shore work is regulated by Shell Company limits.
- Multiple types of operations cause problems e.g. pilots having to fly ATO by day and then do frost protection work under Part 91 at night.
- Many pilots are paid by the hours flown, encouraging high hours
- Need for training for CAA staff in assessing FMS proposals, particularly composite schemes.

6.7 **Rex Kenny:**

(Adventure and recreational aviation)

- Covers Warbirds, manned balloons, parachuting, paragliding, amateur built aircraft.
- There is a big public demand for this type of flying in NZ, combination of scenery and interesting aircraft. NZ is becoming the adventure aviation capital of the world.
- Move to manage risk of adventure aviation by requiring certification of operators under new Part 115.
- Some sectors are very safe e.g. tandem parachuting has had only one fatality since starting – attributed to a very strong organising body.
- However there is a need to consider fatigue – the operations are seasonal and generally weather dependent resulting in a lot of flying when conditions are good.
- Some pilots don’t take breaks provided e.g. doing their own recreational jumps during lunch breaks from instructing jumps.
- Some operations are very physical e.g. paraglider retrieval and hot air balloon setting up.
- Unmanned air vehicles are likely to be operating in the near future e.g. mussel farm surveillance.
- May also be other “fit to fly” factors such as drug use and “party culture”, especially with younger pilots in locations such as Queenstown.
- Risk of very adverse impact of a bad accident on NZ’s tourist reputation.
- Feature of much of adventure aviation is the lack of cross checks and backup systems e.g. not strapping a passenger into a paraglider is likely to be fatal.
- An AC is being prepared for hang gliding that will include the best operational practice including OSH obligations. Will be extended to paragliding later.

**General discussion of GA fatigue issues**

- Agreed the fatigue issues in GA require addressing.
- Serious concerns about the lack of effective controls on the large numbers of GA operations that do not require certification.
• Role of OSH should not be overlooked, fatigue is a workplace hazard and under OSH legislation must be managed. CAA has the delegated OSH responsibility for crew when flying
• Some definitions need to be reviewed or new ones introduced e.g. definition of passenger
• Business jet issues need to be resolved. These are more than just fatigue issues, many “Part 91” biz jet operations are simply shams
• As with Part 121/125 identification of fatigue as a causal factor is not adequately addressed
• Real concerns about pilots performing mixed types of operations
• Part 141 certification will be extended to include Flight training organisations and this will include a requirement for FMS
• Existing AC119-2 is not an acceptable means of compliance under all circumstances and CAA has the ability to require an operator to develop a more suitable scheme
• There is a lack of good data to develop FMS for Part 137 agricultural operations and uncertificated GA operations
• The Part 115 adventure aviation rule will be modelled on Part 119, with requirements for management systems, training and will include FMS requirements
• Agreed the development of AC guidance on fatigue management for hang gliding (and later paragliding and ballooning) will be very worthwhile

6.8 John Bushell:
(Maintenance engineers)
• Little work has been done on fatigue management of engineers
• Existing engineer duty time requirements are being moved from Part 135 to Part 43 but are still very lax and do not have any recognition of night work
• There is a general shortage of engineers and this results in very long hours being worked by some
• The charge out rates for some maintenance shops are very low resulting in low profits and difficulty attracting staff
• There is a very useful UKCAA publication on human factors in aircraft maintenance (reference 15).
• CAANZ (Owen Walker) has done workshops for industry on human factors and these have been very popular. This format could be also be used for providing fatigue management education.
• OSH inspectors don’t appear to be visiting aircraft maintenance organisations.
• Engineers licensing exam includes a human factors paper but it is very basic and needs overhaul and update
• Many maintenance organisations are not certificated under CAA rule Part 145. This is only required if maintaining aircraft over 5700kg MCTOW.
For this reason many GA aircraft are not maintained by a Part 145 certificated organisation instead being maintained by engineers using their Part 66 licences and working under Part 43 maintenance requirements.

- CAA inspectors auditing these “Part 43” maintenance shops usually ask if any fatigue reports have been made, but there are seldom any.

General discussion
- Generally agreed that the existing engineer duty time rules are very inadequate and would be difficult to defend under the OSH requirement for an employer to take “all practicable steps” to manage fatigue-related safety risk.
- MOU between CAA and OSH provides for agencies to work together e.g. CAA can feed back information discovered during audits to OSH in relation to maintenance organisations
- Existing human factors workshop material should be incorporated into an AC including any relevant material from UK CAA CAP715
- The existing OSH workplace stress and fatigue management document is not a good model and for that reason it would be much better to have fatigue material in an AC specifically for aircraft maintenance personnel and organisations

6.9 Alan Roberts
(ATC)
- Rule Part 172 has a “reserved” rule heading for fatigue but no actual rules.
- A lot of good work was done on fatigue in ATC (reference 4), some of which has been put into Part 135 subpart K for GA but not into Parts 121 or 125 for operation of larger aircraft.
- Airways Corporation is currently the only provider of ATC services in NZ. Airways has introduced a FMS which works well. Previously fatigue rules were set by industrial agreements.
- A study group was set up to introduce FMS rules into Part 172 but Airways were reluctant to have their scheme used as a model.
- In late 2004 a complete review of Part 172 was commenced, driven in part by lack of conformance with ICAO Annex 11 which requires an FMS for certification of ATS
- There is currently no major concern regarding fatigue in ATC although there is still an issue of staff in some towers not being able to take a break due to insufficient staff coverage
- Drivers for fatigue rules in Part 172 are; possible new service providers, ICAO compliance requirements, OSH compliance

General discussion
- Agreed a lot of good work had been done in relation to ATC fatigue issue and this needs to be translated into rule and AC material.
- A working group needs to be set up to fine tune previous proposals
• Better feedback systems on the (relatively few) fatigue reports received are required.
• AC171 should address fatigue issues
• AC172 – investigation of incidents should include causal factors to identify incidents in which fatigue was a causal factor
• Possible issue of hours of work of ATC equipment maintenance staff especially flight critical equipment such as ILS

7. Panel discussions

7.1 General remarks

For each type of operation (Part 121, 125, 135, 137, adventure aviation, corporate aircraft, maintenance and ATC) the fatigue issues considered relevant by the panel and technical experts present were identified.

 Possible solutions were then developed for each issue. These solutions were kept fairly general to allow CAA flexibility in determining the exact means by which the solution could be implemented.

Solutions considered were broadly categorised as:

• Rule action – modification of existing rules or development of new rules
• Acceptable means of compliance – to be published in advisory circulars
• Guidance information – to be published in advisory circulars
• Educational material – GAP publications, road shows, Vector magazine articles etc.

The issues identified and solutions recommended are contained in section 9 of this report. A number of issues are common to all types of operation and these are identified and discussed below.

7.2 Lack of identification of fatigue as a causal factor in serious incidents and accidents

This was considered to be a major deficiency in accident and incident investigation “across the board”, on the part of TAIC, the CAA and aviation companies performing internal investigations.

The solution recommended is education in using appropriate methodologies to identify fatigue as a causal factor. The Transport Canada model is particularly recommended.

7.3 Lack of fatigue reporting systems

It is evident there are not many fatigue reports lodged by crew, engineers or ATC staff yet this is certainly not because there is nothing to report. The panel and experts considered that this is due to a lack of rule requirements to report and a climate of fear of reporting on the part of some participants, for example first officers wanting to progress their careers.
The moves towards certification of adventure aviation will enable reporting requirements to be introduced, but consideration may also have to be given to a confidential reporting system. The reporting requirements in relation to fatigue for operations that are currently certificated, such as air operations and agricultural operations also need to be reviewed.

7.4 General lack of recognition of fatigue as a workplace hazard

While the larger airlines generally have appropriate FMS in place for flight crew, there does not seem to be the same recognition of fatigue as a workplace hazard for cabin crew. In general aviation, particularly agricultural and adventure aviation, there appears to be almost a total lack of awareness which not only affects aviation safety but exposes aviation companies to severe penalties under OSH legislation.

The acceptance of long hours in some sectors of the industry and the assigning of flight crew to additional tasks outside their normal duties (e.g. Part 135 GA pilots being required to perform “after hours” operations under Part 91) are other examples of the lack of recognition of fatigue.

There is also a lack of recognition of workload and arduous duties e.g. operation to difficult airports, lack of autopilot, multiple short flight time sectors.

Requirements for education of participants in fatigue and its management are recommended. In some areas requirements already exist but need to be reviewed (e.g. Engineers licensing examination human factors paper) and in some areas requirements are non-existent (e.g. airline operational managers and crew scheduling staff).

7.5 Not all activities contributing to fatigue are included in a FMS

Whilst activities outside work that contribute to fatigue cannot be influenced by the regulator, activities within aviation can be. For example management time, time spent recreational flying and administration activities all contribute and consideration needs to be given to ensuring a FMS captures these and other contributors to fatigue.

Consideration may also have to be given to drug and alcohol testing, particularly in environments where a “party culture” may be prevalent such as adventure aviation.

7.6 Lack of “across the board” requirements for FMS

The existing rule requirements for aviation operations to have a FMS are inconsistent and fragmented. For example FMS for airlines under Parts 121, 125 and 135 are contained in the respective rule parts, but are not consistent in that Part 135 requirements have been developed further (as a result of fatigue research in ATC) than those of Parts 121 and 125. Some rule parts contain traditional duty time limits (such as the maintenance engineer duty time requirements shortly to be transferred into Part 43) that suggest compliance will address all fatigue issues. Some activities (such as cabin crew, agricultural
and adventure aviation) have no fatigue rules at all and some, such as Part 172, have rules and guidance material that have been developed but not issued.

In the airline area the existing AC’s (119-2) and (119-3) have been reviewed and updated but not yet re-issued. Fatigue rules have not been developed, or adequately provided for, in emerging activities such as long range corporate jet operations, large capacity ballooning, and ultra long range air transport operations.

The panel generally considered that the work to address fatigue of air traffic controllers, some of which has been introduced to Part 135, forms a good non-prescriptive model for the development of FMS in other branches of aviation, particularly adventure aviation under the planned rule part 115. Considerable effort will have to go into developing appropriate rules and the associated AC material. Much of this already exists, for example the draft Part 172.55 Management of Fatigue rule and AC text in reference 17. Some areas will require new research, and some existing research has not been fully utilised, for example the work of Dr Melissa Purnell on fatigue among maintenance engineers.

CAA also need to ensure that relevant staff keep abreast of developments in fatigue management, particularly in areas where there is a lot of activity world-wide, such as ULR operations.

8. Recommendations

The panel recommends that CAA review the fatigue issues and the suggested solutions listed in section 9 of this report and draw up an appropriate work plan.

This work plan should in particular identify:

- a common and consistent approach to the management of fatigue across all aviation sectors via the CAA rules, AC and educational material
- areas where further information needs to be gathered and how this can best be done e.g. research projects, CAA/industry study groups, fatigue reporting requirements
- areas where educational material can quickly and easily be issued by CAA to improve the awareness of fatigue as an aviation and workplace hazard e.g. Vector articles, distribution of Transport Canada causal factors model, road shows and release of draft AC guidance material
- areas where it may be possible to work with OSH to ensure aviation companies are aware of their obligations under OSH legislation to manage fatigue (e.g. maintenance organisations and non-certificated operators)
- the rule approach that will best address fatigue management i.e. prescriptive or non-prescriptive or a combination of both
- the relative priorities of introducing fatigue management requirements in the various aviation sectors
• the resources needed with the CAA to adequately address and manage fatigue issues.

9. Issues identified by the panel and possible solutions

9.1 General
The following section contains the issues identified by the panel and technical experts and the suggested solutions. These are divided into the following groupings:

• Part 121, 125 and 135 certificated operations
• Part 137 and non-certificated operations
• Maintenance and ATC operations
## 9.2 Fatigue issues and recommended solutions identified in Part 121, 125 and 135 operations

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<tr>
<th>Issue</th>
<th>Recommended solution</th>
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<tr>
<td><strong>1. Lack of FM requirements for Cabin Crew</strong></td>
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<td><strong>Part 121/125</strong></td>
<td><strong>Part 135</strong></td>
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| • Rules and AC’s are required to include cabin crew in operator’s FMS.  
*Note: H&S unit in CAA is developing HSE guidelines for cabin safety that will include fatigue considerations.*  
*Note: Risks of cabin crew fatigue to safety of operation need to be recognised.* | Not applicable |
| **2. Lack of recognition of crew scheduling as part of a FMS** | | |
| • Add crew scheduling (ICAO SARPS/guidance material) to existing factors in the rule that need to be taken into account in developing a FMS.  
• Supporting guidance material to go in AC  
• Consideration of further education/training material e.g. road shows | • Add crew scheduling/duty assignment (ICAO SARPS/guidance material as applicable) to existing factors in the rule that need to be taken into account in developing a FMS.  
• Supporting guidance material to go in AC  
• Further education/training material e.g. road shows, GAP, video |
| **3. Not all activities contributing to fatigue are covered** | | |
| • Rule 121.803(b) tweaked to include consideration of circumstances before flight and of the flight to be undertaken.  
• Expanded guidance material on factors that should be considered by operators and individuals in managing fatigue e.g. commuting, multiple employers, different types of operation.  
• Education to cover responsibilities of operators and individuals. | • Rule 135.803(b) tweaked to include consideration of circumstances before flight and of the flight to be undertaken.  
• Expanded guidance material on factors that should be considered by operators and individuals in managing fatigue e.g. commuting, multiple employers, different types of operation.  
• Education to cover responsibilities of operators and individuals. |
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<th>Issue</th>
<th>Recommended solution</th>
<th>Part 135</th>
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| 4. Lack of recognition under AC119-2 for diversified operations e.g. split shifts | • Draft AC’s 119-2 rev 2, 119-4, 125-1, 121-4/125-2 should be reviewed and updated by CAA with expert input as required.  
• Include in AC cross reference to other CAA OSH materials.                                                                                                                                                                                                                                                                                                                                                           | • Draft AC’s 119-2 rev 2, 135-1 should be reviewed and updated by CAA with expert input as required.  
• Include in AC cross reference to other CAA OSH materials.                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 5. Lack of fatigue reporting systems                                  | • Include in the review and update of the FM AC’s and in educational material advice on fatigue reporting and monitoring systems.  
• Rule amendment to include a requirement to have a reporting and monitoring system within an operator’s FMS so personnel can report on fatigue issues.                                                                                                                                                                                                                                                                                        | • Include in the review and update of the FM AC’s and in educational material advice on fatigue reporting and monitoring systems.  
• Rule amendment to include a requirement to have a reporting and monitoring system within an operator’s FMS so personnel can report on fatigue issues.                                                                                                                                                                                                                                                                         |
| 6. No coverage for ULR                                                 | • Define ULR operations  
• Review operating rules to include a requirement for a FRMS for ULR operations.  
• Relevant CAA staff become informed on ULR fatigue issues.  
• CAA develop timely guidance material for flight and cabin crew FRMS in ULR operations. Recommended starting points UAE and FSF guidelines.                                                                                                                                                                                                                                                   | Not applicable                                                                                                                                                                                                                                                                                                                                                  |
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<th>Issue</th>
<th>Recommended solution</th>
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<tr>
<td>7. Lack of recognition of workload/arduous duties (e.g. operation with no autopilot, high workload sectors, multiple short flight time sectors)</td>
<td>• In rule and AC review check to ensure fatigue risk associated with workload/arduous duties is adequately addressed.</td>
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<td>• In rule and AC review check to ensure fatigue risk associated with workload/arduous duties is adequately addressed.</td>
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<td>8. Lack of requirement for education and training of participants in fatigue and its management (e.g. flight crew managers, crew scheduling staff)</td>
<td>• FMS to include a requirement for education and training in fatigue management for relevant personnel.</td>
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<td>• FMS to include a requirement for education and training in fatigue management for relevant personnel.</td>
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<td>9. Lack of requirement for an auditable feedback loop within an operator's FMS/FRMS system to ensure fatigue events are reported and acted on.</td>
<td>• Include a rule requirement for reporting and monitoring</td>
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<td>• Include a rule requirement for reporting and monitoring</td>
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<td>10. Lack of in-depth analysis of fatigue as a causal factor in incident and accident investigation.</td>
<td>• Adapt Transport Canada fatigue investigation method for use by various parties required to investigate incidents.</td>
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<td>• Adapt Transport Canada fatigue investigation method for use by various parties required to investigate incidents.</td>
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### Recommended solution

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<tr>
<th>Issue</th>
<th>Part 121/125</th>
<th>Part 135</th>
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</table>
| 11. Current rules do not cover successive flying duties under different rule parts (e.g. Part 91 operation prior to or after 119 operation.) | • Extend rules to cover this type of operation with joint pilot and operator responsibility.  
• This should include ferry flights within an airline. | • Extend rules to cover this type of operation with joint pilot and operator responsibility. (currently only covers pilot responsibilities)  
• This should include ferry flights within an airline. |
| 12. Widely differing requirements between ATO and CTO and exception for emergency operations e.g. lack of daily F&D limits in CTO. | • Delete the emergency flight provisions in the current rules and rely on section 13A of the CAA Act for EMS operations. | • Extend Part 135 ATO FMS requirements to cover CTO and delete CTO limitations.  
• Delete the emergency flight provisions in the current rules and rely on section 13A of the CAA Act for EMS operations. |
### 9.3 Fatigue issues and recommended solutions identified in Part 137 and non-certificated operations

<table>
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<tr>
<th>Issue</th>
<th>Possible solution</th>
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| 1. Suspect that safety analysis does not give adequate consideration of fatigue as a causal factor in accident and serious incident investigation | • Recommend CAA review the database to ascertain the reliability or otherwise of identification of fatigue as a causal factor.  
• Recommend more emphasis be placed on investigating fatigue as a possible causal factor in accidents/serious incidents e.g. use appropriate methods in assessment fatigue in accidents/serious incidents.  
• Recommend training in identification of fatigue casual factors be provide to CAA and TAIC. |
| 2. Suspect that OSH obligations to manage fatigue as a workplace hazard are not well understood | • As a minimum guidance and educational material (including OSH obligations) should be provided for these operators |
| 3. Lack of requirement for a FMS for Part 137 and non-certificated commercial operators or corporate aircraft operators | • Including FMS requirements in Part 137  
• Ensure FMS requirements are included in the scope of the Part 115 adventure aviation rule development  
• Amend Part 91 to require a FMS for private or corporate aircraft operations where fatigue risk is likely to be high e.g. crew operating more than 6hr in any 24 hr period or on more than 2 consecutive days.  
• Include guidance material on fatigue management in hang gliding in the hang gliding AC currently under development and later extend this material to cover other forms of adventure aviation |
| 4. Lack of FM requirements for mission support personnel carried in the aircraft who can affect safe operation of the aircraft (e.g. winch operators) | • Amend definition of crew member to include these personnel. |
9.4 Fatigue issues and recommended solutions identified in Engineering and ATS

<table>
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<tr>
<th>Issue</th>
<th>Suggested solution</th>
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| 1. Lack of effective requirements for FM in aircraft maintenance and ATS related rules. | • An AC on human factors including FM to be developed  
• Update human factors component of LAME exams to include FM.  
• CAA to develop educational material for continuation training of engineers on human factors and FM.  
• Review of Part 43 and 145 limits for fatigue of engineers including a requirement for reporting and monitoring.                                                                                                                                                                      |
| 2. Lack of in-depth analysis of fatigue as a causal factor in defect/incident investigation. | • Adapt Transport Canada fatigue investigation method for use by various parties required to investigate incidents.                                                                                                                                                                                                                             |
|                                                                       | • Develop the rule requirements for FMS in ATS including a requirement for reporting and monitoring.  
• Update draft AC material on FM                                                                                                                                                                                                                                                                                                           |

**Issue for CAA covering all areas:**
The CAA to have access to appropriate resources to adequately monitor and assess FMS  
The CAA to provide educational material on fatigue hazards and their management to participants who are least likely to have an appropriate awareness.
10. References

9. CAANZ (June 2003). Draft AC 119, Fatigue of Flight Crew – Advice for establishing a scheme under rule 121, 125 or 135 Subpart K
10. CAANZ (June 2003). Draft AC 121/125, Fatigue of Flight Crew – a complete scheme for two pilot domestic operations
11. CAANZ (June 2003). Draft AC 121/125, Fatigue of Flight Crew – a complete scheme for international operations
14. UK Civil Aviation Authority, Safety Regulation Group (June 2003). CAP 670 Air traffic services safety requirements
15. UK Civil Aviation Authority, Safety Regulation Group (January 2002). CAP 715 An introduction to aircraft maintenance engineering human factors for JAR 66
17. CAANZ (circa 2005). Proposed changes to Rule 172.55 Management of fatigue (in Air Traffic Services) and associated AC material
18. CAANZ (June 2006), Fatigue management – airline flight operations Part 121 and 125, Power Point presentation at the workshop
19. CAANZ (undated), Fatigue of flight crew: Helicopters and agricultural, presentation notes supplied by Ken Wells at the workshop.