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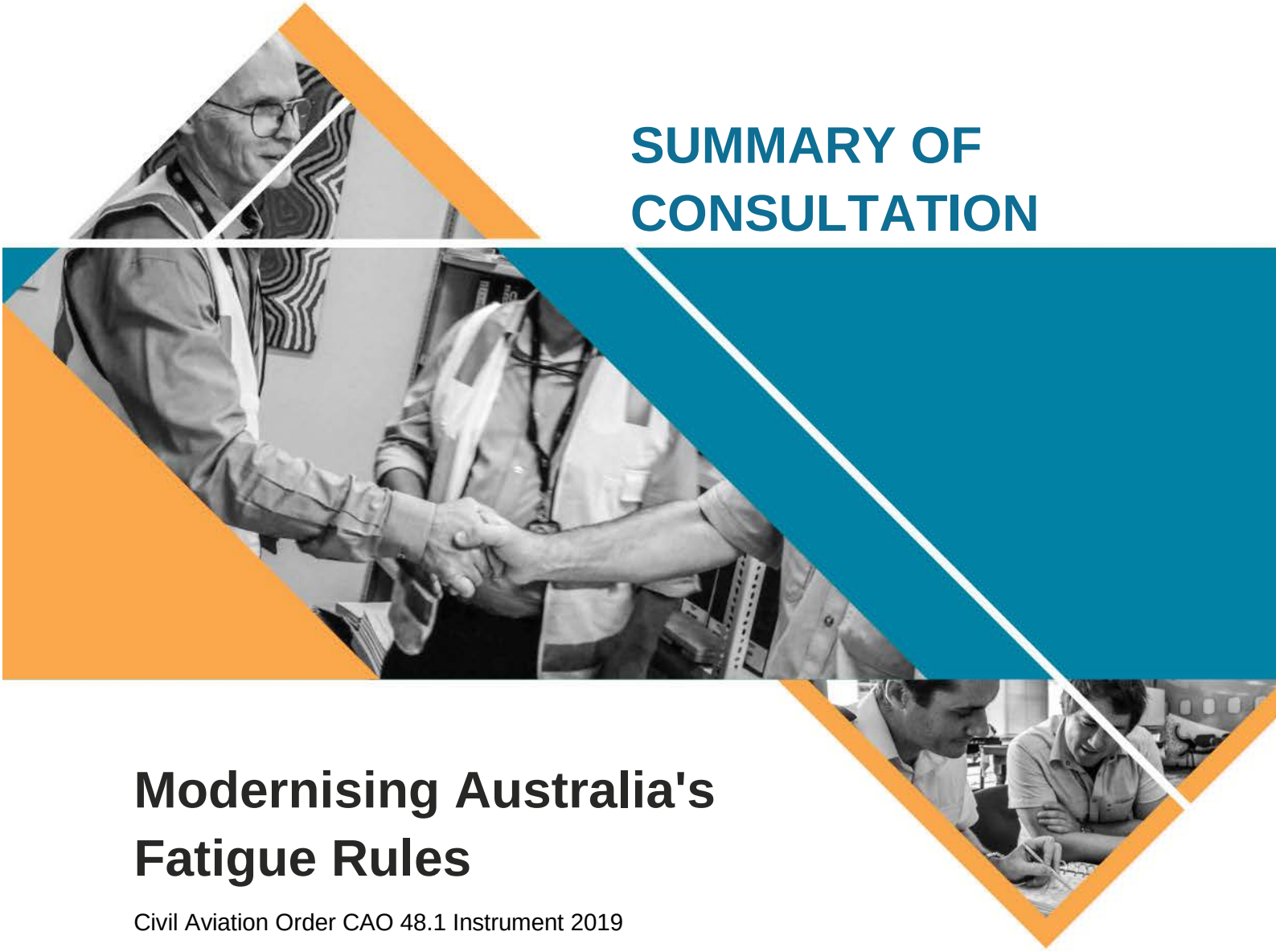

SUMMARY OF CONSULTATION

Modernising Australia's Fatigue Rules

Civil Aviation Order CAO 48.1 Instrument 2019

Date	August 2019
Project number	OS 02/03
File ref	D19/33768

Overview

Fatigue risk management involves operators and pilots taking steps to manage fatigue to minimise its impact on safety.

Prior to 2013, flight time limitations for operators were detailed in Civil Aviation Order (CAO) Part 48.

In April 2013, and as set out in CAO 48.1 Instrument 2013, CASA introduced new fatigue rules for operators and pilots as: The rules based on scientific considerations, sought to align Australia with international standards, improve aviation safety, address known risks, and maintain our reputation for safety in aviation.

In 2017, the CASA Board commissioned an independent review of Australia's fatigue rules for operators and pilots, to provide CASA with an informed basis on which to continue reform of the rules. The independent review team confirmed, in its final report delivered to the CASA Board in March 2018, the need to modernise Australia’s fatigue rules for operators and pilots. Outlined in the report were twenty-four recommendations to improve and implement the fatigue rules contained in CAO 48.1 Instrument 2013.

We conducted public consultation on the recommendations from 21 March- 22 April 2018. In July 2018, the Aviation Safety Advisory Panel (ASAP), appointed a Technical Working Group (TWG) to review industry feedback and CASA's proposed responses to the feedback. The TWG comprised representatives from pilot associations, industry associations, operators and academia. Industry feedback and the TWG, broadly supported the need to modernise Australia's fatigue rules along with the review team's recommendations and CASA's proposed response. There were however, dissenting views on some issues.

Our response to the independent review of fatigue rules identified 54 actions to address the review team's recommendations[1]. The proposed CAO 48.1 Instrument 2019 aims to address 19 of these actions. By the end of 2019, amended guidance material, internal training and related actions will address 49 of the 54 actions.

The proposed CAO 48.1 Instrument 2019 will repeal and replace CAO 48.1 Instrument 2013, CAO 48.1 Amendment Instrument 2016 (No 1) and older fatigue rules. It provides transitional provisions allowing operators to conduct operations in accordance with their current rules until their applicable transition date.

From 13 December 2018-10 February 2019 we provided opportunity for feedback on the proposed instrument by conducting an additional consultation. The questionnaire is available on CASA's Consultation Hub[2]. Questions were grouped into the following areas:

- Maximum flight duty periods
- Flight time limits
- Augmented crew limits
- Disruptive schedule management

[1] https://www.casa.gov.au/standard-page/independent-review-aviation-fatigue-rules-operators-and-pilots
[2] https://consultation.casa.gov.au/regulatory-program/cd-1811os/supporting_documents/Word%20Doc%20%20%20Consultation%20%20Modernising%20Australias%20fatigue%20rules%20%20Proposed%20CAO%2048.1%20CD%201811OS.DOCX

- Standby
- Reassignment
- Fatigue risk management systems
- Aerial application
- Shared responsibility
- Consolidation and transitional provisions
- Other changes
- Policy questions
- General response
- Your priorities.

On 4 December 2018, a live webinar was conducted to explain the proposed changes. A recording of the webinar is available on our website[3].

This summary of consultation (SOC) summarises the main themes that emerged from the feedback and CASA's intended disposition of the proposed changes. References to the scientific research underlying CASA's rationale are included at the end of this document

Subsequent to the completion of the independent review, the following additional material was considered by CASA and the TWG in finalising the fatigue rules:

- Australian Transport Safety Bureau (ATSB) 2019, Fatigue experiences and culture in Australian commercial air transport pilot
- Transport Canada, 2018, Regulations Amending the Canadian Aviation Regulations (Parts I, VI and VII— Flight Crew Member Hours of Work and Rest Periods)
- The European Commission, 2019, Effectiveness of Flight Time Limitation (FTL)

The TWG met again in February and March 2019 to consider industry feedback and inform CASA's response. The TWG recommendations to CASA from those additional meetings are included for each proposal. On 1 July 2019, the ASAP considered TWG feedback and provided formal advice supporting the proposed fatigue rules and identifying any remaining concerns. The final rules address the concerns identified by the ASAP.

[3] https://www.casa.gov.au/safety-management/standard-page/fatigue-management-consultation-webinar

Contents

Respondents

We appreciate the contributions made by all respondents and acknowledge the feedback as beneficial to finalising CAO 48.1 Instrument 2019.There were 331 respondents to the public consultation on the proposed CAO 48.1 Instrument 2019. One hundred and twenty-eight respondents (39%) provided permission to publish their submissions on the Consultation Hub. Where permission has been granted individual responses are available on the CASA website.

Three hundred responses (91%) were individual responses. These responses appear to be from operating pilots although specific demographic information was not requested. Of the 31 responses identified as representing the official views of an organisation, only 20 appeared to be valid. Organisations providing responses included large and small operators, operator associations and pilot associations.

Pilot associations encouraged their members to respond to the consultation, which resulted in the high response rate and focussed pilot responses on key issues identified by the associations. Subsequently, this resulted in a substantial number of submissions with similar or identical text responses; however, these have been treated as individual responses.

Key feedback

The majority of respondents stated that many of the proposed changes did not achieve the intended aims.

Generally, pilots and pilot associations identified that the proposed rules would increase fatigue risk and that changes to increase or remove limits relative to CAO 48.1 Instrument 2013 weren't scientifically justified.

Common themes emerging from the feedback included:

- the use of international averages is not a scientific basis for fatigue rules
- greater scientific justification is required for the proposed changes
- flight duty periods are too long and should be reduced
- the proposed rules for disruptive schedule management provide inadequate protection
- flight time limits should be reinstated
- crew rest facilities required more detailed specifications, particularly Class 3 facilities
- Australian based data should be used to develop Australian fatigue rules
- Operator costs and profits should not be considered when developing safety rules
- fatigue risk would increase under the proposed rules
- the rules place too much pressure on aircrew to report fatigue instead of operators managing fatigue
- there is inadequate protection for fatigue prior to and following simulator training sessions.

Operators and operator associations generally identified that the proposed rules would increase costs, impact schedules, and that the decrease or imposition of limits relative to CAO Part 48 (including standard industry exemptions) weren't scientifically justified. Operators also identified that the deadline for compliance was unreasonable, due to lead times associated with updating software to ensure compliance with the rules and the requirement to publish rosters in advance.

Detailed feedback on each area is provided later in this SOC including statistical analysis of responses, key themes, options considered, TWG/ASAP feedback and CASA response.

Future direction

The statement of expectations for the Board of CASA[4] includes the following expectations for our regulatory approach:

- focus on aviation safety as the highest priority
- consider the economic and cost impact on individuals, businesses and the community in the development and finalisation of new or amended regulatory changes
- take a pragmatic, practical and proportionate approach to regulation as it applies to different industry sectors having regard to risk.

CASA notes that some feedback provides different perspectives between pilots and operators. The independent review was commissioned, in part, to address these disparate perspectives. We have considered the conflicting views and have sought consensus within the TWG and ASAP processes where possible. Where consensus could not be achieved, CASA's role as the regulator requires us to make a final decision in line with our regulatory philosophy and the Minister's statement of expectations.

Fatigue science

Fatigue science identifies multiple factors that will impact fatigue risk (Anund, Fors, Kecklund, van Leeuwen, & Åkerstedt, 2015; Caldwell et al., 2009; Powell, Spencer, Holland, Broadbent, & Petrie, 2007; Phillips, 2015; Van Drongelen, Boot, Hlobil, Smid, & van der Beek, 2017).

Several biomathematical models have been developed to combine these factors and produce an approximate rating of the degree that fatigue is likely to impact performance. However, the models differ in what contributing factors are considered and their relative weighting (Dinges, 2004) and studies have shown discrepancies between observed and predicted fatigue (Dawson, Noy, Härmä, Åkerstedt, & Belenky, 2011; Powell, Spencer, Holland, & Petrie, 2014; Van Dongen, Caldwell Jr., & Caldwell, 2011).

There is no single definition of the estimated level of fatigue that is considered 'acceptable'. At present, fatigue science is not able to provide a simple answer to what fatigue limits should be (Gislason, Bogdane, & Vasiļevska-Nesbita, 2017).

International averages

CASA agrees with feedback that the use of international averages, in isolation, is not a satisfactory approach to regulation. However, the international regulations considered in developing the proposed amendment were all based on considerations of fatigue science pragmatically balanced with economic and cost impact.

Similarly, the proposed rules are not simple averages, but a series of limits based on similar scientific principles. Nevertheless, we have communicated with national and international researchers to evaluate the science-based evidence to guide the current process. The relative weighting of time awake, task complexity, time of day and sleep quantity/quality have been set to

[4] https://www.legislation.gov.au/Details/F2019L00977

achieve a set of limits broadly aligned with other jurisdictions where there is some evidence-based support.

Prescriptive limits

It is impossible to design a single set of prescriptive limits that are suitable for the diverse operations conducted by Australian operators. To address this we have designed a series of appendices to the rules to cater for different industry sectors.

The proposed rules also require operators to assess the hazards associated with their operations, prior to setting operating limits that are constrained by the prescriptive limits.

Variations to prescriptive limits

CASA recognises that specific operations may need minor variations to the prescriptive limits. CASA will consider requests for minor variations to the prescriptive limits where operators can identify specific details of the variation, an assessment of the related fatigue risk along with plans for additional mitigation and monitoring of the risk without a requirement for a full fatigue risk management system. CASA will provide guidance to assist operators with this process in order to ensure the suitability of any such request.

Fatigue risk management systems

The ideal form of fatigue management is a fatigue risk management system (FRMS) that provides a data driven system to continuously and effectively monitor and manage fatigue related safety risks (Cabon et al., 2012; Gander, 2015; Morris, Wiedbusch, & Gunzelmann, 2018).

This approach provides the opportunity for operators to go beyond the prescribed limits. With an FRMS an operator must do more to manage fatigue than would reasonably be expected using a Safety Management System (SMS) alone (Lerman et al., 2012; Satterfield, & Van Dongen, 2013; Starr, 2017). We note that several operators have been approved for an FRMS trial and are actively engaged with additional operators on advanced drafts of FRMS material.

Key changes following consultation

We intend to make the following key changes to the consultation draft rules prior to finalising CAO 48.1 Instrument 2019.

Table 1: CASA disposition

Initial Proposal / Issue	Modified Proposal
Revised prescriptive limits to more closely align with international averages.	Proposed changes are represented in Table 2.1 to reflect scientific principles, aligned with other jurisdictions.
Revised augmented crew limits.	For FDP limits with Class 1 and 2 crew rest facilities, amended to not differentiate between FDP start times. FDP limits for Class 3 crew rest facilities also amended. CASA to improve guidance material regarding optimising sleep opportunity for the landing crew.
Replacement of late-night operations restrictions with new restrictions based on infringement of the window of circadian low (WOCL)	Amendment to the proposed rules to permit three consecutive WOCL infringing duties. Amendment to permit up to five consecutive early starts (0500-0659) where the maximum flight duty period is reduced by two hours for the fourth duty and four hours for the fifth duty. CASA to monitor fatigue associated with alternating schedules to identify if additional prescriptive rules are necessary. CASA to provide additional guidance to assist operators dealing with alternating schedules under enhanced fatigue management or FRMS.
Incorporating standby limits based on US Federal Aviation Regulations short call reserve provisions.	Amendment to the proposed rules to permit a combined period of greater than 16 hours for augmented crew operations or following a split duty rest period of greater than four hours in suitable sleeping accommodation.
Replacing the prescriptive approach to re-assignment of flight duty with an outcome-based approach.	Amendment to the proposed rules to remove Appendix 2 paragraph 7.1(c) and amend the note highlighting the flight crew member's obligation under paragraph 16.1. CASA to provide additional guidance regarding reporting culture.
Revising fatigue risk management system (FRMS) change management processes and other provisions to reflect an outcome-based approach.	Amendment to the proposed rules to permit change notification in accordance with approved procedures under CAO 82 or the regulations CASA to provide additional guidance regarding FRMS assessment and oversight process for improved transparency CASA will permit operators to request a minor variation to prescriptive rules without a requirement for a full FRMS.
Tone and language.	Rearranged some appendices and added headings

Initial Proposal / Issue	Modified Proposal
	to improve readability. Guidance material changes will be consulted separately
Permitting aerial application operators to operate in accordance with Subpart 137.Q of the Civil Aviation Safety Regulations (CASR).	No changes
Updating provisions related to shared responsibility between operators and flight crew members in line with proposed Part 91 of Civil Aviation Safety Regulations (CASR).	Fitness for duty clauses amended to align with the shared responsibility concept in Part 91 of CASR
Incorporating all new fatigue rules into a single instrument.	New instrument prepared to incorporate new rules. Previous versions of CAO 48 repealed. Transition dates have been amended to reflect the extended period of consultation with industry.
Minor wording changes.	Note following paragraph 10.1 removed
Impact of casual day on future roster.	Requirement for 24 days off duty every 84 days removed Modified requirement for 6 days off duty every 28 days
Off duty requirements when transitioning between appendices.	Simplified due to changes in off duty requirements
Transitioning between appendices for a single duty.	Minor changes to requirements based on feedback
Split duty restrictions for charter.	No changes

CASA intends to conduct fatigue surveys prior to the transition date of the amendments and then every two years, assess if the changes have been effective in reducing fatigue risk.

The research will focus on:

- long duties (10-13 hours) at the most favourable times of day
- long duties (8-10 hours) at less favourable times of day
- duties of 3 or more sectors
- augmented crew operations (including ultra-long range)
- disruptive schedules.

CASA will continue to monitor fatigue as part of ongoing operator oversight. Where necessary, CASA may direct operators to change their manuals to address safety concerns.

Summary

CASA appreciates the feedback received and acknowledges that it has resulted in an improved balance between fatigue risk and cost impact.

The final instrument will incorporate the changes outlined above.

Flight Duty Period Limits

This proposal amends prescriptive limits in Appendices 2 and 3, to better align with international averages.

Respondent feedback

Of the 315 respondents who answered this question:

- 18 (5.7%) said the proposal achieved the aim.
- 64 (20.3%) said some changes were required.
- 233 (74%) said the proposal did not achieve the aim.

Among the respondents, there were 10 Operators:

- 4 said the proposal achieved the aim.
- 4 said some changes were required.
- 2 said the proposal did not achieve the aim.

Respondents supporting the changes generally noted:

- These new limits while understandable from a fatigue/sleep science perspective will still require operators to change their allowable FDP limits in rostering systems.

Respondents suggesting some changes generally noted:

- The proposed changes will be more fatiguing for Aircrew.
- The proposed flight duty periods are too long.

Respondents who said the proposal did not achieve the aim generally noted:

- More scientific justification is required to support the proposed changes in flight duty periods.
- The use of international averages is not scientifically justified.
- The proposed changes will be more fatiguing for aircrew.
- The proposed flight duty periods are generally too long.
- Further reductions in duty length need to occur with increasing sectors.
- The rest periods between duties need to be in alignment with FAA and TC provisions.

Options considered

- Retain proposed flight duty periods.
- Increase protection for WOCL impact by reducing FDP.
- Retain existing FDP limits and include a flight time limits impinging the WOCL.
- Reduce FDP by additional 0.5 hours for third and subsequent sectors to reflect workload impact.
- Introduce mandatory reporting and mitigation for less than 5 hours sleep in 12 hours prior to report and 19 hours awake at end of duty.

TWG/ASAP feedback

TWG endorsed a revised flight duty period table:

Table 2.1: Maximum FDP for an acclimatised FCM according to number of sectors and acclimatised time at start of the FDP

Acclimatised time at start of FDP	Maximum FDP hours according to sectors to be flown						
	1-2	3	4	5	6	7	8+
0000-0459	10	10	9.5	9	8.5	8	7.5
0500-0559	11	11	10.5	10	9.5	9	8.5
0600-0659	12	12	11.5	11	10.5	10	9.5
0700-1259	13	13	12.5	12	11.5	11	10.5
1300-1359	12	12	11.5	11	10.5	10	9.5
1400-1459	11	11	10.5	10	9.5	9	8.5
1500-2359	10	10	9.5	9	8.5	8	7.5

TWG noted that CASA will use the flight duty period table as a starting point for FRMS approval. Increases in flight duty period may be approved in an FRMS subject to specific mitigators being in place and monitored.

TWG recommended that CASA incorporate additional guidance in sample templates for operators demonstrating the required enhanced fatigue management approach.

CASA response

CASA acknowledges concerns expressed about increasing flight duty periods and the potential for increased fatigue risk, when the proposed rules are compared against the current fatigue rules in CAO 48.1 Instrument 2013. The majority of Australian operators however, are currently using a previous set of fatigue rules, CAO Part 48, along with a series of standard industry exemptions (CAO 48 + SIE). Table 2 compares the flight duty period limits for the old rules (CAO 48 + SIE) with the consultation draft rules (CAO 48.1 2019 CD) and the final rules (CAO 48.1 2019 final).

Table 2: Comparison of CAO 48 & SIE with CAO 48.1 2019 CD and CAO 48.1 2019.final for 1-3 sectors and 4 sectors

	Maximum FDP 1-3 Sectors			Maximum FDP 4 Sectors		
Acclimatised Start time	CAO 48 + SIE	CAO 48.1 2019 CD	CAO 48.1 2019 final	CAO 48 + SIE	CAO 48.1 2019 CD	CAO 48.1 2019 final
0000-0459	12	10*	10*	11	9.5*	9.5*
0500-0559	13	11.5	11*	12	11	10.5*
0600-0659	14	12*	12*	12	11.5*	11.5*
0700-1259	14	13*	13*	12*	12.5	12.5

	Maximum FDP 1-3 Sectors			Maximum FDP 4 Sectors		
1300-1359	13	12*	12*	12	11.5*	11.5*
1400-1459	13	12	11*	12	11.5	10.5*
1500-1559	12	12	10*	11	11.5	9.5*
1600-2259	12	11	10*	11	10.5	9.5*
2300-2359	12	10*	10*	11	9.5*	9.5*

* FDP are the lowest or equal to the lowest for that start time.

Table 2 highlights the proposed FDPs to be consistently more restrictive for FDPs that commence at times where extended periods of wakefulness and sleep pressure is greatest (see Caldwell, Caldwell, Thompson, & Lieberman, 2018).

Although the initial intent of the TWG was to amend CAO 48.1 (2013) FDPs to align with international averages, as recommended by the independent review in 2017, the resulting proposed limits lack coherence with fatigue research. Rather than simply adopt international averages, CASA has taken a more scientific principles-based approach to FDP limits. That is, the proposed changes were considered using the latest international research and regulations, TWG industry and expert input along with the recommendations of the review. Individual start time/sector limits will compare differently to previous limits, other regulators and simple averages; however, this systematic approach is more aligned with scientific principles.

CASA has reviewed the studies of Caldwell (2012), Marqueze, Nicola, Diniz, and Fischer (2017), O'Hagan, Issartel, Fletcher, and Warrington (2016), Sallinen et al. (2017), and Sallinen et al. (2018). Pilots who are spending longer hours on duty have greater disturbance to their regular sleeping patterns and have more regular experiences of fatigue in the cockpit.

More specifically, Vervodja et al. (2014) found that late-finishing flights typically required long periods of wakefulness at times when the circadian system ceases promoting alertness, and an increased, previously underestimated, fatigue risk. Based on their findings, they recommend that flight duty limitations should consider not only duty start time, but also the time of the final landing. Accordingly, for example, CASA's strategy for FDP requires that once the start time reaches 1300 the maximum flight duty period is reduced to 12 hours because these flights would otherwise encroach the WOCL combined with the potential for prolonged wakefulness; the same approach reduces FDP to 11 hours for duties between 1400 and 1459.

Further, for start times between 1500 and 0459 the maximum flight duty period is reduced to 10 hours due to the compounding effects of:

- WOCL encroachment
- likely prolonged wakefulness
- reduced propensity to sleep and
- reduced quality and quantity of sleep during the day.

Finally, the rules seek to address the impact of workload on fatigue by reductions in FDP with increasing number of sectors. This change reflects the limited, but compelling research in this area that demonstrates consistent decrements in performance at 4 sectors and beyond (Honn, Satterfield, McCauley, Caldwell, & Van Dongen, 2016; Powell et al., 2007; Powell, Spencer, Holland, & Petrie, 2008).

The limits for acclimatised flight crew members are based on the following rationale:

- An acclimatised start time between 0700 and 1259 represents the earliest start time period to minimise fatigue whilst acknowledging a strong passenger demand for early departures. Flight duty periods of up to 13 hours are permitted in this start period.
- Once the start time reaches 1300 the maximum flight duty period is reduced by one hour to 12 hours to avoid encroachment of the WOCL and prolonged wakefulness; this continues until a start time of 1359. The rationale continues during the 1400 – 1459 period when the FDP is reduced further to 11 hours.
- For start times between 1500 and 0459 the maximum flight duty period is further reduced to 10 hours due to the compounding effects of WOCL encroachment, likely prolonged wakefulness and a reduced propensity to sleep and quality and quantity of sleep during the day.
- In addition to the reduction to FDP due to WOCL related concerns, the number of sectors being flown per duty period was also considered due to the workload associated with increased sectors. The maximum flight duty period reduces, for periods with more than 3 sectors, by 30 minutes per sector to address the additional physical and cognitive fatigue associated with multiple approaches and departures.
- The proposed FDP limits are based on the assumptions that FCMs have had adequate rest prior to the start of the duty, are not impacted by acute, cumulative or circadian fatigue, are fit to fly, and working in optimal cockpit conditions. Accordingly, operators using appendices requiring enhanced fatigue management (Appendices 2 to 6) are required to conduct hazard assessment and mitigate identified hazards. Despite these controls, where an FCM does not achieve adequate rest or is suffering from fatigue that will impact their planned duties, they are required to declare themselves unfit and not perform the task.

  The proposed FDP limits address concerns identified in the most recent research conducted by the European Aviation Safety Agency (EASA) and recent Australian pilot surveys.

Daily Flight Time Limits

This proposal simplifies management of daily flight time limits.

Respondent feedback

309 respondents who answered this question:

- 39(12.5%) said the proposal achieved the aim.
- 46 (15%) said some changes were required.
- 224(72.5%) said the proposal did not achieve the aim.

Among the respondents, there were 11 Operators:

- 6 said the proposal achieved the aim.
- 4 said some changes were required.
- 1 said the proposal did not achieve the aim.

Respondents supporting the changes generally noted:

- I am pleased that the industry feedback for flight training has been implemented and we are back to 7 hours.
- No concern with flight time removal.

Respondents suggesting some changes generally noted:

- The proposed removal of flight time limits results in flight time that is too long and should therefore be reduced further.
- As it stands, there are multiple sector flights we currently complete that we would not be able to do under the revised limits. Is there any flexibility to manage this by extended time free of duty post flight or extensions during the duty period.

Respondents who said the proposal did not achieve the aim generally noted:

- Daily flight time limits are required, and their removal is inconsistent with the retention of monthly and annual limits.
- More fatigue will result from either the removal of flight time limits or by using the proposed flight time limits which are too long.
- More scientific justification is required to support the removal of flight time limits.

Options considered

- No change to proposal.
- Re-introduce flight time limits within table 2.1.
- Introduce a flight time limit for duties impinging WOCL.

TWG/ASAP Feedback

- CASA to correct drafting anomaly regarding extension of flight time for two-pilot single sector operations.
- Some TWG members recommended a 10-hour flight time limit for two-pilot single sector operations based on the logic used to draft the 2013 instrument.
- Some TWG members recommended retaining the proposed 10.5-hour flight time limit for two pilot single sector operations due to the paucity of scientific data available on daily flight time limits. 10.5 hours represents the current limit available to be flown under the Standard Industry Exemptions (SIE). Members argued that this limit should be used in the absence of scientific data, supported a reduced limit and should be applied regardless of the number of sectors flown.
- TWG members recommended that CASA include an explanation of the practical limits on flight time inherent in the flight duty period limits.
- ASAP recommended that CASA adopt a 10.5 hour flight time limit for multi-pilot operations.

CASA response

CASA reviewed scientific literature to help determine flight time limits (i.e., Goode, 2003: Honn et al., 2016; Powell et al., 2007; Powell et al., 2008); however, there is only limited scientific support for the use of daily flight time in addition to FDP limits.

The removal of the previously specified daily flight times is consistent with the Fatigue Review Recommendations to move toward international standards.

Many responses in the consultation hub demonstrate a misunderstanding of the proposed rules. The maximum FDP limits inherently limit flight time. FDPs typically start 60 minutes prior to a long endurance flight and continue to at least 15 minutes post flight. The maximum achievable flight time in optimal conditions is 11 hours and 45 minutes which is further reduced by turnaround times for multi-sector FDPs.

CASA notes, Transport Canada and EASA do not provide flight time limits and rely solely on FDP. While the Federal Aviation Administration (FAA) has flight time limits, the actual possible flight time in this proposal for duties where fatigue risk will be greatest (FDP commencing between 1500-0459), is 8.5 hours which is similar to the FAA limit for the same period.

Augmented crew

This proposal revises the approach and limits for augmented crew operations.

Respondent feedback

Of the 252 respondents who answered this question:

- 26 (10%) said the proposal achieved the aim.
- 40 (16%) said some changes were required.
- 186 (74%) said the proposal did not achieve the aim.

Among the respondents, there were 8 Operators:

- 5 said the proposal achieved the aim.
- 2 said some changes were required.
- 1 said the proposal did not achieve the aim.

Respondents supporting the changes generally noted:

- These new limits while understandable from a fatigue/sleep science perspective will still require operators to change their allowable FDP limits in rostering systems. CASA needs to consider that operators cannot implement new FDP limits within rostering systems in short periods of time.
- These changes will require (if legally implemented by CASA) system change to be made by our airline and the compliance timeline proposed is not reasonable to make system changes. (Operator)

Respondents suggesting changes generally noted:

- Rest facilities should be fit for purpose and enable Aircrew to achieve adequate rest.
- Augmented crew limitations under Class 3 rest scenarios is unnecessarily complex for a crew management system to monitor, is there fatigue science to support this complexity? Furthermore, CASA does not provide guidance or prescribe limitations on the duration of rest required within augmented operations, a key measure of the success of the FDP limits. (Operator)

Respondents who said the proposal did not achieve the aim generally noted:

- Rest facilities should be fit for purpose to enable aircrew to achieve adequate rest.
- Class 3 rest facilities need to be specifically addressed to ensure that a consistent standard can be achieved which enables Aircrew to achieve adequate rest.
- Cockpit rest will not be restorative and should not be considered as an appropriate fatigue mitigation strategy.
- More fatigue will result from the proposed changes to augmented crew operations.

Options considered

- Retain proposed changes.
- Reduce maximum flight duty periods for Class 3 facilities.
- Provide prescriptive definitions for crew rest facilities.
- Timing of proposed changes is addressed elsewhere in this report.

TWG/ASAP feedback

- TWG endorses no change required to proposed Class 3 flight duty periods or definition.
- TWG endorses no change required to proposed Class 1 and 2 flight duty periods or definitions.
- TWG recommends CASA improve guidance material regarding optimising sleep opportunity for the landing crew.
- TWG recommends CASA improve guidance material to inspectors and industry regarding fitness for purpose of Class 1 and 2 rest facilities.

CASA response

There has been limited research conducted to quantify the effects of various rest facilities on the quality and quantity of sleep obtained (Simons, & Spencer, 2007). Collectively this research indicates the quality and quantity of sleep obtained is likely to be significantly greater when Class 1 and 2 rest facilities are utilised in comparison to Class 3. CASA acknowledges that Class 3 rest facilities may not provide an adequate environment for sleep. The proposed rules permit a relatively conservative increase in flight duty period for Class 3 rest facilities compared to other regulators.

To qualify for an extension of FDP, Class 3 facilities are required to be fit for purpose to achieve rest, recline greater than 40 degrees and have leg and foot support.

While there is less benefit from Class 3 rest facilities than Class 1 or 2, the literature consistently demonstrates that any rest or activity outside of the cockpit provides benefits to subsequent alertness. Studies have demonstrated that even controlled cockpit rest has restorative value (Hartzler, 2014; Rosekind, Graeber, Dinges, Connell, & Gillen, 1994). Additionally, studies have demonstrated that rest time away from primary duties including activity breaks, light physical activity, and postural breaks can have some restorative value for sustaining alertness later in a duty period (Caldwell et al., 2003; Matsumoto, Mishima, Satoh, Shimizu, & Hishikawa, 2002; Neri et al., 2002).

CASA acknowledges that the research above indicates that there is benefit in rest opportunities in less than Class 3 facilities, including controlled cockpit rest, however, this should be used to mitigate acute fatigue rather than extend FDPs.

CASA provides additional guidance on crew rest facilities in CAAP 48-01 - Fatigue management for flight crew members. This guidance will be updated once the proposed rules have been made.

Disruptive schedule management

This proposal replaces late night operations provisions.

Respondent feedback

Of the 302 respondents who answered this question:

- 38 (13%) said the proposal achieved the aim.
- 58 (19%) said some changes were required.
- 206 (68%) said the proposal did not achieve the aim.

Among the respondents, there were 11 Operators:

- 1 said the proposal achieved the aim.
- 7 said some changes were required.
- 3 said the proposal did not achieve the aim.

Respondents suggesting some changes generally noted:

- Duties which infringe the WOCL should have greater restrictions placed on them including further limiting consecutive WOCL infringements.
- Could a statement be included in Appendix 2 section 13 ‘Limits on infringing the window of circadian low’ to avoid confusion that this WOCL rule may apply to an FCM in an unknown state of acclimatisation? Maybe for Appendix 2 Section13: Note: This does not apply to an FCM in an unknown state of acclimatisation. (Operator)
- The use of a FAID system would automatically adjust for a disruptive schedule. (Operator)

Respondents who said the proposal did not achieve the aim generally noted:

- Duties which infringe the WOCL should have greater restrictions placed on them including limiting consecutive WOCL infringements to 3 days as legislated by the FAA and TC.
- Early to late start duty transitions need to be more adequately addressed.
- The proposed change is more fatiguing and offers less protection than the current late-night operations rule.
- Travelling to work in the WOCL is a fatiguing aspect of work for aircrew which should be addressed by a further reduction in duties which have early starts.

Options considered

- Retain proposed WOCL infringement rule.
- Retain previous Late Night Operations rule.
- Limit to 3 consecutive WOCL infringements without FRMS.
- Require local night after 3 WOCL infringements.

- Require split duty and extended recovery for more than 3 WOCL infringements.
- Require extended recovery for more than 3 WOCL infringements.
- Require local night prior and subsequent to WOCL infringements.
- Introduce mandatory reporting and mitigation for less than 5 hours sleep in 12 hours prior to report and 19 hours awake at end of duty.

TWG/ASAP feedback

- TWG discussed feedback regarding proposed disruptive schedule rules. Operators noted that previous attempts to control consecutive early starts had resulted in schedules that alternated early starts and late starts resulting in increased fatigue reporting.
- TWG identified that the proposed requirement for 24 hours between start times for consecutive duties infringing the WOCL would prevent rosters that were preferred by some crews.
- TWG noted that the WOCL infringement rules apply when any duties infringe the WOCL, this ensures that conducting night simulator training or repositioning is accounted for in subsequent flight duty periods.
- TWG explored several approaches to address alternating early / late schedules but each approach had unintended consequences.
- TWG endorsed an amendment to the proposed rules to permit three consecutive WOCL infringing duties.
- TWG endorsed a further amendment to permit up to five consecutive early starts (0500-0659) where the maximum flight duty period is reduced by two hours for the fourth duty and four hours for the fifth duty.
- TWG noted that operators may exceed these limits under an FRMS only if there are additional mitigations and monitoring in place.
- TWG recommended that CASA monitor fatigue associated with alternating schedules to identify if additional prescriptive rules are necessary.
- TWG recommended that CASA provide additional guidance to assist operators dealing with alternating schedules.

CASA response

There is extensive research showing decrements in performance and safety concerns whilst performing duty periods that infringe the WOCL (Belenky et al., 2003; Caldwell et al., 2018; Folkard & Tucker, 2003, Lopez et al., 2012; Vervodja et al., 2014). Specifically, fatigue related incidents were found to increase in a linear fashion across four consecutive night shifts. Subsequent to the initial night, risk increased approximately 6% on the second night, 17% on the third night and 36% on the fourth night (Folkard & Tucker, 2003). CASA's biomathematical modelling of consecutive WOCL infringing duties has yielded similar results. Therefore, it is logical to impose a threshold of three consecutive night shifts or WOCL infringing duties without additional fatigue mitigation. This strategy aims to prevent escalating fatigue risk in subsequent duties.

Consultation feedback suggests that alternating early/late schedules is a substantial fatigue concern of pilots. However, there is limited research exploring this area and biomathematical models do not consistently highlight fatigue issues in these circumstances (Dawson et al., 2011;

Dinges, 2004; Powell et al., 2014; Van Dongen et al., 2011). This issue was discussed in depth by the TWG and a consensus could not be reached regarding how to best manage within the limitations of the proposed draft CAO 48.1. There is difficulty generating a rule that will prevent the generation of unintended consequences in an automated schedule optimiser. Operators and pilots have a shared responsibility to review schedules for likely fatigue effects and modify pairings accordingly.

After consideration of the available scientific research, consultation feedback and consultation with the fatigue TWG, CASA has amended the CAO 48.1 Instrument 2019 to more effectively reduce the effect of fatigue during FDPs, where the FCM will be performing consecutive WOCL infringing duties or early starts.

If an acclimatised FCM has undertaken duties which infringed the FCM's WOCL on 3 consecutive days, he or she must not be assigned an FDP on the following day if it would also infringe the WOCL.

Despite the above, the FCM may perform 4 or 5-consecutive early starts (0500-0659) that infringe the WOCL, if:

a. the maximum FDP permissible on the day of the 4th early start is reduced by 2 hours
b. the maximum FDP (if any) permissible on the day of the 5th early start is reduced by 4 hours.

In addition to the updated WOCL infringement rule, the proposed rules provide reduced maximum FDP for duties infringing the WOCL. Collectively, these changes are designed to limit the acute, cumulative and circadian fatigue which has been shown to result from working duty periods which involve late nights, early mornings or infringe the WOCL (Belenky et al., 2003; Caldwell, et al., 2018; Folkard & Tucker, 2003, Lopez et al., 2012; Vervodja et al., 2014). Additionally, these changes are consistent with the approaches utilised by other regulators (i.e., Transport Canada and FAA).

Operators should use fatigue hazard management or SMS provisions to review fatigue reports and adjust schedules or other mitigations accordingly. The absence of a predicted fatigue risk when utilising biomathematical models is not sufficient justification to discount fatigue reports that result from disruptive schedules.

CASA designed the flight duty periods with the assumption that the average pilot would wake up to 2 hours prior to reporting for an early duty. This rationale allows for a reasonable morning routine and commute to work. In capital cities, commuting times are generally reduced for late night and early morning shifts.

Standby

This proposal amends standby requirements in response to industry feedback.

Respondent feedback

Of the 297 respondents who answered this question:

- 182 (61%) said the proposal achieved the aim.
- 46 (15%) said some changes were required.
- 69 (24%) said the proposal did not achieve the aim.

Among the respondents, there were 10 Operators:

- 5 said the proposal achieved the aim.
- 4 said some changes were required.
- 1 said the proposal did not achieve the aim.

Respondents supporting the changes generally noted:

- Where an operator is operating under FRMS, employing additional fatigue risk mitigators, the limitations prescribed in Appendix 2 Clause 8 for continuous standby, should not form the basis upon which CASA approves the FRMS. (Operator).

Respondents suggesting some changes generally noted:

- The maximum FDP should commence from the start of the standby period which should be no longer than 12 hours. This is to avoid situations such as standby for 10 hours and then commencing a 12-hour duty period.
- CASA should consider allowing a longer limit than is currently proposed for standby plus FDP when the FDP contains split duty rest period (currently limited to 16-hours). As this split duty rest period allows for an additional sleep opportunity post having been called out from standby. The current proposed standby rule does not take this into consideration and instead is assuming a continued period of wakefulness with no access to sleep for the entire FDP. (Operator).

Respondents who said the proposal did not achieve the aim generally noted:

- The maximum standby periods suggested should be limited to between 8-12 hours.
- The maximum FDP should commence from the start of the standby period which should be no longer than 12 hours. This is to avoid situations such as been on standby for 10 hours and then commencing a 12-hour duty period.

Options considered

- Retain proposed changes.
- Modify standby limits.

TWG/ASAP feedback

- TWG endorsed an amendment to the proposed rules to permit a combined period of greater than 16 hours only for augmented crew operations or following a split duty rest period of greater than four hours in suitable sleeping accommodation.

CASA response

Some of the responses appear to demonstrate a misunderstanding of the proposed rules. The rules do not allow a period of 10 hours standby followed by a 12-hour FDP. For operations under Appendix 2, the maximum FDP following 10 hours standby would be limited to 6 hours by subparagraph 8.3 unless augmented crew or split duty provisions apply.

Re-assignment of flight duty

This proposal replaces the prescriptive approach to re-assignment of flight duty with an outcome-based approach.

Respondent feedback

Of the 288 respondents who answered this question:

- 165 (57%) said the proposal achieved the aim.
- 48 (17%) said some changes were required.
- 75 (26%) said the proposal did not achieve the aim.

Among the respondents, there were 10 Operators:

- 6 said the proposal achieved the aim.
- 2 said some changes were required.
- 2 said the proposal did not achieve the aim.

Respondents supporting the changes generally noted:

- Regardless of any specified limit, FCMs and AOC holders are required to ensure that the crew are fit and sufficiently rested before commencing any FDP or FDP extension. It makes sense that when operational requirements change, that the ability to facilitate that change is assessed on a case-by-case basis by the FCMs who will be allowing the change to occur (by working longer). (Operator)

Respondents suggesting some changes generally noted:

- There is pressure on Aircrew to extend their duties. Limits must be set to the duration of the reassignment period.
- If the operator has a mature FRMS in place, then 7.1 (c) would occur naturally under the processes in place. Some respondents do not consider this clause as being required to be governed, as formal approval for the extension, will provide unnecessary complication.

Respondents who said the proposal did not achieve the aim generally noted:

- There will be additional pressure on Aircrew to extend their duties. Protections should be put in place to avoid this potential pressure.
- Limits must be set regarding the duration of the reassignment period.

Options considered

- Retain proposed changes.
- Provide prescriptive limits for re-assignment.
- Provide additional guidance for fitness for duty.
- Introduce mandatory reporting and mitigation for less than 5 hours sleep in 12 hours prior to report and 19 hours awake at end of duty.

TWG/ASAP feedback

- TWG endorses an amendment to the proposed rules to remove Appendix 2, Section 7 Reassignment and extension, subparagraph 7.1(c) and amend the note highlighting the flight crew member's obligations under paragraph 16.1.
- CASA accepted the TWG recommendation that CASA provides additional guidance regarding reporting culture.

CASA response

The 2019 ATSB report on pilot fatigue highlighted that pilots who had removed themselves from duty perceived that removing themselves from duty left a negative impression with management and did not feel comfortable doing so (Australian Transport Safety Bureau, 2019). Other studies have identified multiple factors impacting likelihood of fatigue reporting including perceived lack of organisational support, level of professional experience, rank, and personal attributes (Hutter & Lloyd-Bostock, 2015). Accordingly, under-reporting of fatigue incidents is likely very high (Haslbeck, Schmidt-Moll, & Schubert, 2015).

The ATSB (2019) report also highlighted a higher than expected proportion of pilots conducting flights where they reported less than 5 hours sleep or would be awake for more than 19 hours. These sleep thresholds are associated with impaired performance.

As CASA intends to conduct fatigue surveys every two years to assess whether the proposed changes have been effective in reducing fatigue risk, the area of reporting/culture will also be evaluated.

CASA will monitor fatigue as part of ongoing operator oversight. Where necessary, CASA may direct operators to change their manuals and culture to address safety concerns.

Fatigue risk management systems

This proposal amends fatigue risk management system requirements, to achieve a more outcome-based system in response to recommendations 5 and 6.

Respondent feedback

Of the 207 respondents who answered this question:

- 78 (38%) said the proposal achieved the aim.
- 57 (27.5%) said some changes were required.
- 72 (34.5%) said the proposal did not achieve the aim.

Among the respondents, there were 11 Operators:

- 7 said the proposal achieved the aim.
- 2 said some changes were required.
- 2 said the proposal did not achieve the aim.

Respondents supporting the changes generally noted:

- It is very important that requirements are clearly identifiable using suitable terms. We strongly support any action that helps to improve the distinction between legal requirements, guidance material and acceptable means of compliance. (Operator)

- The guidance materials to be issued by CASA are welcomed, particularly related to the application and approval processes and to ensure consistency. (Operator)

Respondents suggesting some changes generally noted:

- CASA should have greater oversight regarding any changes to an FRMS and the monitoring / analysis of fatigue data that is collected.

Respondents who said the proposal did not achieve the aim generally noted:

- CASA should have greater oversight regarding any changes to an FRMS.
- Fatigue data that is collected needs to be monitored and analysed by CASA to ensure appropriate regulatory oversight.
- CASA needs to ensure that commercial interests do not dominate safety principles in the balance of an FRMS.
- The operators should not be given more flexibility in regard to the formation, structure and components of an FRMS.
- Action 5-1 only partially addresses the Recommendation 5. The Action 5-1 does not achieve its objective. The FRMS change process is more prescriptive than the change process in Part 119. Part 119 change process does not prescribe a specific timeframe for notifying CASA of non-significant changes but rather requires the change process in the approved Exposition to be complied with. (Operator)

Options considered

- Retain proposed changes.
- Provide additional prescriptive requirements.

TWG/ASAP feedback

- TWG endorses an amendment to the proposed rules to permit change notification in accordance with approved procedures under CAO 82 or the regulations.
- TWG recommends CASA provide additional guidance regarding FRMS assessment and oversight process for improved transparency.
- The ASAP recommended that CASA explicitly require an operator FRMS to be appropriate for the size and complexity of the organisation.
- The ASAP recommended that CASA permit minor variations to prescriptive limits without the need for an FRMS.

CASA response

CASA reviews and approves FRMS applications in accordance with CAO 48.1 and related ICAO and CASA guidance material. The prescriptive limits provide a starting point for this assessment and any increases in flight duty periods or decreases in rest periods require appropriate mitigation and monitoring of related fatigue risks.

Initial approvals allow for an FRMS trial which provide an opportunity for operators to collect and analyse fatigue data on their operations. Full approval of an FRMS will not be provided until CASA has assessed data from the trial period, including any changes to processes during the trial in response to data.

The change management provisions ensure that CASA has been notified and accepts any significant planned changes to fatigue limits. That is, limits do not change without CASA approval.

CASA can direct changes to an FRMS where necessary, given the outcome of data collections and/or reporting. CASA expects to use this provision only in rare circumstances where an operator is not collecting data or not responding to data indicating increased fatigue countermeasures are required or that more conservative limits are necessary to mitigate fatigue risk.

CASA participates in the fatigue safety action group of large operators as an observer.

The final fatigue rules incorporate the ‘scalability’ provisions that apply under CASR Part 119 for a safety management system.

CASA will permit operators to request minor variations to prescriptive limits without the need for an FRMS. Requests will be required to provide specific details of the variation, an assessment of the related fatigue risk along with plans for additional mitigation and monitoring of the risk. CASA will provide guidance to assist operators with this process in order to ensure the suitability of any such request.

Tone and language

Please provide feedback on specific ways to further improve tone and language in the draft CAO.

Respondent feedback

206 respondents answered the question although most of the responses were a form of 'not applicable'; those that provided a response generally noted:

- Use clear and concise language that is not open to interpretation.
- Simplify the layout of information.

Options considered

Accept the recommendations and feedback and address the tone and language where possible to improve clarity.

TWG/ASAP feedback

- TWG endorsed the proposed instrument and recommended that CASA incorporate any additional opportunities to rearrange the Order to improve readability.

CASA response

CASA will consider further opportunities to simplify the layout during final drafting and provision of guidance material that provides a holistic explanation of how fatigue is managed within CAO 48.1.

Aerial Application

This proposal permits aerial application (aeroplane) operators to continue operating in accordance with Subpart 137.Q of CASR in response to recommendation 8.

Respondent feedback

Of the 68 respondents who answered this question:

- 31 (45.5%) said the proposal achieved the aim.
- 10 (14.5%) said some changes were required.
- 27 (40%) said the proposal did not achieve the aim.

Among the respondents, there were 5 Operators:

- 3 said the proposal achieved the aim.
- 1 said some changes were required.
- 1 said the proposal did not achieve the aim.

Respondents suggesting some changes generally noted:

- AAAA strongly supports the use of CASR Part 137Q for both fixed wing and rotary aerial application fatigue management. However, AAAA is also strongly of the view that CASR Part 137Q should be reviewed and significantly simplified - including coverage of rotary aerial application operations.
- Commercial limitations should be implemented for all aerial operations. These operations can be in close proximity to high capacity RPT flights and hence need to be covered by prescriptive rules.
- There are no obvious flight crew difference between mustering, aerial application, and fire suppression. Therefore, the risk appears the same and so the rules managing such risk should reflect this similarity.

Respondents who said the proposal did not achieve the aim generally noted:

- Aerial application involves high risk operations where the pilot must be alert and have a high level of situational awareness as well as good manipulative skills. Limits beyond those prescribed for RPT should not be utilised.
- What is the scientific justification for the limits beyond those prescribed for RPT?
- The limits appear to be focused on the risk to the public rather than the FCM.
- There is significant commercial pressure on pilots to get the job done in order to secure work for the next season. They are more likely to continue working while fatigued than risk feeling like they have let their mates down.

Options considered

- Retain proposed changes.
- Have a consistent set of FDP limits across all AA operations.
- Impose conditions on the individual obligation for initial fatigue training with recurrent training.

TWG/ASAP feedback

- TWG discussion expressed concerns regarding reduced controls over fatigue risks in Aerial Application noting that the sector has higher accident rates than passenger transport.
- TWG noted that there was limited coverage of the sector within the TWG and that other regulators don't have prescriptive limits for the sector.
- TWG noted that CASA had engaged with the Aerial Application Association of Australia regarding the proposed rule and that the association support the proposed rule.

CASA response

CASA acknowledges concerns that commercial pressures provide an incentive for pilots to accept duties when fatigued. Subpart 137.Q of CASR permits duties that are not permitted for air transport operations due to these operations generally being conducted away for populous areas and other airspace users. CASA notes that other regulators provide no prescriptive limits for this sector and will continue to work with AAAA to improve fatigue education.

Shared responsibility

This proposal aligns the shared responsibility between flight crew and operators in line with proposed measures in Part 91 of CASR, in response to recommendation 9.

Respondent feedback

Of the 278 respondents who answered this question:

- 171 (61.5%) said the proposal achieved the aim.
- 42 (15%) said some changes were required.
- 65 (23.5%) said the proposal did not achieve the aim.

Among the respondents, there were 10 Operators:

- 6 said the proposal achieved the aim.
- 2 said some changes were required.
- 2 said the proposal did not achieve the aim.

Respondents generally noted:

- Further protections should be offered for Aircrew.
- Rostering should be designed to prevent fatigue from occurring.
- Operators should not be permitted to inflict any penalty on the FCM for reporting themselves as fatigued such as take sick leave.
- More pressure will be placed on Aircrew to fly when they are fatigued.

Options considered

- Provide additional guidance for fitness for duty.
- Introduce mandatory reporting and mitigation for less than 5 hours sleep in 12 hours prior to report and 19 hours awake at end of duty.

TWG/ASAP feedback

- TWG agreed that the proposed rules provide sufficient provisions for both pilot and operator management of fatigue.
- TWG recommends that CASA work with industry to provide better education on shared responsibilities and just culture for pilots, operations departments and senior management.

CASA response

See responses to re-assignment of flight duty.

The issue of the use of sick leave when cancelling a flight due to fatigue, is an industrial matter. However, fatigue reporting culture and just culture more broadly, are important factors in managing aviation safety. These will be investigated further.

Consolidation and transitional provisions

This proposal replaces existing fatigue rules to provide clarity of what rules apply and provides a staggered approach to implementation in response to recommendation 9.

Respondent feedback

Of the 243 respondents who answered this question:

- 182 (75%) said the proposal achieved the aim.
- 31 (13%) said some changes were required.
- 30 (12%) said the proposal did not achieve the aim.

Among the respondents, there were 13 Operators:

- 4 said the proposal achieved the aim.
- 5 said some changes were required.
- 4 said the proposal did not achieve the aim.

Respondents generally noted:

- Clear transitional dates need to be set.
- The 30 Sept 2019 transition date for high cap RPT operators is not achievable.

Options considered

- Retain current provisions.
- Extend transition deadlines.
- Consider limited relief from requirements where software systems are unable to be modified by the deadline.

TWG/ASAP feedback

- TWG endorsed an amendment to the proposed rules to extend the transition period subject to operators developing a transition plan, demonstrating progress against the plan and meeting enhanced fatigue management requirements.

CASA response

The final rules have been amended to extend the transition period subject to high-capacity RPT operators developing a transition plan, demonstrating progress against the plan and meeting enhanced fatigue management requirements prior to 30 November 2019.

High-capacity RPT operators intending to operate under Appendix 7 will be required to submit an application for trial FRMS prior to 30 November 2019.

Operators would have until 30 June 2020 to comply with the new rules. However, non-high-capacity RPT operators who submit an FRMS application by 30 June 2020 would have until 30 September 2020 to have their FRMS trial approved.

Other minor wording changes

This proposal includes other minor changes. Do the minor changes introduce unintended consequences?

Respondent feedback

Of the 141 respondents who answered this question:

- 64 (46%) said the proposal introduced unintended consequences.
- 26 (18%) said some changes were required.
- 51 (36%) said the proposal did not introduce unintended consequences.

Among the respondents, there were 9 Operators:

- 3 said the proposal introduced unintended consequences.
- 3 said some changes were required.
- 3 said the proposal did not introduce unintended consequences.

Respondents supporting the changes generally noted:

- Operators using multiple appendices will have difficulty managing the many possibilities that may arise.

A number of concerns that have not been addressed due to the limitations of the present review were discussed:

- There is no recognition of simulator sessions accounting for duty time. This gives potential for a company to roster crew unlimited simulator sessions when the crew member has run out of hours for the week/month/year.
- There are no protections for reporting fatigue by pilots, therefore any potential feedback about scheduling will not happen.
- Any changes need to be implemented with a post-implementation review by relevant stakeholders to ensure that the safety of aviation is not compromised by the changes.
- Respondents look forward to the guidance material that provides the scientific basis of the FCM limits provided as Basic Limits. (Operator)
- Short and infrequent flights are still limited by the requirement to have the same duty-free period as long duty periods. (Operator)

Options considered

- Conduct a fatigue survey prior to transition to the new rules to establish a baseline and use subsequent surveys to evaluate the effectiveness of the new rules.
- Require adequate rest prior to simulator training to ensure that adequate training effect is obtained.

TWG/ASAP feedback

- TWG noted that simulators are included in flight duty period or duty period as described in the definitions for duty, duty period and flight duty period at paragraph 6.1 of the 2019 CAO.
- CASA should clarify paragraph 10.1, note 2 of the 2019 CAO.

CASA response

Some responses indicate a potential misunderstanding of how simulator training relates to flight duty periods and duty periods generally. Simulators are included in flight duty period or duty period as described in the definitions for duty, duty period and flight duty period at paragraph 6.1 of the 2019 CAO. CASA has clarified paragraph 10.1, note 2 of the 2019 CAO.

Impact of casual day on future roster

A TWG member identified a concern with the cumulative off-duty requirements in Appendix 2, clauses 10.5 and 10.6.

When crew accept a duty on a rostered casual day, they may be inadvertently impacting future cumulative off-duty requirements that will prevent them fulfilling the remainder of the roster.

Some TWG members suggested that accepting duty on a casual day should be counted as an off-duty period, as if it were recreational flying. This was not broadly supported. CASA is seeking industry feedback.

Respondent feedback

245 respondents answered the question and generally noted:

- A flying duty is just that a duty and therefore MUST be counted towards cumulative duty limits. The operator should have sufficient capacity to negate future roster implications.

Options considered

- No change to proposed rules.
- Permit FCMs to work on a casual day and consider this ‘recreational flying’.
- Review the cumulative off-duty requirements.

TWG/ASAP feedback

- TWG was unable to reach consensus in relation to this proposal and referred the issue to the ASAP to provide advice to CASA.
- Some TWG members contended that flying on an off-duty day must be regarded as a duty day and impact cumulative off-duty provisions.

- Some TWG members contended that prohibiting FCMs from working on a day off amounted to a restriction on their right to work. These members proposed an approach that permitted FCMs to work on a day off, subject to FCM agreement on a case by case basis.
- Based on ASAP and TWG feedback, CASA proposed an alternative approach to remove the requirement for 24 days off in 84 days and reduce the requirement from seven to six days off-duty in 28 days.
- The ASAP did not support the six days off in 28 days requirement and recommended that the requirement be removed. The ASAP considered that the requirement is more constraining than requirements of comparable NAAs as well as the current standard industry exemption and considered that it lacks supporting evidence.
- The ASAP supported retention of the requirement for 36 hours off-duty, including 2 local nights, every 7 days.

CASA response

Fatigue science does not provide a simple solution for how many days are required to recover from cumulative fatigue. Work rosters, quality/quantity of sleep achieved, and individual variability are key factors in the cumulative impact of fatigue.

The rules permit pilots to work in conditions that can accumulate fatigue risk including long hours, irregular schedules and operating during the window of circadian low. In order to mitigate cumulative fatigue, the rules prescribe off-duty periods following an FDP, as well as two local nights' rest each week. The cumulative off-duty requirements (over 28 consecutive days) provide additional opportunities to recover from fatigue accumulated over that period.

CASA considered the approach of other regulators in determining the cumulative off-duty requirements.

UK Civil Aviation Authority and Hong Kong Civil Aviation Department require an average of 8 days off-duty per 28 days. The previous high capacity regular public transport standard industry exemption and Civil Aviation Order 48.1 Instrument 2013 had similar requirements.

EASA requires the equivalent of 6 days off duty per month.

The FAA and Transport Canada require 4 days off per 28 days.

Of note, the CAO 48.1 *local night* definition permits an earlier start than any of the comparable regulators. This means that the sleep achieved in the second night of the weekly recovery period may be lower quality and quantity when compared to other jurisdictions.

In addition to the aviation safety rules, the European Commission has parallel requirements for an average 8 days off duty per month in its working time regulations. In Australia, the *Fair Work Act*, Pilot Award and any relevant enterprise agreements operate in parallel with CAO 48.1 and the more restrictive requirements would apply.

CASA has modified the cumulative off-duty provisions to require 6 days off per 28 days. This is more closely aligned with the EASA approach to managing cumulative fatigue.

Off duty requirements when transitioning between appendices

The cumulative off-duty periods for operations under Appendices 4B, 5 and 5A are less restrictive than other appendices. A problem arises when a flight crew member has been

operating under one of these appendices and then seeks to operate under Appendix 2, as they may not meet the cumulative off-duty requirements.

The simplest way to enable transitioning between appendices is to always meet the more restrictive cumulative off-duty requirements. If this is not possible, Part 3 - Limits and requirements, Clause 13A, provides a discounted method for meeting the 24 days off-duty in previous 84 days requirement.

Industry feedback has highlighted that this approach is overly complex. CASA is seeking industry input of alternative ways to meet this requirement.

Respondent feedback

225 respondents answered the question. Those who provided a response generally noted:

- The 7 in 28 rule is overly restrictive for smaller operators including training organisations.
- The most restrictive appendix should apply.
- Check for additional comments / solutions.

Options considered

- Consider modification to the 7 in 28 rule with appropriate mitigation.
- Retain existing rules.
- Modify the cumulative off duty day requirements, generally.
- Introduce an alternative approach for a single duty period.

TWG/ASAP feedback

- TWG and ASAP feedback in relation to cumulative off-duty requirements is detailed above.
- TWG and ASAP feedback in relation to conduct of a single duty period is detailed below.

CASA response

CASA has retained the requirements for transitioning between appendices; however, these requirements have been re-drafted to align with the revised cumulative off-duty requirements. The revised requirements will substantially simplify transition between appendices.

Transitioning between appendices for a single duty period

Some operators have proposed an alternative approach to transitioning appendices by providing an opportunity for a limited flight duty period regardless of prior duty. This would permit flight crew members operating under Subpart 137.Q or Appendices 4B, 5 and 5A to conduct limited passenger carrying or training flights without the need for an extended off-duty period. A potential approach is detailed below:

a. A flight crew member may conduct passenger transport operations following a period of operations under Subpart 137.Q of CASR or Appendices 4B, 5 or 5A if:
    i. the off-duty period undertaken immediately prior to the FDP was at least 12 hours including a local night

ii. the previous FDP was less than 8 hours
iii. the proposed FDP will be less than 8 hours.

CASA is seeking industry feedback on this approach.

Respondent feedback

Of the 206 respondents who answered this question:

- 54 (25.4%) said the proposal achieved the aim.
- 21 (10.2%) said some changes were required.
- 131 64.4(%) said the proposal did not achieve the aim.

Among the respondents, there were 9 Operators:

- 3 said the proposal achieved the aim.
- 3 said some changes were required.
- 3 said the proposal did not achieve the aim.

Respondents suggesting some changes generally noted:

- The most restrictive appendix should be utilised for transitioning between appendices.

It is unclear as to whether this approach refers to transitioning between appendices from one single FDP to another or whether it is referring to transitioning between appendices within the same single FDP.

Respondents who said the proposal did not achieve the aim generally noted:

- The most restrictive appendix should be utilised for transitioning between appendices.

Options considered

Rely on the changes to the FDP for the operators within these appendices to resolve the issue.

TWG/ASAP feedback

TWG endorsed the alternative approach to conduct one-off passenger transport operations while not meeting the cumulative off-duty requirements of Appendix 2, 3 or 4 based on the following limitations:

- off-duty period immediately prior to the planned flight duty period is at least 12 hours
- the report time is 0700 or later
- the previous flight duty period was less than 8 hours
- the planned flight duty period will be less than 8 hours
- only two consecutive FDP are permitted using this approach.

CASA response

The alternative approach incorporating TWG recommended changes will be included in the final version of CAO 48.1 Instrument 2019 .

Split duty restrictions for charter

A TWG member identified that the 6-hour limit on flight duty period following split duty in Appendix 2 subclause 4.5 was overly restrictive for some charter operations.

CASA is seeking industry feedback on:

- whether this is a broad issue
- any proposed options for resolution.

Respondent feedback

227 respondents answered the question, although most responses were a form of 'not applicable'. Those that provided a response provided conflicting advice:

- Split duties are fatiguing and the proposed rules are not too restrictive.
- Split duties are not fatiguing and the proposed rules are too restrictive.
- The issue of split duties should be managed via an FRMS.

Options considered

- Retain proposed requirements.
- Amend split duty requirements.

TWG/ASAP feedback

TWG discussed the split duty requirements and clarified that Appendix 5 permitted a longer FDP in appropriate circumstances. The TWG also noted that operators could transition FCM between Appendices 2 and 5 relatively easily, if the FCM maintained the cumulative off duty requirements of Appendix 2.

CASA response

No change to the proposed requirements.

General response

Are the proposed changes to the fatigue rules appropriate and can they be complied with by industry without undue burden?

Respondent feedback

Of the 307 respondents who answered this question:

- 32 (10.5%) said the proposal achieved the aim.
- 63 (20.5%) said some changes were required.
- 212 (69%) said the proposal did not achieve the aim.

Among the respondents, there were 13 Operators:

- 9 said the proposal achieved the aim.
- 2 said some changes were required.
- 2 said the proposal did not achieve the aim.

Respondents suggesting some changes generally noted:

- In order to properly address the longstanding issue of flight crew fatigue, the industry needs to recognise the issue properly and implement a science-based fatigue rules as a matter of urgency. It is incumbent that industry accept its role in maintaining Australia’s aviation safety record.
- There are issues with the method of calculating the maximum FDP's in that they are not using fatigue science, but rather using averages. This can be reconciled with the use of fatigue science to determine maximum FDP's and minimum rest periods.

Industry respondents who said the proposal did not achieve the aim generally noted:

- There is not sufficient time to implement changes in CAO 48.1 given the proposed timeline of 30 September 2019 for large operators.

Pilot respondents who said the proposal did not achieve the aim generally noted:

- Scientifically based data was not used and needs to be gathered to ensure the safest possible limits are considered.

Options considered

See previous responses to similar issues raised.

TWG/ASAP feedback

See previous responses to similar issues raised.

CASA response

See previous responses to similar issues raised.

Specific rostering issues

Please identify any specific rostering issues that you expect due to these changes. Please provide as much information as possible to assist us to resolve potential issues. If required, attach any supporting documents on the final page of this survey.

Respondent feedback

249 respondents answered the question and generally noted:

- Multiple early starts that infringe the WOCL will not be addressed unless they are consecutive, and even then, the reduction in FDP is insufficient to prevent fatigue.
- Late night operations are not addressed at all. There are no restrictions on multiple late-night operations finishing as late as 0159. A pilot finishing this late is unlikely to be in bed before 0330.
- There are no restrictions on early to late transitions. Multiple early starts can be rostered followed by multiple late finishes prior to 0159.
- Limited specific schedule information was provided to support the issues described.

Options considered

See previous responses to similar issues raised.

TWG/ASAP feedback

See previous responses to similar issues raised.

CASA response

See previous responses to similar issues raised.

Aviation safety risk

Are there any significant aviation safety risks which have not been addressed in the draft CAO 48.1 Instrument 2019?

Respondent feedback

Of the 259 respondents who answered this question:

- 231 (89%) said the proposal did not achieve the aim.
- 28 (11%) said the proposal achieved the aim.

Among the respondents, there were 12 Operators:

- 6 said the proposal achieved the aim.
- 1 said some changes were required.
- 5 said the proposal did not achieve the aim.

Respondents who said the proposal did not achieve the aim generally noted:

- Fatigue will increase and safety will be compromised.
- Sleep during rest periods will be compromised.
- Multiple early starts that infringe the WOCL will not be addressed unless they are consecutive, and even then, the reduction in FDP is insufficient to prevent fatigue.
- Late night operations are not addressed at all. There are no restrictions on multiple late-night operations finishing as late as 0159. A pilot finishing this late is unlikely to be in bed before 0330.
- There are no restrictions on early to late transitions. Multiple early starts can be rostered followed by multiple late finishes prior to 0159.
- I think the difference between full time exclusive employees and casual multi-employer FCM’s needs to be explored. It needs to be considered that organisations that operate with full time exclusive pilots have significantly more oversight that companies that use casual or part time pilots where oversight is much less transparent. (Operator)

Options considered

See previous responses to similar issues raised.

TWG/ASAP feedback

See previous responses to similar issues raised.

CASA response

CASA appreciates the input from the aviation community. At this time, matters arising from the 2017 Fatigue Review were considered by the TWG as they related to amending CAO 48.1 (2013). However, a number of concerns raised through the public consultation will be included in future research / industry surveys.

Priorities

When you reflect on the feedback you have provided throughout this consultation, what are the three matters you consider most important?

Respondent feedback

302 respondents provided feedback on their priorities. The most common themes were:

- Safety
- Fatigue
- Science based FDP
- WOCL encroachment
- Health – Wellbeing
- Class 3 rest
- Rest opportunities – Off duty periods
- Disruptive schedules (e.g., early to late)

Additional documentation

Respondent feedback

18 respondents uploaded a file to support their submission, 5 of these were from Operators.

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