



Government
of Canada

Gouvernement
du Canada

Home (<http://www.canada.ca/en/index.html>) → How government works (<http://www.canada.ca/en/government/system/index.html>)
→ Treaties, laws and regulations (<https://www.canada.ca/en/government/system/laws.html>) → Canada Gazette (</accueil-home-eng.html>)
→ Publications (</rp-pr/publications-eng.html>) → Part I: Vol. 151 (2017) (</rp-pr/p1/2017/index-eng.html>)
→ July 1, 2017 (</rp-pr/p1/2017/2017-07-01/html/index-eng.html>)

Vol. 151, No. 26 — July 1, 2017

Regulations Amending the Canadian Aviation Regulations (Parts I, VI and VII – Flight Crew Member Hours of Work and Rest Periods)

Statutory authority

Aeronautics Act

Sponsoring department

Department of Transport

REGULATORY IMPACT ANALYSIS STATEMENT

(This statement is not part of the Regulations.)

Executive summary

Issues: Flying (piloting) is a highly psychomotor and cognitively demanding job. Working multiple long duty days consecutively without adequate rest and restoration will degrade human performance over time. The current Canadian regulatory regime does not reflect the scientific principles and knowledge on fatigue that were only discovered and understood in the last few decades. In addition, there is a gap between the *Canadian Aviation Regulations* (CARs) and International Civil Aviation Organization (ICAO) standards and those of other jurisdictions such as the Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA). Inconsistency with other jurisdictions would affect the public's confidence and trust in Canadian civil aviation safety standards.

Description: The proposal would amend prescriptive requirements and introduce a Fatigue Risk Management System (FRMS) exemption mechanism for all air transport services in Canada (excluding private operators and aerial work operators). The proposed prescriptive amendment would apply to air operators who are subject to Subparts 703 *Air Taxi Operations*, 704 *Commuter Operations*, and 705 *Airline Operations* of the CARs. However, an FRMS would be an option for air operators who are subject to Subparts 702, 703, 704 and 705.

Air operators who are subject to Subpart 705 would have one year to implement the new requirements, upon their coming into force, while air operators subject to Subparts 703 and 704 would have four years.

Cost-benefit statement: The proposed amendments would allow Canada to meet ICAO obligations, and would also reduce flight crew member fatigue, which has been linked to accidents and incidents. (*see footnote 1*) Estimates show that the potential reduction in accidents would save passengers, flight crew members and air operators approximately \$314.30 million over the next 15 years (2018–2032). Benefits to flight crew members were only partially quantified due to lack of data.

Adopting the proposed amendments would cost industry about \$337.65 million over 15 years, mainly due to the changes to flight crew scheduling requirements. The data used to value the change in crew scheduling costs was drawn in great part from consultation with industry. Overall, the analysis leads to an estimated net cost of \$23.35 million over the relevant 15-year period.

“One-for-One” Rule and small business lens: The “One-for-One” Rule does not apply. The small business lens applies and analysis was conducted that compared the initial option to the flexible option recommended by Transport Canada. The flexible option would provide a longer compliance period for Subparts 703 and 704 air operators and would reduce the annualized average cost by roughly 28%. (The costs listed for Subpart 702 air operators are for FRMS only.) Overall, the flexible option would save Canadian small businesses roughly \$56.99 million over the 15-year time frame.

Domestic and international coordination and cooperation: The proposed amendments would ensure that Canada is meeting its ICAO obligations. Transport Canada will continue to advance the promotion and pursuit of international cooperation, collaboration, sharing of best practices, and the negotiation of mutual recognition arrangements between key trading partners in order to have in place a safe and efficient aviation industry and supporting regulatory framework.

Canada's key trading partners, including the United States and the European Union, have moved ahead of Canada in terms of making amendments to regulations respecting flight crew fatigue management. Canada needs to address this gap to maintain public confidence.

Background

On February 12, 2009, Colgan Air Flight 3407 crashed into a house in Clarence Center, New York, after experiencing an aerodynamic stall. All 49 people on board were killed, along with one person in the house. This disaster brought flight crew member fatigue to the forefront as an international air safety issue. When the accident investigation was complete, the United States' National Transportation Safety Board (NTSB) stated "the pilots' performance was likely impaired because of fatigue."

ICAO

- defines fatigue as a physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness, circadian phase, or workload (mental and/or physical activity) that can impair a flight crew member's alertness and ability to safely operate an aircraft or perform safety-related duties; and
- identifies fatigue as a major human-factor safety hazard because it affects most aspects of a flight crew member's ability to perform their duties.

Within this context, ICAO amended the associated Standards and Recommended Practices (SARPs) to Annex 6 of the Convention on International Civil Aviation (Operation of an Aircraft) Part I (International Commercial Air Transport — Aeroplanes, Chapter 4, Section 10) in 2009, to include a series of standards for fatigue management requirements (Annex A). One standard is for state members to establish regulatory requirements for flight time, flight duty time, duty periods and rest period limitations based on scientific principles and knowledge, to enable flight crew members to perform at an adequate level of alertness.

ICAO further updated the SARPs in 2011, to introduce new requirements for state members to develop and implement an FRMS as an alternative to prescriptive requirements respecting fatigue. Using an FRMS allows air operators certain flexibility to deviate from the prescriptive requirements while keeping the pilot's alertness and flight's safety level at least equivalent to the prescriptive requirements.

On January 4, 2012, the FAA issued a final rule that was published in the *Federal Register* as Flight Crew Member Duty and Rest Requirements 77 FR 330-403. The regulations, found under 14 CFR 117, 119 and 121, became effective on January 4, 2014.

The EASA amended EU regulations governing flight and duty time limitations in 2014. These regulations came into force in February 2016. The EU's rules are stricter than the FAA's in terms of maximum flight duty time and minimum required rest. They include an FRMS and flight time specification schemes that allow air operators to deviate slightly from required flight and duty time limitations in certain circumstances.

Many other civil aviation authorities, including those of Australia and India, have all enacted new regulations that meet the ICAO SARPs.

The current Canadian regulatory regime for flight duty time predates the introduction of the CARs. It is based on a very basic model of regulating flight crew fatigue (i.e. to limit the daily hours of work; provide regular time off; and limit the number of flight hours per week, month and year.) In other words, it does not take into account

- the effects of working at different times of the day (i.e. circadian body clock);
- factors such as sleep hygiene and sleep quality; and
- the effects of cumulative fatigue due to workload or operational context or other reasons, that were only discovered and understood in the second half of the 20th century.

Issues

The nature of work in the aviation transportation sector makes the industry particularly vulnerable to risks associated with performance and alertness and the hazards associated with fatigue.

Flying (piloting) is a highly psychomotor and cognitively demanding job. Pilots, who are responsible for safe operations, face long workdays, often during night time or early morning hours. Working multiple long duty days consecutively without adequate rest and restoration will degrade human performance over time. Because flight crew members must sometimes rest or sleep away from home, conditions for rest and sleep quality are also important factors to be considered.

The current Canadian regulatory regime does not reflect the scientific principles and knowledge on fatigue, such as working at different times of the day, sleep hygiene and quality, and mitigating the effects of cumulative fatigue. In addition, there is a gap between Canadian regulations and those of other jurisdictions such as those of the FAA and EASA, as well as with the ICAO Standards. The ICAO Standards mandate contracting states to establish regulations for

- flight time;
- flight duty time;
- duty period limitations; and
- minimum rest periods.

Therefore, Canada needs to amend its regulations in order to comply with ICAO Standards and to reflect scientific principles on fatigue.

Objectives

The objectives of the proposed amendments are to

- Enhance safety within flight operations by amending the current limitations associated with flight duty for flight crew members. It would introduce the concept of "fit for duty" and an alternative FRMS option that would allow air operators to deviate from some of the prescriptive requirements for specific flights on the basis of an alternative way to manage fatigue under an FRMS;

- Increase the CARs' compliance with the ICAO Standards (see footnote 2) relating to flight duty limitations and rest time, based on scientific principles and knowledge, and allow the use of an FRMS; and
- Reduce existing gaps with respect to maximum flight duty and rest time and ensure harmonization with other jurisdictions such as the FAA and EASA.

Description

Applicability

The proposal would amend prescriptive requirements (except for private operators and aerial work air operators) and introduce an FRMS option to deviate from the prescriptive requirements for all air transport services in Canada. The proposed prescriptive requirements would apply to air operators who are subject to Subparts 703 *Air Taxi Operations*, 704 *Commuter Operations*, and 705 *Airline Operations* of the CARs. However, an FRMS would be an option for air operators who are subject to Subparts 702, 703, 704 and 705 of the CARs.

1. Maximum flight time

Flight time means the time from the moment an aircraft first moves under its own power for the purpose of taking off until the moment it comes to rest at the end of a flight. The amendment proposes to reduce annual flight time limits (paragraph 700.15(1)(a) of the current CARs) from 1 200 to 1 000 hours in any consecutive 365 days. This provision uses flight time as a measure of workload that leads to fatigue.

2. Maximum flight duty period

Flight duty period (FDP) means the period of time that begins at the earliest of the following events and ends when the engines are off or the rotors are stopped at the end of a flight:

- (a) the flight crew member carries out any duties assigned by the operator before reporting for a flight;
- (b) the flight crew member reports for a flight or, if the flight duty period consists of more than one flight, reports for the first flight;
- (c) the flight crew member reports for positioning; and
- (d) the flight crew member reports as a flight crew member on standby.

The flight duty time limit under subsection 700.16(1) of the current CARs is 14 consecutive hours in a 24-hour period. A workday of 14 consecutive hours is considered too long a duty period to maintain performance throughout.

The proposed regulatory amendment would introduce a range of flight duty period from 9 to 13 hours as per the table below. Limits would be set per the start time of the flight duty (i.e. the time of day) and by the number of flights.

Table: Maximum Daily FDP Calculation				
Average Flight Time		Column 2	Column 3	Column 4
		Number of Flights		
50 minutes or more		1-4	5-6	7+
30 minutes or more but less than 50 minutes		1-7	8-11	12+
less than 30 minutes		1-11	12-17	18+
Item	Start of FDP	Maximum FDP (hours)		
1	24:00-03:59	9.0	9.0	9.0
2	04:00-04:59	10.0	9.0	9.0
3	05:00-05:59	11.0	10.0	9.0
4	06:00-06:59	12.0	11.0	10.0
5	07:00-12:59	13.0	12.0	11.0
6	13:00-16:59	12.5	11.5	10.5
7	17:00-21:59	12.0	11.0	10.0
8	22:00-22:59	11.0	10.0	9.0
9	23:00-23:59	10.0	9.0	9.0

Note: Day Visual Flight Rules (VFR) operation would use column 2 (not limited by the number of flights or average flight duration).

3. Maximum duty time

In the proposal, the maximum duty time would relate to the time free from duty options. The following demonstrates the two aspects of the proposed provision.

(a) Maximum duty time

Proposed section 700.29 would introduce a new concept of cumulative duty hour limits to address cumulative fatigue. There is currently no daily, weekly, monthly or annual duty time limit to avoid the cumulative impact of long working hours that induce fatigue.

The yearly duty time limit was calculated based on the *Canada Labour Code*, which establishes a maximum of 2 400 working hours in any 365 consecutive days.

The weekly (seven days) limit (i.e. 60 or 70 hours) and monthly (or 28-day period) limit (192 or 210 hours) would be new requirements. The “monthly” and “weekly” limits would relate to time free from duty options as outlined below.

Options	Time Free From Duty (if Pilots Are Free From Duty)	Maximum Duty Time	Hours per 7 Days	Hours per 28 Days	Hours per 365 Days
Option 1	33.5 hours / 8 days (over 2 nights) x 4 per 28 days	Option 1	60	192	2 400
Option 2	5 days off / 21 days on	Option 2	70	192	2 400
Option 3	5 days off / 28 days on	Option 3	70	210	2 400

(b) Time free from duty

Current regulations allow for at least 36 consecutive hours of time free from duty within each consecutive seven days (paragraph 700.19(1)(a) of the CARs). The proposed amendment changes the current requirements for time free from duty by introducing a period of time free from duty of 33 consecutive hours in eight days (i.e. 192 consecutive hours), in which the time free from duty would begin no later than 22:30 and end no earlier than 07:30 on the second subsequent morning. Although this reduces the total time free from duty by 3 hours, this amendment would require that time free from duty occur over the course of two nights (two quality sleep opportunities) and provide the flight crew with the opportunity for recovery from the effects of cumulative fatigue. In addition, there are time free from duty options for 21- and 28-day rotational operations.

4. Rest period

Science shows that people need a regular rest period to avoid acute fatigue. Currently, after completing a flight duty period, the pilot will receive a rest period of eight hours plus time for travel, meals, and personal hygiene.

Proposed section 700.40 would require flight crew members to be provided sufficient rest time as follows:

- When they are at home base
 - a period of 12 consecutive hours or 11 consecutive hours plus travel time, or
 - if the air operator provides a suitable accommodation, a period of 10 hours in that suitable accommodation; and
- When they are away from home base, a period of 10 consecutive hours in a suitable accommodation would be required.

5. Rest period: Disruptive schedules, consecutive night duty periods, time zone differences, positioning

The proposed amendment would provide additional rest opportunities for flight crew members when transitioning from FDP start times that are very fatiguing due to the shift in start times. It includes scenarios such as disruptive schedules, time zone differences, night duties and positioning.

(a) Disruptive schedules

This new concept introduced in section 700.41 aims to address the shift of start duty time. It refers to changing from a late night duty to early duty or vice versa. Dramatic shifts of the start duty time will disrupt a flight crew member's circadian cycle (i.e. disrupt sleep patterns, which results in fatigue). A local night's rest is required to prevent or reduce fatigue associated with the circadian cycle disruption. In other words, an air operator would have to provide a flight crew member a local night's rest between a late duty (i.e. hours of work that end between 00:00 and 01:59) or night duty (i.e. hours of work that begin between 13:00 and 01:59 and that end after 01:59), and an early duty (i.e. hours of work that begin between 02:00 and 06:59); or between an early duty, and a late duty or night duty.

(b) Consecutive night duty periods

Proposed section 700.51 addresses the additional rest and methods of counteracting fatigue resulting from multiple consecutive night duty periods. The intent is to capture any duty that is combined with a subsequent night flight duty period. It would allow

- three consecutive night duty periods followed by a local night's rest; or
- five consecutive nights with a rest period of at least three hours in a suitable accommodation during each night duty period (split flight duty).

(c) Time zone differences

Crossing multiple time zones induces fatigue because the person is out of sync with local time. Therefore, the further away (time zones) a flight crew member moves from his or her acclimatized time, and the longer time he or she spends away from that acclimatized time, the more fatiguing it is in the return to the starting point. To compensate for this, proposed section 700.42 imposes one, two or three additional local nights' rest to recover, depending on the time zone differences and total time the flight crew member spends away from home base.

(d) Positioning

Positioning occurs when a flight crew member must travel at the request of the air operator from one point to another before or after a flight. Proposed section 700.43 sets out the conditions under which an air operator may require the positioning of a flight crew member and how to address the fatigue resulting from the positioning flight.

Where positioning follows an FDP and the duration of the duty period exceeds the permitted maximum flight duty period by

- Three hours or less — the air operator must provide a rest period that is equal to the duration of the duty time; and
- Three hours or more — the air operator must provide a rest period that is equal to the duration of the duty time plus the time spent positioning in excess of the FDP.

Examples:

FDP = 13 hours + 3 hours positioning = 16 hours of rest

FDP = 13 hours + 4 hours positioning = 17 + 4 = 21 hours of rest

6. FDP due to in-flight rest and augmented flight crew

Proposed section 700.60 would modify the current regulations to reflect the fatigue science and provide detailed criteria for permitting extensions to flight duty periods as a result of in-flight rest.

This section would provide extensions to the FDP based on the quality of the rest facility and whether there is one or two additional flight crew members available to provide augmentations to the pilots flying.

The maximum flight duty periods assigned by the air operator are to be as follows:

With one additional flight crew member and a

- Class 3 rest facility: ([see footnote 3](#)) a maximum FDP of 14 hours; or
- Class 1 ([see footnote 4](#)) or 2 ([see footnote 5](#)) rest facility: a maximum FDP of 15 hours; or

With two additional flight crew members and a

- Class 3 rest facility: a maximum FDP of 15.25 hours;
- Class 2 rest facility: a maximum FDP of 16.5 hours; or
- Class 1 rest facility: a maximum FDP of 18 hours.

7. Long range flight

As a result of proposed section 700.61, no pilot shall operate an additional flight following a planned flight greater than seven hours long if it occurs within the flight crew member's window of circadian low (WOCL).

Where there is an operational necessity to fly a continuing flight, and it infringes on the flight crew member's WOCL, the air operator would have to submit a proposal that outlines mitigation supported by a safety case (FRMS).

8. Ultra long-range flight

Based on international practices, flights with an FDP of over 18 hours or a flight time of over 16 hours would have to operate under an exemption from the prescriptive requirements (FRMS).

9. Unforeseen operational circumstances

The requirements respecting unforeseen operational circumstances are set out in section 700.17 of the CARs. This section permits overly long flight duty time (periods) that causes acute fatigue. Proposed section 700.63 reflects modern fatigue science. It emphasizes the authority of the pilot-in-command to reduce or extend the flight crew member's flight duty period and requires consultation with all flight crew members. The pilot-in-command may increase the flight duty period by

- one hour for single-pilot operation;

- two hours for not augmented flight (two-pilot operation);
- three hours for augmented flight crew if operating a single flight; and
- two hours for augmented flight crew if operating two or three flights.

The following table briefly summarizes the current and proposed limits in the nine areas described above.

Areas for Adjustment	Current Limits	Proposed Limits				
1. Maximum flight time	— 40–60 hours / 7 days — 120 hours / 30 days — 300 hours / 90 days — 1 200 hours / 365 days	— 112 hours / 28 days — 300 hours / 90 days — 1 000 hours / 365 days				
2. Maximum flight duty period	13 hours 45 minutes or 14 hours	Maximum 9–13 hours — based on start time of day and sectors flown				
3. Maximum duty time						
3(a) Maximum duty time	Nil		Hours Per 7 Days	Hours Per 28 Days	Hours Per 365 Days	
		Option 1	60	192	2 400	
		Option 2	70	192	2 400	
		Option 3	70	210	2 400	
3(b) Time free from duty	— 36 hours / 7 days — 3 days / 17 days — 3 periods x 24 hours / 30 days — 13 x 24 hours / 90 days	Option 1	33.5 hours / 8 days (over 2 nights) x 4 per 28 days			
		Option 2	5 days off / 21 days on			
		Option 3	5 days off / 28 days on			
4. Rest periods	8 hours, plus time for travel, meals and hygiene	At home — 12 hours or 11 hours plus travel time, or 10 hours in a suitable accommodation provided by the air operator Away from home — 10 hours in a suitable accommodations				
5. Rest periods	Nil	Additional Rest Period Due to		Local Nights Rest Required		
5(a) Disruptive schedules		Disruptive schedules		1		
5(b) Time zone differences		Time zone difference		1, 2 or 3		
5(c) Consecutive night duties		3 consecutive night duty periods		1		
5(c) Consecutive night duties	Nil	Allow 5 consecutive nights with a split duty				
5(d) Positioning	Half the time in excess of maximum flight duty time is calculated into the following rest period	If positioning 3 hours or less in excess of max flight duty period, the rest period must equal the duty period; If positioning greater than 3 hours in excess of max flight duty period, the rest period must be equal to duty period plus time spent in excess of max flight duty period; and More than 7 hours of positioning — FRMS required.				
6. FDP due to in-flight rest and augmented flight crew	Pilots	Seat	Bunk	Pilots	1 more	2 more
				Class 3 rest facility	14 hours	15.25 hours
	1 more	17 hours	20 hours	Class 2 rest facility	15 hours	16.5 hours
				Class 1 rest facility	15 hours	18 hours
			>18 hours extension requires an FRMS.			
7. Long range flights		No additional FDP following a greater than 7-hour flight if it occurs within the WOCL.				

8. Ultra long-range flight	Permitted (standard 720.16(3))	Permitted only under an FRMS.	
9. Unforeseen operational circumstances	Add 3 hours to flight duty period	Number of flight crew members	Permitted additional flight duty period
		One pilot	One additional hour
		Not augmented (two pilots)	Two additional hours
		Augmented	If one flight, three additional hours If two or three flights, two additional hours

Window of circadian low (WOCL) means the period between 02:00 and 05:59 at the location where a flight crew member is acclimatized.

Fitness for duty

Several factors may affect fitness for duty. They include consumption of alcohol or drugs, mental and physical conditions, and fatigue. Proposed amendments to section 602.02 of the CARs would prohibit an operator of an aircraft to require any person to act as a flight crew member or to carry out any pre-flight duties, or a person to act as a flight crew member or carry out such a duty, if the operator or the person is not, or is not likely to be, fit for duty.

The proposed amendments to paragraph 602.03(a) of the CARs would prohibit a crew member from working within 12 hours after consuming an alcoholic beverage (an increase from the current limit of 8 hours).

Fatigue Risk Management System

The proposed Regulations would provide to Subparts 702, 703, 704 and 705 air operators the option to deviate from the prescriptive requirements (except for maximum annual flight time and maximum annual duty time) provided they can demonstrate, by way of a safety case, that they can provide at least the same level of safety as the prescriptive requirements introduced as part of this proposal.

An FRMS is a management system air operators use to identify and minimize the acute and chronic sources of fatigue and manage the potential risks associated with fatigue. An FRMS is a holistic risk management approach, in which air operators

- identify hazards;
- assess risk;
- develop mitigation strategies;
- offer training and education programs;
- introduce fatigue monitoring systems; and
- adopt continual improvement processes to reflect changing circumstances; and feedback.

From an operational perspective, an FRMS serves as a prevention, prediction, detection, and intervention regime.

An FRMS allows an air operator to tailor its fatigue management policies, procedures, and practices to its specific conditions and unique operational demands that induce fatigue. In general terms, an FRMS allows the air operators to

- base their operations on scientific fatigue knowledge;
- test its effectiveness through bio-mathematical software, pilot surveys, monitoring and other alertness testing; and
- demonstrate if pilot fatigue is increased and alertness levels are maintained.

A typical FRMS comprises four components:

Component	Elements
1. Fatigue Risk Management Plan	FRMS policy, safety objectives, safety indicators, FRMS responsibilities, fatigue reporting policy, training plan and communication plan
2. Fatigue Risk Management Process	Fatigue reporting procedure, identification of fatigue-related hazards, data collection and analysis, method to analyze planned work schedules, risk assessment and management process
3. Fatigue Risk Management Promotion	Training program for FRMS components, employee responsibilities, impact of fatigue on aviation safety, how to recognize fatigue, sleep disorders, human and organizational factors that may cause fatigue, actions to be taken for fatigue-related risks, personal fatigue management strategies Communication procedure to inform employees of the FRMS and fatigue-related issues

4. Fatigue Risk Management System Assurance	FRMS audit process, procedures to assess and improve FRMS effectiveness, procedures to develop/implement/monitor corrective and preventative measures
--	---

In order to be permitted to deviate from prescriptive requirements, an air operator would need to submit to Transport Canada

- an initial notice of intent to express their intention to adopt an FRMS; and
- a letter of confirmation to commence operating specific flights under an FRMS.

Air operators would have to use fatigue data or science evidence to demonstrate that their proposed deviation is safe and they have managed all risks. Transport Canada would reserve the right to assess the air operator's readiness to begin implementing an FRMS.

The proposed Regulations would permit deviations from the prescriptive limitations in accordance with the FRMS if

- (a) the operator demonstrates that applying their FRMS does not increase the level of fatigue nor decrease the level of alertness of flight crew members; and
- (b) the operator can demonstrate this through a safety case supported by data.

Data could include, but not be limited to the following:

- (a) flight crew member performance data;
- (b) aircraft flight data monitoring to assess the operational errors;
- (c) accident or incident information;
- (d) work schedules report;
- (e) comparisons of planned schedules in relation to time worked; and
- (f) a review of operational or administrative duties;

Air operators operating pursuant to Subpart 705 would have one year to implement the proposed Regulations after their coming into force, while air operators operating pursuant to Subparts 703 and 704 would have four years.

Regulatory and non-regulatory options considered

Voluntary approach

Through labour agreements and risk management, and given that the United States and other countries have implemented prescriptive requirements and FRMSs, some Canadian air operators may have already begun or could begin adapting to prescriptive requirements or FRMS-type strategies to combat flight crew fatigue voluntarily.

The cost of continuing with this voluntary approach would be lower than that of a regulatory approach due to lower overall adoption by air operators, and little to no intervention by the Government. However, the benefits would also be lower as not all air operators would increase safety through fatigue risk management methods equivalent to the proposed regulatory amendments, with the likelihood that some air operators would make little to no change. As a result, fewer safety benefits and lesser flight crew welfare would be attained than under the proposed regulatory amendments.

Regulatory approaches

Option 1: Prescriptive requirements

A number of regulatory options have been considered at the early stage of the development of this regulatory proposal. One of the options was the application of prescriptive standards that would apply to air operators who are subject to Subparts 703, 704 and 705.

The prescriptive requirements option would enhance safety in particular for smaller air operators (Subparts 703 and 704) and would increase the CARs' compliance with ICAO Standards. This option, by excluding the Subpart 702 air operators, also takes into account the economic hardship and operational restraints that this proposal may cause for air operators who are subject to Subpart 702 as the prescriptive standards may be too rigid and less appropriate to the companies' small-scale operations.

A cost-benefit analysis performed by Transport Canada has shown that the costs of prescriptive requirements are expected to exceed the benefits by about \$51.74 million in present value, should the Government of Canada proceed with this option. However, Option 1, which addresses flight crew fatigue solely through prescribed limits on maximum flight and duty hours, is less cost-effective than a more flexible option where air operators can opt for either the prescriptive requirements or an FRMS for some flights, depending on their operations and cost structure.

Option 2 (adopted): Prescriptive requirements and FRMS option

Through the consultations, industry has raised objections to the “one-size-fits-all” nature of the prescriptive requirements in Option 1. Option 1 does not take into consideration the operational differences among air operators, and does not allow for flexibility on how flight crew fatigue can be managed.

In contrast, the combination of prescriptive requirements with an FRMS allows the air operators the flexibility to tailor their approach to fatigue management to their operations, while providing at least the same safety level as the prescriptive requirements-only option. Depending on the complexity and/or size of their operations, air operators may choose to place only certain routes in their operations under an FRMS and others may be managed under the prescriptive requirements. In fact, some air operators may choose not to implement an FRMS at all. ([see footnote 6](#)) As a result, Option 2 offers a better balance between safety and business profitability.

The recommended approach would be to implement a combined regulatory approach including both new prescriptive requirements and an FRMS. More specifically, flexibility would be allowed between the prescriptive requirements and the FRMS to all air operators who are subject to Subpart 703, 704 or 705. Although the proposed amendments to the prescriptive regime do not apply to Subpart 702 air operators, the operators would have access to using an FRMS as an option. A combined regulatory approach provides flexibility, which allows the reduction of costs associated with crew member fatigue risk management.

Benefits and costs

The proposed amendments would allow Canada to meet ICAO obligations, and would also reduce flight crew member fatigue, which has been linked to accidents and incidents. ([see footnote 7](#)) Estimates show that potential reduction in accidents would save passengers, flight crew members and air operators approximately \$314.30 million over the next 15 years (2018–2032). Benefits to flight crew members were only partially quantified due to lack of data.

Adopting the proposed amendments would cost industry about \$337.65 million over 15 years, mainly due to the changes to flight crew scheduling requirements. The data used to value the change in crew scheduling costs was drawn in great part from consultation with industry. Overall, the analysis leads to an estimated net cost of \$23.35 million over the relevant 15-year period. Several benefits have not been quantified, however, due to missing data, but they are discussed in the following. The benefit and cost details are presented below.

Analytical framework

The approach to cost-benefit analysis (“the analysis”) identifies, quantifies and monetizes, where possible, the incremental costs and benefits of the proposed Regulations. This analysis evaluates the impact of the regulatory proposal as compared to the baseline option of not imposing any requirements. The cost-benefit framework for this proposal consists of the following considerations.

Regulated community: The proposed amendments would affect Canadian air operators engaged in domestic and international commercial air services. The proposed amendments would apply to those air operators who are subject to Subparts 705 (*Airline Operations*), 704 (*Commuter Operations*), 703 (*Air Taxi Operations*), and 702 (*Aerial Work*) [FRMS only: the prescriptive requirements that apply to air operators subject to Subpart 702 remain essentially unchanged]. Flight crews’ work schedules would be affected, and consequently their health, medical costs, stress levels and quality of life could be affected.

According to Transport Canada’s National Aviation Company Information System (NACIS), a system that assists Transport Canada Civil Aviation’s regulatory control of the certification of aviation companies, there are 40 air operators operating under Subpart 705, which represents the bigger commercial airlines with aeroplanes that generally have 20 or more seats.

Subpart 704 (*Commuter Operations*) applies to the mid-sized aircraft air operators that generally operate from a regional airport with more support infrastructure and available runway lengths than the smaller airstrips commonly used by air taxi operators (Subpart 703). Commuter operators generally fly more sophisticated aircraft than air taxi operators. These aircraft are more capable and equipped to operate in instrument flight conditions and icing conditions.

Air operators who are subject to Subpart 703 (*Air Taxi Operations*) usually conduct unscheduled air transport flights, carrying miners or other workers to remote locations, aboriginal people to northern First Nations communities or vacationers travelling to fishing lodges or other out-of-the-way destinations.

Subpart 702 (*Aerial Work*) services are conducted using aeroplanes or helicopters. Most aerial work does not involve the transportation of persons between two points. These operators conduct work in the air such as aerial advertising, aerial construction, aerial spraying, firefighting, and glider towing. Their operations are generally not scheduled.

Analysis time frame: Since there is a four-year transitional period in respect of certain air operators following the coming-into-force date of the proposed amendments, which is expected to be in 2018, the 10-year time frame would not be sufficient to capture the impact of this regulatory proposal. Thus, the time frame considered for the analysis of this proposal is 15 years (2018–2032).

Dollar value and discount rate: Benefits and costs are expressed in 2016 Canadian dollars (2016 CAN\$). A discount rate of 7% is used to derive the present values.

Costs

Compliance with the prescriptive requirements and the FRMS would result in incremental costs to air operators. It is expected that there would be no or negligible costs for the Government of Canada, as existing resources would adapt to the work requirements of the proposed amendments. Between 2018 and 2032, it is expected that the proposed amendments would cost industry roughly \$337.65 million using a 7% discount rate, including \$26.44 million for adopting an FRMS.

The regulated community are those air operators operating pursuant to Subparts 702, 703, 704, and 705. Table 1 shows the number of air operators and the number of aircraft operated under each Subpart, as well as their total flight crew members. Since the air operators have different sizes and types of operations (regional, northern, national, and/or international), it is anticipated that they would not be affected evenly by the proposed amendments, even among air operators operating within the same subpart. The section below describes the Canadian commercial airline sector and presents the cost impacts for each subpart.

Table 1: Air operators, aircraft, and flight crew members listed by subpart (see footnote 8)

Parameters	705	704	703/702
Number of operators	40	71	494
Number of aircraft	695	498	2 117
Number of flight crew members	8 340	1 992	3 310

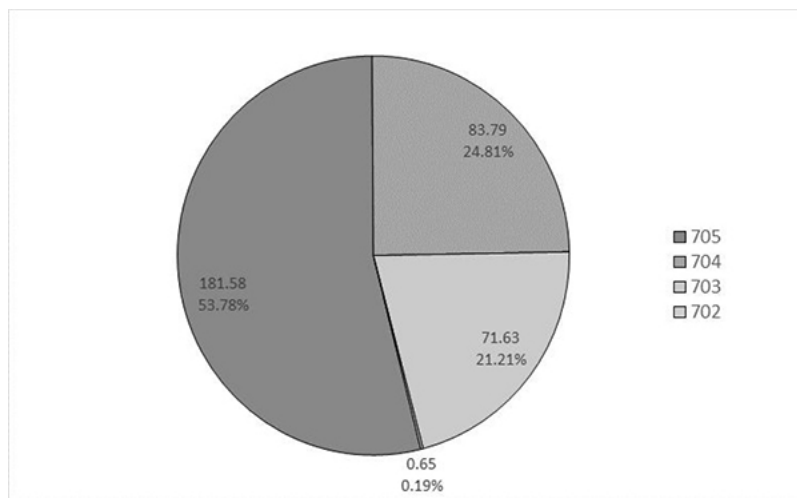
As shown in Table 1, there are 40 air operators operating pursuant to Subpart 705. With 8 340 crew members, it represents the largest sector group. (see footnote 9) To meet the proposed amendments, Subpart 705 air operators may need to hire more flight crew, provide fatigue-related training to their flight crew members, or manage fatigue-related risks through an FRMS implementation. It is expected that Subpart 705 air operators would carry costs of \$181,581,737 over the 15-year time frame of the analysis.

The 71 air operators who are subject to Subpart 704 are expected to bear some crew scheduling costs. Since they have about 1 992 flight crew members, the fatigue training costs resulting from the proposed amendments would be relatively small when compared to those borne by the Subpart 705 air operators. The result of the analysis indicated that the proposed amendments would cost Subpart 704 air operators \$83,786,893 over the 15-year period.

Subparts 703 and 702 consist of 494 air operators with a total flight crew workforce of 3 310. Many air operators conduct operations under both Subparts 703 and 702, and flight crew members can also work under both regimes. Without detailed data, a 50-50 split of the number of air operators and flight crew members is assumed in the analysis. With the four-year delay in the implementation period of the proposed amendments, the amendments would cost \$71,630,938 to the Subpart 703 air operators over the 2018–2032 time frame. Since Subpart 702 air operators are excluded from the prescriptive requirements, they would only carry the FRMS implementation costs (administrative and compliance costs), which are estimated to be \$647,761 over the time frame of the analysis.

The following pie chart (Figure 1) shows the cost (in percentage) for each affected industry group. Overall, Subpart 705 air operators would bear about 54% of the total cost, with 25% for Subpart 704 air operators, 21% for Subpart 703 air operators and 0.19% for Subpart 702 air operators.

Figure 1: Cost by air operator group (2016 CAN\$ millions, discounted)



Costs to air operators (prescriptive requirements)

The costs to air operators consist of the prescriptive requirements costs and the FRMS costs. To assess the cost of the prescriptive requirements, it was necessary to identify the proportion of flights for which each air operator group would choose the prescriptive requirements over the FRMS. Transport Canada is expecting that the following proportions of the flights would be operated under the prescriptive requirements (the remainder being operated under an FRMS).

Table 2: Percentage of flights operated under the prescriptive requirements

Air Operator Group

705	704	703	702
80%	98%	84%	97%

Costs of the proposed amendments to air operators (prescriptive requirements) fall into three main categories: flight operations, fatigue training, and rest facilities.

1. Flight operations costs

The flight operations costs include flight crew scheduling costs, flight crew management system computer programming costs, and cost savings resulting from reduced fatigue through reduced sick leave.

A. Flight crew scheduling costs

For industry, the proposed amendments would increase the number of flight crew members required due to changes in flight crew scheduling. In terms of costs, this translates into increases in total flight crew salary and benefits, per diem and hotel costs. Transport Canada assumes that salary and overhead cover all these costs. During the consultation, air operators were asked to provide their estimated number of incremental flight crew members needed to fulfill the new prescriptive requirements. Using survey replies to extrapolate to all operators, it is estimated that the incremental flight crew scheduling costs would increase on average by 3.97% (air operators subject to Subpart 705), 12.96% (air operators subject to Subpart 704) and 17.53% (air operators subject to Subpart 703).

B. Flight crew management system computer programming costs

Changes to flight crew scheduling may also require some air operators to update their flight crew management computer programs. Estimated crew management system update costs were provided by air operators who responded to the consultation survey. About 87% of air operators subject to Subpart 705 and 69% of air operators subject to Subpart 704 indicated the need to update their crew management system. For Subpart 703 air operators, 53% of the survey respondents reported a positive flight crew management system computer programming cost.

Based on the consultation results, Transport Canada estimated the average crew management update cost per air operator and per Subpart. The estimates are as follows: \$343,900 per Subpart 705 air operator, \$140,000 per Subpart 704 air operator and \$52,170 per Subpart 703 air operator.

C. Cost savings due to reduced sick leave

Since the proposed changes would increase rest periods for flight crew members, it is expected that they would have a positive effect on the flight crew member's sick leave. A study conducted in 2003 has shown a statistically significant relationship between fatigue and sick leave. (see footnote 10) Therefore, Transport Canada expects a reduction of sick leave as a result of the proposed new prescriptive requirements. Similarly to the FAA, Transport Canada assumed that sick leave represents 5% of the total flight crew member pay, (see footnote 11) and expects the proposed changes to reduce sick leave by 5%. (see footnote 12)

In light of these assumptions, Transport Canada expects the overall present value of flight operations costs for the 2018–2032 period to be \$299,302,513. Table 3 summarizes the present value over 15 years of the different flight operations costs (and cost savings) by air operator group.

Table 3: Types of flight operations costs by air operator group (2016 CAN\$, 7% discount rate)

Operations Cost Elements	Air Operator Group		
	705	704	703
Crew scheduling costs	150,941,352	77,136,644	58,781,021
Crew management system computer	9,612,019	6,945,341	7,717,528
Cost savings due to reduced sick leave	(9,505,123)	(1,487,975)	(838,292)
Total	151,048,248	82,594,009	65,660,257

Due to rounding, some of the numbers may not add up.

2. Fatigue training costs

Fatigue training includes initial training for all flight crew, and recurrent fatigue training for new pilots over time, at normal replacement rates. Since the coming into force dates of the proposed requirements would differ by air operator type, the initial training costs would occur in 2019 for Subpart 705 air operators, and in 2022 for Subpart 704 and Subpart 703 air operators.

The FAA has estimated that it takes five hours to complete the fatigue training. (see footnote 13) It is also assumed the average career of a pilot is 20 years, leading to a 5% annual replacement rate. Based on these assumptions, Transport Canada expects the present values of the initial fatigue training and the recurrent training over the 15-year time frame to be \$1,198,395 and \$568,817, respectively.

Air operators would also have to develop fatigue training materials. On the basis of the U.S. airline industry standard, the FAA noted that developing training materials takes 3 hours for each hour of course required. Based on that standard, it will require 15 hours per operator to develop the initial training curriculum. Additionally, Transport Canada estimates that 5 hours would be needed for an annual update of the training curriculum. Therefore, the present value for curriculum development would be \$405,571 over the 15-year period. (see footnote 14) Transport Canada has developed a curriculum that is available to the industry and that is periodically updated. As a result, the calculated cost for fatigue curriculum development is likely an upper bound. Table 4 summarizes the present value of the fatigue training costs by air operator group. The overall present value of training costs over the 2018–2032 period is about \$2,172,783.

Table 4: Fatigue training costs by air operator group (2016 CAN\$, 7% discount rate)

Fatigue Training Cost Element	Air Operator Group		
	705	704	703
Initial training cost	930,476	170,009	97,910
Recurrent training cost	456,977	71,537	40,302
Curriculum development cost	55,523	87,910	262,139
Total	1,442,976	329,456	400,351

Due to rounding, some of the numbers may not add up.

3. Rest facilities costs

A rest facility is a bunk or seat that provides a crew member with a sleeping opportunity on board an aircraft. For industry groups subject to Subparts 703 and 704, the consultation suggested that the proposal would not result in any additional rest facilities costs. However, some air operators who are subject to Subpart 705 identified the need for such facilities. Indeed, some aircraft may need to be modified to provide a rest area for the flight crew members. This implies aircraft downtime for the duration of the renovation and it typically requires removing some passenger seating to make room for the rest area. The overall present value of rest facilities costs is anticipated to be \$9,727,312 over the 2018–2032 period.

Table 5 summarizes the costs related to the prescriptive requirements of the proposed amendments.

Table 5: Costs to air operators, prescriptive requirements (2016 CAN\$, 7% discount rate)

Cost Type	Present Value
Flight operations	299,302,513
Fatigue training	2,172,783
Rest facilities	9,727,312
Total	311,202,610

Due to rounding, some of the numbers may not add up.

Costs to air operators (FRMS)

Studies have shown that there may be some early adopters in the airline industry who have embraced the FRMS with others possibly starting to move in this direction. During industry consultation, some air operators have indicated their preference for implementing an FRMS compared to the prescriptive requirements. In the absence of metrics on early adoption of an FRMS, the analysis assumes that none of the air operators will have adopted such a management system before the coming into force of the proposed amendments. This assumption may lead to a slight overestimation of the cost to air operators (and the benefits as well, since those would have been realized with early adoption). (see footnote 15) FRMS costs include implementation costs as well as incremental operational costs, which are assumed to be lower than under the prescriptive rule. The lower incremental operation costs would justify FRMS adoption.

1. Operational costs (FRMS)

Air operators would need to adjust their business strategy and operations to meet regulatory requirements and manage flight crew member fatigue. In the absence of metrics on the incremental operation cost savings from an FRMS as compared to prescriptive requirements, Transport Canada assumes that the saving is 50%.

The remainder of flights from Table 2 would adopt an FRMS, i.e. 20% for Subpart 705, 2% for Subpart 704, 16% for Subpart 703 and 3% for Subpart 702. The analysis indicates that the incremental operational costs are about \$21,484,357 from 2018 to 2032, with \$15,935,615 for Subpart 705; \$681,416 for Subpart 704; and \$4,867,326 for Subpart 703.

2. Implementation costs (FRMS)

In addition to the change in operation costs, air operators opting for an FRMS would assume FRMS implementation costs, which include developing a notice of intent, establishing, maintaining, implementing and monitoring the FRMS, building a safety case, performing an audit, and keeping records. The following table summarizes the estimates used to calculate the implementation costs of an FRMS.

Table 6: FRMS estimated costs items and timeline

Requirements	Description	Time Spent		
		705	703/704	702
1. Notice of intent				
Prepare and send a notice of intent	Operator's intention letter to establish, implement and maintain an FRMS	2 hours	2 hours	2 hours
Review and sign a notice of intent		1 hour	1 hour	1 hour
2. Establish FRMS				
FRM plan	Develop a plan that establishes safety objectives, indicators, training plan and communication plan	3 days	1 day	1 day
FRM process	Establish a process for crew members to report fatigue, and for the air operator to collect and manage data	5 days	3 days	2 days
FRM promotion	Establish a training program for employees	5 hours	5 hours	5 hours
FRM quality assurance	Establish a process for the audit and the review of an FRMS	3 days	2 days	2 days
3. Building safety case	Safety case required for each flight, showing it does not increase fatigue	4 days	2 days	2 days
4. Initial internal audit	Ascertain that the FRMS in place is working	1 day	3 hours	3 hours
5. Letter of confirmation	Letter to minister to confirm that the FRMS in place is working			
Prepare and send the letter		2 hours	2 hours	2 hours
Review and sign the letter		1 hour	1 hour	1 hour
6. Maintenance FRMS				
Audit	After 12 months, or a major incident or a change in air operator activities	1 day	2 hours	2 hours
Review		1 day	2 hours	2 hours
7. Record keeping	Records of employees testing for fatigue, records of audits and reviews	Part of costs of running the business	Part of costs of running the business	Part of costs of running the business
8. Monitoring FRMS	To ensure the FRMS is functioning properly and safety case is operating accordingly	12 days per year	6 days per year	6 days per year

It is assumed that these activities are taking place only once, except for maintenance, record keeping, and monitoring. It is also assumed that these tasks are performed by staff in managerial roles, except for preparing and sending letters of intention and confirmation, which would likely be performed by administrative staff. (see footnote 16) The present value of the total implementation costs to affected air operators is estimated at \$4,960,362 over 15 years. These costs are broken down as follows: air operators subject to Subpart 705 (\$3,427,585), air operators subject to Subpart 704 (\$182,012), air operators subject to Subpart 703 (\$703,004), and air operators subject to Subpart 702 (\$647,761).

Overall, adopting an FRMS would lead to incremental costs to industry, which are expected to be \$26,444,719 over the 2018–2032 time frame. Table 7 details the costs associated with an FRMS adoption.

Table 7: FRMS costs to air operators (2016 CAN\$, 7% discount rate)

Cost Type	Operator Group			
	705	704	703	702
Operational costs	15,935,615	681,416	4,867,326	15,935,615
Implementation costs	3,427,585	182,012	703,004	647,761
Total	19,363,200	863,427	5,570,330	647,761

Due to rounding, some of the numbers may not add up.

Costs to Government

There would be negligible or zero incremental costs to the Government of Canada to implement and enforce the proposed amendments, since existing resources would be used.

1. Regulatory administration costs

There will be zero administrative cost to the Government of Canada, since Transport Canada does not intend to approve the FRMS. Instead, Transport Canada would require the air operators to notify Transport Canada by means of a notice of intent and a letter of confirmation that they would be using an FRMS to manage pilot flight duty periods. Only upon request, the air operator would have to submit documentation describing their system, a safety case supporting the proposed deviation(s) and a year's worth of data to support their suggested flight schedules. Transport Canada regional inspectors would assist to administrate the process as part of their day-to-day activities, which would simply be added to the inspection schedule at no additional cost to the Government.

The regulatory administration cost associated with the aforementioned activities would be negligible. The assessment process is expected to be part of the responsibilities of existing resources. Preliminary assessment also concluded that hiring additional personnel would not be required. Therefore, there would be no overall incremental regulatory administration.

2. Educational and enforcement costs

With respect to compliance and education costs, Transport Canada is updating the existing FRMS checklist/guidance and will request stakeholder feedback. Therefore, the incremental educational costs would be negligible. Transport Canada regional inspectors would perform oversight functions as part of their ongoing surveillance and regular inspection duties, mandate and responsibilities. Transport Canada already has two or three specialists working on the Flight Crew Fatigue Management (FCFM) file. Preliminary assessment concluded that hiring additional personnel would not be required.

Benefits

The proposal would amend current prescriptive limitations (for Subparts 705, 704 and 703) and introduce the option for all commercial air operators in Canada to deviate from prescriptive requirements when an FRMS is established and a safety case is built, which would benefit passengers, commercial air operators, crew members, and the Government of Canada. Between 2018 and 2032, the proposed amendments are expected to result in \$314.30 million in present value benefit.

The monetized benefits of the proposed amendments include avoided fatalities, injuries, property damages, investigations, and improved flight crew welfare, as measured by decreased sick leave. Of the five categories of benefits, avoiding fatalities and property damages would represent the largest components. The expected benefits are described in Table 8.

Table 8: Benefits summary (2016 CAN\$, 7% discount rate)

Benefit Type (Items avoided due to fewer expected accidents)	Present Value
Avoided fatalities (benefit to passengers)	147,491,560
Avoided injuries (benefit to passengers)	13,559,800
Avoided property damages to aircraft (benefit to air operators)	140,842,434

Avoided Transportation Safety Board of Canada investigations (benefit to Government)	1,065,339
Avoided need for sick leave (part of crew welfare improvement)	11,336,565
Total	314,295,698

Due to rounding, some of the numbers may not add up.

Benefits for passengers

New prescriptive requirements and an FRMS for air operators are expected to result in fewer accidents and incidents. Avoided accidents result in fewer fatalities and injuries. Data scarcity did not allow the monetization of benefits due to reduced incidents; ([see footnote 17](#)) therefore, incremental benefits were only monetized for avoided fatalities and injuries.

To quantify the avoided fatalities and injuries, Transport Canada obtained data from the Transportation Safety Board of Canada (TSB). From 2006 to 2015, there were 249 fatalities and 182 serious injuries identified in Canada, caused by Canadian-registered commercial aircraft, as reported in Table 9.

Table 9: Number of fatalities and serious injuries due to aircraft accidents, 2006–2015

Operator Group	Fatalities	Serious Injuries
705	12	17
704	27	19
703	155	105
702	55	41
Total	249	182

Source: Transportation Safety Board of Canada

1. Avoided fatalities

Using TSB historical data for the number of aviation fatalities, estimates for fatalities caused by flight crew member fatigue are obtained by multiplying the 2006–2015 average annual fatalities with the fatigue rate contribution to commercial air accidents. Several studies have established that pilot fatigue is a contributing factor in 15 to 20% ([see footnote 18](#)) of aviation accidents. For the analysis, a fatigue contribution rate of 17.5% was used.

Future flight crew member fatigue-related fatalities are calculated by estimating the number of expected 2018–2032 fatalities using the annual air passenger traffic growth rate, which is 4.47%. ([see footnote 19](#)) On this basis, approximately three fatigue-related fatalities will occur annually in Canada, for a total of about 44 fatalities over 15 years (as illustrated in Table 10).

Table 10: Expected number of fatalities due to flight crew member fatigue, 2018–2032

Air Operator Group			
705	704	703	702
2.14	4.81	27.63	9.80

TSB aviation investigation reports show that flight crew member fatigue has rarely been the only factor contributing to past aviation accidents. Therefore, the proposed amendments would not prevent 100% of all future fatigue-related accidents. By analyzing the 20-year accident history, the FAA estimated that their proposed rule would likely reduce the fatigue-related accident risk by 52.5%. ([see footnote 20](#)) Transport Canada also assumes the same effectiveness rate for the proposed amendments.

To value avoided fatalities, Transport Canada uses the *value of a statistical life* (VSL), ([see footnote 21](#)) which is estimated at 2007 CAN\$7.8 million. ([see footnote 22](#)) Using the Canadian Consumer Price Index, the VSL is estimated at 2016 CAN\$8.98 million. Over the 2018–2032 time frame, the present value of the avoided fatalities is estimated at \$147,491,560.

2. Avoided injuries

TSB injury data is used to project future fatigue-related serious injuries. A similar process to what was used for the valuation of fatalities is used to monetize avoided serious injuries. Transport Canada expects a total of 32 fatigue-related injuries to happen in Canada over the 2018–2032 time frame. Table 11 shows the expected injuries for each air operator group from 2018 to 2032.

Table 11: Expected number of flight crew member fatigue-related injuries, 2018–2032

Air Operator Group			
705	704	703	702
3.03	3.39	18.71	7.31

Transport Canada estimates the value of avoided injuries by applying the health economics concept of *quality-adjusted life years* (QALY) (see footnote 23) to the outcome of serious injuries. A study of motor vehicle collisions estimated scientifically sound fractions of VSL to value different motor vehicle injury severities. For aviation accidents, injuries are assumed to be equivalent to motor vehicle major injuries only (i.e. resulting in hospitalization), with a corresponding fraction of 12.42% of VSL. (see footnote 24) On this basis, the estimated value associated with the avoided injuries is \$ 13,559,800 over the 15-year time frame.

3. Benefit of reduced incidents to passengers

Passengers are exposed to many incidents such as declared emergencies, engine failures, and depressurizations, among others. These incidents may cause stress to passengers, which in turn may contribute to disease, with associated health costs and loss of welfare. A study on people's willingness-to-pay (WTP) for transport safety found that people are willing to pay more than twice as much for air transport safety than for safe transport in a taxi due to higher mental suffering from feelings of insecurity and fear. (see footnote 25) Passengers therefore have a positive WTP to avoid incidents, although the magnitude of this WTP is unknown. Given the high volume of passengers, the welfare benefit by reducing incidents to passengers could be important, which would be calculated as the sum of WTPs of all passengers.

Reducing incidents also reduces flight delays, which saves time and money for passengers, and avoids the loss of welfare from potential reduced demand in flight transportation. A comprehensive study on impacts of flight delays commissioned by the FAA suggests that the welfare loss carried by passengers from flight delays was about \$2.2 billion in 2007. (see footnote 26)

Benefits to commercial air operators

The proposed amendments would result in avoided accidents as well as in reduced incidents (incidents that may otherwise lead to the loss of reputation) for air operators. Reduced incidents for air operators are described in qualitative terms only due to scarcity of data.

1. Avoided property damage

To quantify the avoided property damage, it is necessary to estimate the value of aircraft operated by each air operator group. Aircraft values depend on their original value, their age, and the useful life of the aircraft. For aircraft of Subpart 705 operators, the value was derived from the Airliner Price Guide. (see footnote 27) Knowing the market value of new aircraft, the values of aircraft for other subpart air operators were obtained by assuming a useful life of 20 years for all aircraft, with an estimated residual value of zero after this useful life.

The expected aircraft damage avoided was determined by multiplying the calculated residual value with the average annual probability of an aircraft accident, which is based on 2006–2015 accident statistics. Transport Canada estimated future avoided property damage by applying the fatigue contribution rate to accidents (17.5%) and the effectiveness rate of the proposed amendments (52.5%). The present value of avoided property damage from 2018 to 2032 is estimated at \$140,842,434.

2. Benefits of reduced incidents to air operators

Aircraft accidents, but also incidents, can cause a loss of reputation for an air operator, potentially resulting in significant forgone revenues. Loss of reputation happens when consumers lose confidence in the reliability and safety of airline companies for which incidents and delays are frequent. Flight delays cost the airline industry approximately \$8 billion a year in 2007, according to the U.S. study on costs of flight delays. (see footnote 28)

Benefits to flight crew members

Reducing flight crew members' exposure to fatigue may result in better health conditions and flight crew welfare is therefore expected to be improved. In addition, the proposed amendments would result in reduced sick leave to crew members as well as in avoided medical costs. Transport Canada has been able to value the benefit related to the reduced sick leave only. (see footnote 29) Nevertheless, qualitative descriptions were provided in the remaining benefits.

1. Reduced sick leave

Using the same assumption previously outlined in the cost section, which is that sick leave represents 5% of the total flight crew member pay, the proposed changes are expected to reduce sick leave by 5%, and the expected benefits related to the crew members reduced sick leave are valued at \$11,336,565 over 15 years.

2. Improved flight crew member welfare

While it is challenging to establish direct links between fatigue, stress, and different types of illnesses with precision, evidence suggests that mental and physical stress puts a strain on the human body, weakens the immune system, and increases the risk for a variety of medical risks. Reduction in fatigue for pilots is expected to result in improvements in welfare through better general health conditions. Reduced fatigue would improve pilots' overall quality of life while improving their ability to effectively deal with stressful situations on duty and in their personal life. This is expected to improve pilots' physical health, as the inability to effectively manage stressful events can cause momentary hyperventilation, panic attacks, headaches, elevated blood pressure, and an increased heart rate. Stress can also result in abuse of alcohol and tobacco, which in turn cause adverse effects.

Fatigue and stressful events can potentially cause significant adverse impacts on mental health, including depression and post-traumatic stress disorders. Mental health issues can cause sleep disorders and behavioural issues that can be permanent and negatively impact pilots and other people in their immediate social environment. A recent study suggests that mental depression occurrence among airplane pilots is high and that underlying factors include long trips, which disrupt circadian rhythm, and sleep deprivation. ([see footnote 30](#))

3. Avoided medical costs

Taken together, the potential adverse health impacts from fatigue and stress can significantly reduce flight crew members' welfare and impose considerable costs on the health care system in treatments and drug prescriptions. Health issues from stress and fatigue, both physical and mental, may also result in reduced productivity for flight crew members when on duty. As a result, economic and social benefits to flight crew members from reduced incidents due to fatigue may be significant.

Benefits to Government of Canada: Avoided investigations

The TSB conducts investigations to identify causes and contributing factors of aviation transportation accidents under the Aviation Occurrence Investigations program. ([see footnote 31](#)) To estimate the avoided investigation costs, Transport Canada has used budgetary data from the TSB's *Report on Plans and Priorities*, 2016–2017.

The expected annual spending associated with aviation investigations, which is \$13,000,774, was obtained by averaging 2017, 2018 and 2019 planned aviation investigation spending. In order to estimate the avoided investigation value attributed to the target air operator groups, Transport Canada used statistics on aircraft accident occurrences in Canada. From 2006 to 2015, there was a total of 2 442 aircraft accidents, including 481 accidents concerning the target groups. The target air operator groups account for 19.70% of the total aircraft accidents. The avoided investigation costs were quantified by applying the same previous assumptions, that is the fatigue contribution rate of 17.5% and the effectiveness rate of 52.5%. Between 2018 and 2032, the proposed amendments would result in a total present value of \$1,065,339 in avoided investigation costs.

Net benefits

Over the 2018–2032 period of analysis, Transport Canada estimates the present value of the costs of the proposed amendments to be \$337.65 million. At the same time, the proposed amendments would result in a present value benefit of \$314.30 million. Overall, the net benefits of the proposed amendments would be –\$23.35 million. The results are presented in Table 12.

The proposed changes, while bringing Canada in line with ICAO's standards for flight crew fatigue management, would be beneficial to various stakeholders, mainly to air passengers, and also to flight crew, although that benefit is not fully monetized. The analysis shows that benefits to passengers would represent more than 50% of the total quantified benefit. Due to data scarcity, most parts of the benefits to flight crew members, and some to passengers, have not been quantified. Considering the several benefits that Transport Canada was unable to quantify, it is possible that the proposed amendments would result in a positive net benefit to Canadians.

The air operators are mostly expected to bear an increase in flight operations costs due to changes in crew scheduling and requirements related to fatigue training. Since the implementation period differs by air operator group, compliance with the proposed amendments would cost air operators about \$39.77 million in the second year and about \$62.92 million in the fifth year. However, the total benefit would increase over time, concluding with a net positive benefit of \$11.80 million in 2032.

Table 12: Results of the cost-benefit analysis of the proposed amendments

Benefits and Costs	2019 (see footnote 32)	2022 (see footnote 33)	2032 (see footnote 34)	Present Value (2016 CAN\$, 7% discount rate)	Annualized Value
Monetized benefits					
Benefits to passengers					
Avoided fatalities	903,292	18,271,400	32,503,302	147,491,560	16,193,780
Avoided injuries	158,934	1,666,238	2,934,678	13,559,800	1,488,793
Benefits to industry					
	6,629,057	19,976,177	21,452,777	140,842,434	15,463,742

(avoided property damage)					
Benefits to crew members (less fatigue as evidenced by decrease sick leaves)	886,332	1,454,399	1,617,116	11,336,565	1,244,694
Benefits to Government (avoided accident investigation)	21,130	156,652	177,861	1,065,339	116,969
Total benefits	8,598,745	41,524,866	58,685,733	314,295,698	34,507,978
Monetized costs					
Costs to industry					
Flight operations costs	27,490,806	59,977,941	43,021,667	299,302,513	32,861,807
Fatigue training costs	1,139,144	632,548	130,008	2,172,783	238,560
Rest facilities costs	11,136,800	0	0	9,727,312	1,068,007
FRMS costs	4,649	2,310,630	3,734,514	26,444,719	2,903,488
Total costs	39,771,399	62,921,119	46,886,189	337,647,329	37,071,862
Net benefits	(31,172,654)	(21,396,253)	11,799,544	(23,351,631)	(2,563,884)
Qualitative and non-monetized benefits					
<ul style="list-style-type: none"> • Improved flight crew welfare, i.e. improved quality of life • Decreased flight crew medical costs as fatigue-related health issues may be lessened • Improved passenger and crew welfare through reduced incidents • Avoided site contamination and environmental cleanup • Avoided third-party damage and on-ground fatalities • Avoided loss of reputation • Avoided airline delay and rescue costs • Avoided cargo and passenger luggage damage and loss 					

Benefit-cost ratio

Overall, the benefit-to-cost ratio is estimated to be 0.93 for the proposed amendments. However, it varies by air operator group. As shown in Table 13, Subparts 705 and 704 air operators would assume higher costs for the proposed amendments relative to their benefits. The ratios for Subparts 703 and 702 air operators are larger than 1, indicating that Canadian society is better off with the proposed amendments for these air operator groups, even with limited monetization of the benefits. These results are generally driven by lower fatigue benefits from smaller numbers of accidents avoided in Subparts 705 and 704 operations relative to Subparts 703 and 702. One should note that these ratios only account for monetized benefits. Had Transport Canada been able to monetize the other qualitative benefits (e.g. flight crew welfare and benefits related to incidents), the ratios would all be higher.

Table 13: Benefit-cost ratio by air operator group

Operator Group			
705	704	703	702
0.49	0.57	2.43	4.69

Sensitivity analyses

Sensitivity analyses were also performed to measure the impact of uncertainty for some key variables on the proposed amendments' net benefit value and benefit-to-cost ratio. To explore the impact of each variable change, the sensitivity analyses considered changes in four variables, one at a time, while other variables were kept constant.

1. Change in the crew scheduling cost

There is a tendency to estimate future costs to adjust to new requirements based on business-as-usual operations. In reality, air operators would change not only their crew numbers; they would also adjust their operations to minimize their costs when faced with the proposed requirements. In addition, the one and four years' delay for the implementation of certain regulatory requirements would give air operators time to adapt and move away from their business-as-usual operations. Therefore, the sensitivity analyses considered two additional scenarios: findings from a study commissioned by Transport Canada and averaging values of the study findings and the consultation with industry results. ([see footnote 35](#))

2. The effectiveness rate of fatigue management measures

The U.S. *Flightcrew Member Duty and Rest Requirements* rule is intended to address the fatigue issue for flight crew members flying in Part 121 commercial service, which corresponds to Subparts 705 and 704 of the CARs. A 52.5% effectiveness rate may underestimate the effectiveness rate for Subparts 703 and 702, where the bulk of accidents were reported. Consequently, a sensitivity analysis was done using 62.5% instead.

3. The discount rate

As an alternative to the standard 7% discount rate, a 3% rate was used for comparison purposes.

4. The time frame

Since the costs to adjust to the proposed requirements are heavily borne in the early years while the benefits continue into the future, 20-year and 25-year periods were used to explore how net present values could change.

Sensitivity analysis results

All sensitivity analyses indicate that the benefits exceed the costs, except when using a discount rate of 3% or a time frame of 20 years, as reported in Table 14.

Table 14: Sensitivity analyses on key variables (2016 CAN\$, 7% discounted except if indicated otherwise) ([see footnote 36](#))

Parameter Changes	Net Benefit	Benefit-Cost Ratio
Flight Crew Scheduling Change		
Fletcher and Klemets: 705 (0.65%); 704 (0.65%); 703 (5%)	236,505,814	4.040
Transport Canada: 705 (2.31%); 704 (6.81%); 703 (11.27%)	106,528,896	1.513
Effectiveness Rate		
62.5%	34,354,871	1.102
Discount Rate		
3%	(12,604,050)	0.973
Time Frame		
20 years	(372,358)	0.999
25 years	24,248,198	1.052

Distributional analyses

Attention was paid to how the costs would affect air operators on average and by flight crew member, which is contingent upon the size of the average air operator as larger air operators hire more flight crew members. The analysis also considered how the proposed regulatory changes might affect provinces and territories, consumers and industry competitiveness.

1. Average cost by air operator and by flight crew member

The average compliance costs of the proposed Regulations would be \$4.54 million per Subpart 705 air operator; average costs per Subpart 704 air operator would be \$1.18 million; and \$0.29 million per Subpart 703 air operator. In summary, it seems that the larger the air operator is and the more complex its operations are, the higher the average compliance cost is.

In contrast, and as shown below, average compliance costs per flight crew member would be higher for Subparts 704 and 703 air operators, even with the four-year implementation delay proposed by Transport Canada. This may be due to the fact that the largest air operators may have more flexibility to adjust their operations and their crew schedules, in order to adapt to the regulatory changes.

Table 15: Average cost per air operator and per flight crew member (2016 CAN\$, 7% discounted)

Average Costs	Air Operator Group			
	705	704	703	702
Per operator	4,539,543	1,180,097	290,004	2,623
Per flight crew member	21,772	42,062	43,282	391

2. Cost impacts by province and territory

To analyze the regional impacts of the proposed amendments, Transport Canada used the registered addresses of Subparts 702, 703, 704, and 705 air operators within Canada. As indicated in Table 16, the estimated costs are well distributed across the country. Ontario would bear the highest total costs in Subparts 705, 704, and 702, while British Columbia would see the largest costs for Subpart 703 air operators. Roughly 86% of the total costs are carried by air operators based in Quebec, Ontario, Manitoba, Saskatchewan, Alberta, and British Columbia.

Table 16: Average costs by province and territory (2016 CAN\$, 7% discounted)

Province/Territory	705	704	703	702	Total
NL	4,775,600	5,521,556	2,335,169	12,178	12,644,502
PEI	0	0	136,099	0	136,099
NS	0	921,656	823,756	5,571	1,750,982
NB	0	0	687,657	6,672	694,329
QC	33,447,356	13,808,080	10,014,005	89,844	57,359,286
ON	42,998,555	24,859,571	17,427,807	125,342	85,411,275
MB	9,551,199	3,686,623	4,663,174	57,651	17,958,647
SK	9,551,199	3,686,623	2,335,169	55,448	15,628,440
AB	38,222,956	10,129,835	8,230,395	98,719	56,681,905
BC	23,896,157	12,886,424	19,619,714	155,268	56,557,563
YU	4,775,600	921,656	3,015,662	23,319	8,736,237
NWT	14,326,799	6,443,212	2,199,070	16,647	22,985,728
NU	0	921,656	136,099	1,101	1,058,856
Total	181,545,420	83,786,893	71,623,775	647,761	337,603,850

Due to rounding, some of the numbers may not add up.

3. Impacts on consumers

The annualized costs to industry are estimated to be \$37,071,862. In 2015, Canadian airports reported an estimated 131 million enplaned and deplaned passengers. (see footnote 37) Using this statistic and assuming that 50% of the cost may be passed on to consumers, the proposed amendments would result in approximately \$0.14 per passenger per flight. The maximum that could be passed on to consumers is \$0.28 per passenger per flight. Therefore, the cost passed on to consumers would be negligible.

“One-for-One” Rule

The “One-for-One” Rule does not apply to the amendments. The amendments only result in administrative costs for those businesses that voluntarily participate in the FRMS. However, given that air operators will still have the option to use the prescriptive requirements, voluntary administrative costs associated with the FRMS are not considered an administrative burden for the purposes of the “One-for-One” Rule. In any case, Transport Canada has sought to minimize these voluntary administrative costs to those necessary so that the onus on air operators is manageable and adopting FRMS options is cost-effective.

Small business lens

Although most of the Canadian commercial air operators do not meet the definition of small and medium business category when using the gross revenue criteria to determine whether a business is small (having between \$30,000 and \$5 million in annual gross revenues), Transport Canada would consider most businesses small due to the criteria of having 100 employees or fewer. Therefore, Transport Canada carefully took the small business lens into consideration at the initial consultation stages and throughout the process of developing the proposed amendments.

Flexible option with longer compliance periods vs. initial option with the same compliance period for all air operators

Transport Canada also considered how to reduce compliance costs for small businesses such as Subparts 703 and 704 air operators. Allowing three more years for small businesses to comply would yield significant cost savings. The following table compares the total costs between the initial option (one year to comply for all Subparts 703, 704, 705 air operators) and the flexible option (one year to comply for Subpart 705 air operators and four years to comply for Subparts 703 and 704 air operators).

	Flexible Option		Initial Option	
Short description	1. Prescriptive requirements: It is proposed that Subpart 705 air operators would have one year from the coming into force to comply with the proposed requirements, while Subparts 704 and 703 air operators would have four years. 2. FRMS: Subparts 705 and 702 air operators would have access to FRMS in 2019 and Subpart 704 and 703 in 2022.		1. Prescriptive requirements: Assumes the compliance period is one year after the coming into force date. 2. FRMS: Assumes all air operators would have access to FRMS in 2019.	
Number of small businesses impacted	704 (71), 703 and 702 (494)		704 (71), 703 and 702 (494)	
	Annualized Average (\$ 2012)	Present Value (\$ 2012)	Annualized Average (\$ 2012)	Present Value (\$ 2012)
Total costs for all small businesses	16,241,400	147,925,275	22,498,762	204,916,791
Total costs to 704	8,719,661	79,417,925	12,068,719	109,920,857
Total costs to 703	7,454,329	67,893,390	10,362,633	94,381,974
Total costs to 702	67,410	613,961	67,410	613,961
Average cost per small business	153,265	1,395,920	212,209	1,932,780
Average cost per 704	122,812	1,118,562	169,982	1,548,181
Average cost per 703	30,179	274,872	41,954	382,113
Average cost per 702	273	2,486	273	2,486
Risk considerations				

In comparison to the initial option, the flexible option recommended by Transport Canada would reduce the annualized average cost for Subparts 704 and 703 air operators by roughly 28%. Due to Transport Canada not imposing the proposed prescriptive requirements on Subpart 702 air operators, there is no difference between the two options for those small businesses. The costs listed for Subpart 702 air operators are FRMS only. Overall, the flexible option would save Canadian small businesses roughly \$56.99 million over the 15-year time frame.

Transport Canada will take further measures to promote small businesses compliance, by

- Informing industry and conducting compliance promotion activities;
- Holding outreach sessions with new stakeholders, including small businesses; and
- Planning additional outreach sessions in 2018 and 2019 once the proposed requirements are finalized.

In addition, Transport Canada will

- Maintain all forms and processes and web pages in compliance with the Government's common look and feel; and
- Collect data electronically and use electronic validation and confirmation of receipt of notice where appropriate.

For small businesses in remote areas and/or those without access to high-speed (broadband) Internet, prospective air operators may

- Call Transport Canada to request documents be sent to them by mail;
- Call the support staff for any assistance they require; and
- Provide information via fax, and Transport Canada will enter the information into its database, if needed.

Consultation

Transport Canada conducted extensive consultations before and during the proposal's development. Transport Canada included many stakeholders, such as air operators, associations, pilots and pilot unions/associations, throughout the process through a joint working group, face-to-face meetings, online notices, conference calls and technical briefings.

The consultations aimed to

- Identify the extended stakeholder group (including both air operators and pilots);
- Inform the current stakeholder community about the proposed amendments;
- Build stakeholder support for the amendments;
- Gather relevant information (i.e. for the cost-benefit analysis); and
- Gauge stakeholder reactions to changes to the regulatory landscape.

In 2010, Transport Canada created a working group of pilots, industry associations and Transport Canada employees. The Working Group chose Dr. Gregory Belenky, a research professor at the Sleep and Performance Research Center at Washington State University, as its scientific advisor. The Working Group

- met for about 43 days over 18 months;
- reviewed and considered about 190 data sources; and
- published a final report in August 2012, *Report of the Canadian Aviation Regulation Advisory Council Flight Crew Fatigue Management Working Group*, which addressed various discussion topics and provided recommendations for each.

Although there was no stakeholder consensus on all of the Working Group recommendations, pilot unions and pilot associations, such as the Air Canada Pilots Association (ACPA), the WestJet Pilots' Association (WJPA) and the Air Line Pilots Association, International (ALPA), were mostly supportive and willing to compromise.

As a result of the Working Group recommendations, Transport Canada published a Notice of Proposed Amendment (NPA) on September 15, 2014, for consultation through the Canadian Aviation Regulation Advisory Council (CARAC) process.

During this consultation period, Transport Canada received 94 submissions on the NPA through the CARAC consultation process:

- 32 submissions (or 34%) supported the proposed changes;
- 35 submissions (or 37%) partially supported the proposed changes, and made suggestions on areas of improvement;
- 16 submissions (or 17%) opposed the proposed changes. Opposing respondents included a handful of individual pilots as well as small to large air operators. Generally, the opposition was related to
 - the newly proposed Maximum Flight Duty Period table;
 - more restrictive duty lengths based on start times; and
 - the proposed implementation period;
- the remaining 11 submissions were duplicates, as several stakeholders submitted the same letter to Transport Canada.

Following the NPA consultation period, Civil Aviation senior management held two face-to-face meetings with stakeholders, from January 19 to 23, 2015, to seek more information on their comments. The meetings included representatives from the following groups:

- Air Transport Association of Canada (ATAC);
- Canadian Business Aviation Association (CBAA);
- Helicopter Association of Canada (HAC);
- National Airlines Council of Canada (NACC);
- Northern Air Transport Association (NATA); and
- Three pilot associations: Air Canada Pilots Association (ACPA), Air Line Pilots Association, International (ALPA) and WestJet Pilots' Association (WJPA).

On May 20, 2015, Transport Canada organized another face-to-face meeting with the associations representing stakeholders directly impacted by the proposed changes. In attendance were representatives from the ALPA, the ACPA, the HAC, the NACC, the Teamsters, the ATAC, the NATA, and the WJPA. During the meeting, Transport Canada proposed additional changes based on the submissions received during the NPA consultation.

Many of the comments Transport Canada received reflected all of the points the stakeholders raised before. In addition to support, partial support or opposition to the proposal, there were emerging themes in the comments that included consultation, perceived industry hardship, and implementation timelines.

For example, while unions and associations representing pilots (specifically the ALPA and the ACPA) advocated for the same implementation time frame for Subparts 705, 704, and 703, the air operators supported a delayed implementation for Subparts 704 and 703.

Transport Canada took the two conflicting interests into consideration during the consultation, analyzed the impacts for small and medium businesses (mostly Subparts 704 and 703) and proposed the following new compliance periods:

- Subpart 705: 12 months from the date of registration for publication in the *Canada Gazette*, Part II; and
- Subparts 704 and 703: 48 months from the date of registration for publication in the *Canada Gazette*, Part II.

One Subpart 705 air cargo operator voiced concerns with respect to inclusion of cargo-only operations while the FAA excluded the cargo operations. Transport Canada, after consulting union members (some representing cargo operations), is of the view that all pilots (both passenger-carrying and cargo flight crew members) experience fatigue. In spite of minor variances, there are patterns and firm limits in science that Canada's current regulations do not support. Cargo operators generally fly during the night, when the body naturally wants to sleep, which creates risk in cargo operations due to human physiology.

Although U.S. air cargo carriers were excluded from the application of Part 117 Regulation (the new flight duty and rest rules), they must follow the Public Law 111-216 August 1, 2010, in which the U.S. Congress mandated that all Part 121 air carriers (large air carriers), in both passenger and cargo operations, develop and use a fatigue management plan (FMP). ([see footnote 38](#))

Transport Canada does not support excluding cargo operations from the application of the proposed amendments, because the U.S. FMP requirement prescribes that the air cargo carriers must analyze their schedules and adjust them where fatigue is found to be a problem (because of the fatigue risk management plan requirement). In the United States, it has shown that the existing flight and duty time requirements induce hazards and risks to aviation safety due to the nighttime nature of these operations. This has resulted in U.S. air cargo carriers reducing flight duty periods, increasing rest periods and making sleep rooms available for use while the aircraft is being loaded and unloaded at the cargo hubs during the night. The FRMS regime, should it be adopted by the air cargo operators, could potentially allow them certain flexibility to deviate from the prescriptive rules.

On June 21, 2016, Transport Canada held another face-to-face CARAC briefing with stakeholders to update them on the path forward, timeline, implementation periods and guidance materials. Transport Canada confirmed that the proposal would apply to all air cargo operations. The stakeholders were supportive of Transport Canada's decision not to include Subparts 702 and 604 under the prescriptive requirements.

On February 8 and 16, 2017, Transport Canada held face-to-face consultation meetings with stakeholders on guidance material being developed for both prescriptive requirements and the FRMS. The purpose of the consultation sessions was to verify that the guidance material is clear and user-friendly to both large airline operators and smaller air operators. Stakeholders made various suggestions on how to improve the guidance material. For example, one air operator raised the concern that the guidance on the intent of the 10-hour rest period when away from home was vague. Transport Canada revised the text and provided a more detailed explanation of the intent of the 10-hour rest period for flight crew members.

On March 25, 2017, a Notice of Intent (NOI) was published in the *Canada Gazette*, Part I, to communicate to stakeholders Transport Canada's most current policy direction on this proposal. Transport Canada chose to publish an NOI before engaging the stakeholders in the formal consultation process to give Canadians and impacted stakeholders an opportunity to better understand and comment on Transport Canada's policy direction on flight crew fatigue management.

Transport Canada received a total of 15 comments from various groups: 4 from individual pilots, 4 from air operators, 5 from industry associations, 1 from an aircraft manufacturer and 1 from a pilot college. Most of the comments received are not new and centred on the themes of implementation periods, the FRMS and the financial and operational impacts:

- Implementation periods and applicability
 - extend the implementation period of the proposed Regulations for Subpart 705 air operators from one year to two years, to allow air operators to introduce the required enterprise changes to implement the new requirements;
 - reduce the implementation period of four years for Subparts 703 and 704 air operators; and
 - include the prescriptive requirements on flight crew fatigue management for Subpart 702 air operators.

Implementation periods have been discussed extensively during the working group meetings and other consultation venues. Air operators and pilot associations are two conflicting interest groups. Based on the consultation, Transport Canada believes the current implementation period is reasonable considering that all affected parties have had the opportunity to review Transport Canada's most current policy direction on this proposal.

Excluding Subpart 702 air operators takes into account the operational restraints that this proposal may cause for Subpart 702 air operators, as the proposed prescriptive regime may be less appropriate to Subpart 702 air operators' operational scales and uniqueness. Although the proposed prescriptive regime does not apply to Subpart 702 air operators, they would have access to an FRMS as an option. This combination of regulatory instruments allows the reduction of costs associated with flight crew member fatigue risk management and provides flexibility.

Financial/operational impacts of an FRMS:

- an FRMS requires strong regulatory supervision to be truly effective;
- gaps need to be addressed to establish a good baseline and more consultation is needed for some newly introduced provisions on FRMSs;

- FRMSs have been promoted by Transport Canada to avoid developing new regulations that are industry-segment specific;
- the implementation of FRMSs would be a costly and complex exercise that is beyond the capability of air operators in Canada; and
- an FRMS is most suited to the scheduled airlines operational context and does not provide sufficient mechanisms to adapt to other types of flight operations, such as Medevac, thus compromising the ability for an operator to realize either a monetary or safety return on the significant investment in establishing an FRMS.

Transport Canada does not support the view that strong regulatory supervision is required for an FRMS. In order for the implementation of an FRMS to be successful, Transport Canada believes that the baseline established by the prescriptive limitations needs to be based on science and a robust regulatory structure. An FRMS is the best tool to address the fatigue associated with 24/7 operations.

The FRMS regime and the new prescriptive regulations also need to be promoted to the industry for the awareness of its members. Close collaboration between an air operator and its pilots is of primary importance to the success of an FRMS. Work is underway to further consult stakeholders, including both the air operator and the pilot associations, to develop the guidance materials to guide the implementation of an FRMS.

Developing segment specific prescriptive regulations to address every possible scenario may cause overregulation. An FRMS offers the scientific support and flexibility to tailor a solution that is specific to the needs of an individual operator regardless of the subpart under which it operates. Even within the same subpart the span and diversity among the different air operators can be huge. For example, among Subpart 705 air operators, the number of pilots for each company ranges from 28 to over 3 500.

Transport Canada believes that the proposed regulatory text itself would be general enough to provide sufficient mechanisms to adapt to other types of flight operations in addition to the scheduled flights. In addition, efforts have been made by Transport Canada to provide more focused guidance materials specifically to Subparts 703 and 704 air operators while developing the guidance materials for FRMSs. Work is ongoing to refine the guidance materials catering to Subparts 703 and 704 air operators to address any additional concerns.

Comments have also been expressed with respect to the economic and operational hardship that would result from specific provisions of the proposed amendment. Transport Canada will carefully examine these comments and has completed a comprehensive cost and benefit analysis to calculate the total cost and benefit, which is available upon request.

On April 5 and 6, 2017, Transport Canada held a day and a half consultation session on guidance material and the NOI. In the end, union representatives and air operator representatives agreed to work together to come up with suggestions to help Transport Canada to improve the guidance materials and other related areas, prior to the publication of the new amendments in the *Canada Gazette*, Part II.

With respect to Canada's northern communities, Transport Canada has been and will continue to engage in open dialogues with those stakeholders involved in northern operations, with a view to mitigating any unforeseen effects. Transport Canada is also committed to continue working with companies/stakeholders to determine how the amendments would apply to their business.

Regulatory cooperation

Since the FAA introduced new requirements in 2014 and up to now, Transport Canada has had the opportunity to learn from the FAA program. One example is "cargo operation exclusion" and the other is "approval process for FRMS." Transport Canada, after studying the regulatory impact, decided to take a different approach by requiring cargo air operators to comply with ICAO SARPs 2009 and removing the FRMS approval process to reduce the administrative burdens for air operators who wish to apply for FRMS exemptions.

The proposed amendments would ensure that Canada is meeting its ICAO obligations. Transport Canada will continue to advance the promotion and pursuit of international cooperation, collaboration, sharing of best practices, and the negotiation of mutual recognition arrangements between key trading partners in order to have in place a safe and efficient aviation industry and supporting regulatory framework.

Activities currently include

- cooperating with key countries such as the United States, Australia and the European Union;
- collaborating with international organizations, including the International Civil Aviation Organization (ICAO); and
- collaborating with various federal departments and agencies.

Transport Canada has consulted with the European Union, the United States and Australia, and received favourable feedback. Transport Canada endeavours to create amendments that adopt the best practices of its international partners.

The proposal is consistent with ICAO SARPs for flight crew fatigue management. ICAO requires that

- these two approaches (prescriptive limitation and performance based FRMS) be based on scientific principles, knowledge and operational experience; and
- fatigue management be a shared responsibility between the State, service providers and individuals.

It is worth pointing out that although ICAO supports two distinct methods for managing fatigue, the ICAO Standards do not identify actual limits. In addition, ICAO requires States to base their regulatory proposal on fatigue science. ICAO also requires, as per Annex 6 of the Convention, that States apply fatigue management regulations to all air carriers that travel across State boundaries, regardless of the nature of their operations (i.e. cargo versus passenger

carrying).

Transport Canada used the FAA and EASA regulations as a model for regulatory development. The major difference is the application. Like Canada, EASA has chosen to comply with the ICAO SARPs and apply fatigue management regulations to all types and sizes of air operators. The FAA has chosen to exempt cargo operations from its requirements and is now in non-conformance with the ICAO SARPs, with which the FAA has filed a difference notice.

After reviewing and analyzing the current CARs, the proposed amendments and U.S. Part 121, Subchapter G, Chapter I, Title 14 of the *Code of Federal Regulations* (FAR Part 121), it was concluded that the current CARs are less restrictive than FAR Part 121. This review further stressed that the proposed CARs would be slightly more restrictive than a standalone FAR Part 121, which, when combined with Public Law 111-216, is far more restrictive than the proposed CARs, as the mandatory Fatigue Management Plan forces restrictiveness (FRMS is an option in the proposed CARs).

Although Canada's proposal would apply to broader air operations than those in the United States and the European Union, the FAA has stated that it will be initiating rulemaking activities for the other air operators when resources permit it. EASA has already implemented new requirements for the airline and commuter (Subparts 705 and 704 equivalent) air operators. Proposed amendments for the air taxi and private air operators are expected to be published by this summer and rulemaking activities for the aerial work sector will follow.

This proposed amendment would bring Canada into compliance with the ICAO SARPs and harmonize regulations with the regulatory scheme of other major jurisdictions. The following table describes where Canada stands comparing with FAA and EASA.

	Proposed CARs	US FARs Part 117	EASA
Comparison	Least Restrictive	In Between	Most Restrictive
Where no shading has been added, there is effectively no difference between the requirements			
Flight Time Limitations			
365 consecutive days	1 000 hours	1 000 hours	900 hours per calendar year 1 000 hours in 12 consecutive months
90 consecutive days	300 hours	N/A	N/A
28 consecutive days	112 hours	100 hours	100 hours
24 consecutive hours	N/A	8 or 9 hours	N/A
Rest Periods			
Daily	12 hours at home base or 11 hours plus travel time or 10 hours rest in rest facility away from home base	10 hours — opportunity for 8 hours of sleep	12 hours minimum or equal to preceding duty period if greater than 12 hours
Recurrent	33 hours in 8 days (single day free from duty) and 4 single days free from duty per 28 days	30 hours in 7 days	36 hours in 7 days (single day free from duty) and 6 single days free from duty per 28 days EU Directive (2000/79/EC) requires 7 days per month off and 96 days per year off
Duty Time Limitations			
365 consecutive days	2 400 hours	N/A	2 000 hours EU Directive (2000/79/EC)
28 consecutive days	192 hours	190 Flight Duty Hours	190 hours
14 consecutive days	N/A	N/A	110 hours
7 consecutive days	60 hours or 70 hours Includes all hours of work	60 Flight Duty Hours Work assigned without a flight being involved is not counted	60 hours Includes all hours of work

Daily Flight Duty Time Limitations			
Based on start time of day — reduced at night and reduced by number of flights flown	13–9 hours	14–9 hours Restricted by 8 or 9 hour daily flight time limitation	13–9 hours
With additional pilots and rest facilities on board	14–18 hours All regulators permit longer flight duty periods with the use of a fatigue risk management system — ultra long range operations	13–19 hours	14–17 hours
Consecutive Nights			
	No more than 3 in a row that begin prior to 01:59 and infringe on 02:00–05:59	No more than 3 in a row that infringe on 02:00–05:59	Restricted to no more than 4 flights per night
	If a 3 hour rest is provided each night — up to 5 in a row	If a 2 hour rest is provided each night — up to 5 in a row	N/A

Rationale

Transport Canada has based this proposed regulatory amendment on scientific knowledge and principles or on the accepted practices of other international civil aviation authorities, such as the FAA and EASA (when there is no major contradiction). The proposal would meet Canada’s ICAO obligations.

In addition to the best practices of other jurisdictions, Canada’s unique operational environment also played an important role in shaping the proposed amendment.

Maximum flight time

An example of a difference between the current Transport Canada regulations and those of the FAA pertains to maximum flight time. Transport Canada proposes to reduce the maximum annual flight time (current paragraph 700.15(1)(a) of the CARs) from 1 200 to 1 000 hours in 365 days. This provision uses flight time as a measure of workload that leads to fatigue.

The proposed reduction aligns Canada’s Regulations with Part 117, Subchapter G, Chapter I, Title 14 of the *Code of Federal Regulations* of the United States, which imposes a 1 000-hour annual limit. The FAA has administered these cumulative flight-time limits for over four decades and, based on its operational experience, has found that cumulative flight time that falls within these limits is safe. Based on its significant operational experience with the 1 000-hour annual limit, the FAA has determined that a flight-time average of about 83 hours per month is safe. EASA has the same requirement.

Maximum flight duty period

Another example of a difference between the current Transport Canada regulations and those of the FAA pertains to maximum flight duty period. There is a flight duty period (FDP) limit of 14 hours in a 24-hour period under paragraph 700.16(1) of the CARs. A 14-hour day is considered too long a duty period to maintain performance throughout.

Transport Canada has studied the range of FDP developed and implemented by both the FAA and EASA, based on the start time of the flight duty period and the number of flights. EASA has a maximum FDP of 13 hours. The FAA has permitted a maximum FDP of 14 hours. Transport Canada proposed a range of FDP similar to the one developed by the FAA, after taking into account the Working Group’s recommendation and consultation with the stakeholders. EASA’s table, illustrating the range of various FDP, is very detailed, whereas the table developed by the FAA and the one proposed by Transport Canada are both simplified when compared to the EASA table.

Rest period

Science shows that people need a regular rest period to avoid acute fatigue. Currently, after completing a flight duty period, the pilot will receive a rest period of 8 hours (section 101.01 of the CARs), plus time for travel, meals, and personal hygiene. Scientific research found that an 8-hour sleep opportunity was not long enough to sustain performance over a 32-day period. (see footnote 39) Studies have shown that people need 9 hours in bed to obtain 8 hours of sleep (see footnote 40) to maintain safe levels of human performance. The current rest period does not allow enough time to do this.

Proposed section 700.40 would introduce a new requirement to provide a flight crew member sufficient rest time as follows:

- When they are at home base:
 - a period of 12 consecutive hours or 11 consecutive hours plus travel time;
 - if the air operator provides suitable accommodation, 10 hours in that suitable accommodation.
- When they are away from home base, a period of 10 consecutive hours in a suitable accommodation would be required.

When a flight crew member is at home base, the air operator is not responsible for the transportation of the flight crew member. The research shows that 8 hours of sleep requires 9 hours in bed, plus 1 hour before and after to get ready and another hour to commute, which equates to 12 hours. Transport Canada provided the option for air operators to measure the commuting time and add it to 11 hours (in a small town setting and this may be of benefit to the air operator).

When the flight crew member is away from home base, the air operator is required to provide the suitable accommodation and the transportation to and from it. Ten hours in a suitable accommodation is a compromise reached through consultation.

This proposed regulatory amendment would place Canada between the FAA (10-hour rest period) and EASA, which requires the longer period of either the duration of the previous duty period or 12 hours at home base / 10 hours away from home base.

Consecutive night duty periods

This new section addresses the required additional rest and ways to counteract fatigue resulting from multiple consecutive night duty periods. Academics have found exponential increases in risk across successive night shifts: “As before, the frequency of incidents on each night was summed across the studies and then expressed relative to that on the first night shift. On average, risk was 6% higher on the second night, 17% higher on the third night and 36% higher on the fourth night.” (see footnote 41). This risk compounds over successive nights — a significant decrease in performance.

These statistics relate to night workers who do not have the opportunity to sleep during their night shifts. The proposed Regulations would permit up to five consecutive nights, provided there is a 3-hour rest period during each night duty period in a suitable accommodation that allows the pilot to sleep. This sleep (2 to 3 hours) is combined with their daytime sleep, which should be in the range of 5 to 6 hours. As long as 8 hours of sleep is achieved in a 24-hour period, performance can be sustained.

Competitiveness impacts

Canada's key trading partners, including the United States and the European Union, have moved ahead of Canada in terms of Flight Crew Fatigue Management (FCFM) amendments. Canada needs to address this gap and maintain public confidence. Because of Canada's unique geography and industry profile, adopting exactly the same prescriptive requirements as those of our international partners is not feasible.

For example, one of the unique characteristics of the Canadian airline industry is that “economies of scale are negligible” (see footnote 42) likely due to less dense population in a relatively large land. In comparison with U.S. aviation network and cluster, Canada has many areas to improve to be more competitive in the world market. (see footnote 43)

One way to improve the competitiveness related to this proposal is to opt out of the approval process for the FRMS. The FAA requires an approval process for the FRMP. Transport Canada, after studying the FAA's practice, decided to reduce the administrative burden of air operators by removing the approval process and reserving the right to audit. This would strongly increase the air operators' incentives to conduct self-review, self-audit and quality assurance, which were built in by Transport Canada in its “two notices” submission processes for the FRMS option. During consultation, the air operators have applauded this decision, which will add competitive advantages for Canadian air operators in general.

Fit for duty

In the last 12 months, there were several incidents of pilots reporting for duty while under the influence of alcohol. Although airlines are taking appropriate actions to encourage flight crew members to report suspicions related to substance abuse, there remains a strong need for regulations to proactively address alcohol, drug, mental health and fatigue issues to promote flight crew fitness for duty and to mitigate the risk to aviation safety.

Given the safety-related functions a flight crew performs, and the decrease in cognitive and psychomotor abilities that alcohol, drugs or fatigue can cause, the consequences of not strengthening the current regulations could affect the safety and confidence of the travelling public.

Recommended approach

In general, the proposed amendments take an approach that would align Canada with its international trading partners, create a performance-based FRMS option for air carriers, and benefit Canadians overall, both in terms of the Canadian economy and in terms of aviation safety.

As Transport Canada was developing the proposed amendments, numerous options were considered, including maintaining the status quo. Maintaining the status quo presents the least amount of burden and lowest costs for businesses and the Government. However, this is inconsistent with the main goals of the Civil Aviation Safety Program and Canada's international partners. A safe aviation industry cannot improve, where that improvement can be recognized by international partners, without implementing robust regulations that allow all air operators and flight crew members to operate in a healthy and safe environment. In this context, Transport Canada would adopt the two distinct approaches.

1. Prescriptive requirements identify maximum work periods and minimum non-work periods for flight crew members. The prescribed limits are essentially informed boundaries Transport Canada has identified, inside which the air carriers must manage their fatigue-related risks as part of their existing safety management processes.

2. The performance-based Fatigue Risk Management System (FRMS) would allow the air carriers to deviate from the prescribed limits. This approach is focused on managing the actual fatigue risk in the operations to which it applies (rather than addressing the predicted fatigue risk in general, which is the basis of prescriptive requirements). An FRMS approach would represent an opportunity for air carriers to use advances in scientific knowledge to improve safety, use resources more efficiently and increase operational flexibility.

Considering the uniqueness of Subparts 702 and 604, excluding them from the proposed prescriptive requirements would reduce the adverse cost impacts the proposal would cause. In addition, capturing air operators who operate aircraft under Subparts 703 and 704 in this proposal would address the risks associated to the flight crew member fatigue issue proportionally, as the accidents tend to occur more with the smaller commercial air operators.

Although the prescriptive requirements will essentially remain the same in Subpart 702, having the FRMS option available for Subpart 702 air operators would bring further net benefits to the economy, especially for those Subpart 702 air operators whose main business is firefighting. Those Subpart 702 air operators currently are applying for exemptions on an annual basis to justify operations under emergent firefighting situations. Including air operators who are subject to Subpart 702 under FRMS exemptions would help to reduce the administrative burden of those air operators who are seeking an exemption from the flight duty and rest requirements and give them a level playing field. The proposed amendments would not be too costly for those Subpart 702 air operators with data collection mechanisms already in place, and those who have begun using safety management systems to manage the additional risk associated with their operations. Once they meet the FRMS requirements, these air operators would only have to successfully validate and maintain their safety case.

The administrative burden is minimized since the proposed amendments simply update prescriptive requirements, they do not add new ones. Industry can continue to use its established mechanism for managing flight crew duty and flight time / duty time. To operate under an FRMS, carriers would only need to submit a notice of intent and a letter of confirmation to Transport Canada, as long as they have an FRMS that supports their case and they demonstrate that the pilot's alertness level is not reduced.

Introducing the FRMS will bring Canada into alignment with the FAA and EASA, as both civil aviation authorities include the FRMS in their regulations. Both the FAA and EASA offer the FRMS as an alternative (not mandatory) means for air operators to manage fatigue. While the FAA does have an FRMS approval process, Canada would not approve the FRMS at this time, but will assess the applicants' readiness to operate under the FRMS.

The amendments present a direction that raises few significant concerns in terms of the cost impact associated with giving flight crew members more rest and less duty periods. During the consultation period, feedback from the pilots' unions and most air carriers' representatives supported the amendments.

Transport Canada has and will continue to find solutions to stakeholder concerns should they arise. Transport Canada is committed to having the regulatory framework be flexible enough to accommodate the scenarios that various types of stakeholders have presented.

Implementation, enforcement and service standards

These amendments will come into force

- One year after the date of registration for publication in the *Canada Gazette*, Part II, for air operators subject to Subpart 705 of the CARs; and
- Four years after the date of registration for publication in the *Canada Gazette*, Part II, for air operators subject to Subparts 703 and 704 of the CARs.

Between the registration of the amending regulations and their coming-into-force date, Transport Canada will communicate with affected air operators to promote the amendments and outline the FRMS option for those who wish to participate in stakeholder briefings. Specific actions at this time may include

- meeting with affected air operators, including unions and industry associations;
- answering inquiries;
- developing and distributing promotional materials; and
- organizing information sessions to explain the amendments.

With respect to the alternative FRMS exemption mechanism, once the air operators submit their notice of intent and letter of confirmation to operate under an FRMS exemption mechanism, certain flights of their operations could deviate from certain prescriptive requirements. Air operators would not require approval to begin operating under an FRMS provided they make the required data and documents available for Transport Canada's audit.

Transport Canada would enforce these amendments by

- Imposing monetary penalties under sections 7.6 to 8.2 of the *Aeronautics Act*, which carry a maximum fine of \$5,000 for individuals and \$25,000 for corporations;
- Suspending or cancelling a Canadian aviation document; or
- Taking legal action by way of summary conviction, pursuant to section 7.3 of the *Aeronautics Act*.

Transport Canada will conduct its implementation, compliance promotion and enforcement activities with existing resources, within the existing departmental reference level.

Performance measurement and evaluation

The performance measurement criteria would be closely linked to the objectives to see if the implementation of the amending regulations would reach the goals that have been set up at the outset of the regulatory development. Therefore, Transport Canada selected the following performance measures subject to consultation results:

- Increase the CARs' compliance with the ICAO Standards ([see footnote 44](#)) relating to flight duty limitations and rest time, based on scientific principles and knowledge, and allow for the use of an FRMS.
- Harmonize and reduce existing gaps associated to maximum flight duty and rest time with other jurisdictions such as the FAA and EASA.
- Enhance safety within flight operations. This could be measured by the following:
 - Total incidents and accidents rate comparison;

- Pilot fatigue survey report; and
- One-on-one fatigue management interview.

Contact

Chief
Regulatory Affairs (AARBH)
Civil Aviation
Safety and Security Group
Transport Canada
Place de Ville, Tower C
Ottawa, Ontario
K1A 0N5
Telephone: 613-993-7284 or 1-800-305-2059
Fax: 613-990-1198
Website: www.tc.gc.ca

PROPOSED REGULATORY TEXT

Notice is given that the Governor in Council, pursuant to section 4.9 ([see footnote a](#)), paragraph 5(a) ([see footnote b](#)), subsection 5.9(1) ([see footnote c](#)) and paragraphs 7.6(1)(a) ([see footnote d](#)) and (b) ([see footnote e](#)) of the *Aeronautics Act* ([see footnote f](#)), proposes to make the annexed *Regulations Amending the Canadian Aviation Regulations (Parts I, VI and VII — Flight Crew Member Hours of Work and Rest Periods)*.

Interested persons may make representations concerning the proposed Regulations within 90 days after the date of publication of this notice. All such representations must cite the *Canada Gazette*, Part I, and the date of publication of this notice, and be addressed to Chief, Regulatory Affairs (AARBH), Civil Aviation, Safety and Security Group, Department of Transport, Tower C, 330 Sparks Street, Ottawa, Ontario K1A 0N5 (general inquiries — tel.: 613-993-7284 or 1-800-305-2059; fax: 613-990-1198; internet address: <http://www.tc.gc.ca>).

Ottawa, June 19, 2017

Jurica Čapkun
Assistant Clerk of the Privy Council

Regulations Amending the Canadian Aviation Regulations (Parts I, VI and VII — Flight Crew Member Hours of Work and Rest Periods)

Amendments

1 (1) The definitions *flight deck duty time* and *flight duty time* in subsection 101.01(1) of the *Canadian Aviation Regulations* ([see footnote 45](#)) are repealed.

(2) The definition *local approprié* in subsection 101.01(1) of the French version of the Regulations is repealed.

(3) The definition *période de repos minimale* in subsection 101.01(1) of the French version of the Regulations is replaced by the following:

période de repos minimale Période qui ne peut être interrompue par l'exploitant aérien ou l'exploitant privé au cours de laquelle le membre d'équipage de conduite n'est pas en service et peut se voir accorder au moins huit heures de sommeil consécutives dans un poste de repos approprié en plus du temps requis pour s'y rendre et en revenir et les soins d'hygiène personnelle et les repas. (*minimum rest period*)

(4) Subsection 101.01(1) of the Regulations is amended by adding the following in alphabetical order:

fit for duty, in respect of a person, means that their ability to act as a flight crew member of an aircraft is not impaired by fatigue, the consumption of alcohol or drugs or any mental or physical condition; (*apte au travail*)

flight duty period means the period that begins at the earliest of the following events and ends at engines off or rotors stopped at the end of a flight:

- (a) the flight crew member carries out any duties assigned by the private operator or the air operator or delegated by the Minister before reporting for a flight,
- (b) the member reports for a flight or, if the flight duty period consists of more than one flight, reports for the first flight,
- (c) the member reports for positioning, and
- (d) the member reports as a flight crew member on standby; (*période de service de vol*)

home base means the location where a flight crew member normally begins and ends a flight duty period; (*base d'affectation*)

positioning means the transfer of a flight crew member from one location to another, at the request of the air operator, but does not include travel to or from suitable accommodation or the member's lodging; (*mise en place*)

rest period means the continuous period during which a flight crew member is off duty, excluding the travel time to or from suitable accommodation provided by a private operator or an air operator; (*période de repos*)

(5) Subsection 101.01(1) of the French version of the Regulations is amended by adding the following in alphabetical order:

poste de repos approprié Chambre pour une personne qui est exposée à un bruit minimal, bien ventilée et dotée de dispositifs de contrôle de la température et de la lumière ou, lorsqu'une telle chambre n'est pas disponible, local qui est approprié au lieu et à la saison, est exposé à un bruit minimal et offre un confort et une protection convenables contre les éléments. (*suitable accommodation*)

2 The references "Subsection 700.14(1)" to "Subsection 700.21(2)" in column I of Part VII of Schedule II to Subpart 3 of Part I of the Regulations and the corresponding amounts in column II are replaced by the following:

Column I Designated Provision	Column II Maximum Amount of Penalty (\$)	
	Individual	Corporation
Subsection 700.20(1)	3,000	15,000
Subsection 700.20(2)	1,000	5,000
Subsection 700.20(3)	1,000	5,000
Subsection 700.20(4)	1,000	5,000
Subsection 700.21(3)	1,000	5,000
Subsection 700.26(1)	5,000	25,000
Subsection 700.26(2)	1,000	5,000
Subsection 700.26(3)	1,000	5,000
Subsection 700.26(4)	1,000	5,000
Subsection 700.26(5)	1,000	5,000
Subsection 700.27(1)	5,000	25,000
Subsection 700.28(1)	5,000	25,000
Subsection 700.29(1)	5,000	25,000
Subsection 700.29(5)	3,000	15,000
Section 700.37	1,000	5,000
Subsection 700.40(1)	5,000	25,000
Subsection 700.41(1)	5,000	25,000
Subsection 700.42(1)	5,000	25,000
Subsection 700.42(2)	5,000	25,000
Subsection 700.43(1)	5,000	25,000
Subsection 700.43(2)	3,000	15,000
Subsection 700.51(1)	5,000	25,000
Subsection 700.52(4)	5,000	25,000
Section 700.61	5,000	25,000
Subsection 700.62(1)	5,000	25,000

Subsection 700.62(2)	5,000	25,000
Subsection 700.63(3)	5,000	25,000
Subsection 700.70(1)	3,000	15,000
Subsection 700.70(2)	3,000	15,000
Subsection 700.70(3)	3,000	15,000
Subsection 700.70(4)	3,000	15,000
Subsection 700.70(5)	3,000	15,000
Subsection 700.70(6)	3,000	15,000
Subsection 700.70(7)	3,000	15,000
Subsection 700.70(10)	3,000	15,000
Subsection 700.71(1)	3,000	15,000
Subsection 700.71(2)	3,000	15,000
Subsection 700.72(1)	3,000	15,000
Subsection 700.73(1)	3,000	15,000
Subsection 700.73(2)	1,000	5,000
Subsection 700.73(3)	1,000	5,000
Subsection 700.73(4)	1,000	5,000

3 Subpart 2 of Part VII of Schedule II to Subpart 3 of Part I of the Regulations is amended by adding the following after the reference “Subsection 702.84(2)”:

Column I Designated Provision	Column II Maximum Amount of Penalty (\$)	
	Individual	Corporation
Subsection 702.91(1)	3,000	15,000
Subsection 702.91(2)	1,000	5,000
Subsection 702.92(1)	5,000	25,000
Subsection 702.93(1)	5,000	25,000
Subsection 702.93(2)	5,000	25,000
Subsection 702.96(1)	3,000	15,000
Subsection 702.96(3)	1,000	5,000
Section 702.97	3,000	15,000

4 Section 602.02 of the Regulations is replaced by the following:

602.02 An operator of an aircraft shall not require any person to act as a flight crew member or to carry out a preflight duty, and a person shall not act as a flight crew member or carry out such a duty, if the operator or the person has reason to believe that the person is not, or is not likely to be, fit for duty.

5 (1) Paragraph 602.03(a) of the Regulations is replaced by the following:

(a) within 12 hours after consuming an alcoholic beverage;

(2) Paragraphs 602.03(b) and (c) of the French version of the Regulations are replaced by the following:

- b) elle est sous l'effet de l'alcool;
- c) elle fait usage d'une drogue qui affaiblit ses facultés au point où la sécurité de l'aéronef ou celle des personnes à son bord est compromise de quelque façon.

6 The reference “[602.47 to 602.56 reserved]” after section 602.46 of the Regulations is replaced by the following:

Suitable Accommodation

602.47 A private operator or an air operator, as the case may be, shall provide a flight crew member with suitable accommodation for rest periods away from home base.

[602.48 to 602.56 reserved]

7 Subsection 604.01(1) of the Regulations is amended by adding the following in alphabetical order:

flight deck duty time means the period spent by a flight crew member at a flight crew member position in an aeroplane during flight time. (*temps de service au poste de pilotage*)

8 Paragraphs 604.102(1)(b) and (c) of the Regulations are replaced by the following:

- (b) the flight duty period is extended as a result of an unforeseen operational circumstance that occurs after the beginning of the flight duty period;
- (c) the next minimum rest period is extended by an amount of time that is at least equal to the length of the extension of the flight duty period; and

9 Section 700.01 of the Regulations is amended by adding the following in alphabetical order:

acclimatized, in respect of a flight crew member, means a person whose biorhythm is considered aligned with local time; (*acclimaté*)

class 1 rest facility means a bunk or other horizontal surface located in an area that

- (a) is separated from the flight deck and passenger cabin;
- (b) has facilities to control the temperature and light; and
- (c) is subject to a minimal level of noise and other disturbances; (*poste de repos de classe 1*)

class 2 rest facility means a seat that allows for a horizontal sleeping position in an area that

- (a) is separated from passengers by a curtain or other means of separation that reduces light and sound;
- (b) is equipped with portable oxygen equipment; and
- (c) minimizes disturbances by passengers and crew members; (*poste de repos de classe 2*)

class 3 rest facility means a seat that reclines at least 40 degrees from vertical and that has leg and foot support; (*poste de repos de classe 3*)

early duty means hours of work that begin between 02:00 and 06:59 at the location where a flight crew member is acclimatized; (*service de début de journée*)

flight crew member on deployed standby means a flight crew member on standby who is located at or near an aerodrome and who has been provided with suitable accommodation by an air operator for the period during which they are available to report for flight duty; (*membre d'équipage de conduite en attente de déploiement*)

late duty means hours of work that end between midnight and 01:59 at the location where a flight crew member is acclimatized; (*service de fin de journée*)

local night's rest means a rest period that begins at 22:30 and ends at 07:30 at the location where a flight crew member is acclimatized; (*nuit de repos locale*)

night duty means hours of work that begin between 13:00 and at 01:59 and that end after 01:59 at a location where a flight crew member is acclimatized; (*service de nuit*)

reserve availability period means the period in any period of 24 consecutive hours during which a flight crew member on reserve is available to report for flight duty; (*période de disponibilité en réserve*)

reserve duty period means the period that begins at the time that a flight crew member on reserve is available to report for flight duty and ends at the time that the flight duty period ends; (*période de service en réserve*)

single day free from duty means a period free from duty that begins at the end of the first local night's rest and ends at the beginning of the following local night's rest; (*journée isolée sans service*)

window of circadian low means the period that begins at 02:00 and ends at 05:59 at the location where a flight crew member is acclimatized; (*phase de dépression circadienne*)

10 The reference “[700.12 to 700.13 reserved]” after section 700.11 of the Regulations is replaced by the following:

[700.12 reserved]

11 The Regulations are amended by adding after the heading “Division III — Flight Time and Flight Duty Time Limitations and Rest Periods” the following:

Non-application

700.13 This Division does not apply to an air operator who operates an aircraft under Subpart 2 of Part VII or to a flight crew member who operates an aircraft under that Subpart.

12 The reference “[700.12 reserved]” after section 700.11 of the Regulations is replaced by the following:

[700.12 to 700.18 reserved]

13 Division III of Part VII of the Regulations is replaced by the following:

Division III — Flight Crew Member Fatigue Management

Non-application and Interpretation

700.19 (1) This Division does not apply to an air operator who operates an aircraft under Subpart 2 of Part VII or to a flight crew member who operates an aircraft under that Subpart.

(2) For the purposes of this Division, references to time of day are

- (a)** if a flight crew member is acclimatized to their location, to the local time at that location; or
- (b)** if a flight crew member is not acclimatized to their location, to the local time at the last location where the member was acclimatized.

Monitoring System and Records

700.20 (1) An air operator shall have a system that monitors the flight times, flight duty periods, duty periods and rest periods of each of its flight crew members and shall include in its company operations manual the details of that system.

(2) An air operator shall, for each flight crew member, keep a record of

- (a)** all flight times;
- (b)** the start and end time as well as the duration of each flight duty period;
- (c)** the start and end time as well as the duration of each duty period;
- (d)** the start and end time as well as the duration of each rest period; and
- (e)** time free from duty.

(3) An air operator shall keep a record of all notifications provided to it by a pilot-in-command under subsection 700.63(4).

(4) An air operator shall keep a record referred to in this section for a period of 24 months after the day on which it is made.

Air Operator Obligations — Scheduling

700.21 (1) An air operator shall provide a flight crew member with the member's schedule sufficiently in advance for them to plan for adequate rest.

(2) An air operator shall, on a monthly basis, determine if a flight crew member's maximum flight duty period with respect to a flight is exceeded more than 10% of the time in a period of 90 consecutive days.

(3) If an air operator determines that more than 10% of a flight crew member's maximum flight duty periods are exceeded as a result of an unforeseen operational circumstance, the air operator shall change the schedule or the flight crew member pairing for the flight not later than 28 days after the day on which the determination was made.

(4) If the air operator sets schedules on a seasonal basis, the changes referred to in subsection (3) may be delayed until the beginning of the same season in the following year.

[700.22 to 700.25 reserved]

Fitness for Duty

700.26 (1) An air operator shall not allow a flight crew member to begin a flight duty period if, before the beginning of the period, the member advises the air operator that they are fatigued to the extent that they are not fit for duty.

(2) A flight crew member shall advise every other flight crew member and the air operator as soon as the member becomes aware that they have become fatigued during a flight duty period to the extent that they are not fit for duty.

(3) If there is only one flight crew member on board the aircraft, and the member becomes aware during a flight duty period that they have become fatigued to the extent that they are not fit for duty, they shall advise the air operator immediately or, if the aircraft is in flight, as soon as feasible after the aircraft has landed.

(4) If a person who is assigned by an air operator to act as a flight crew member, or any other person, becomes aware that the assignment would result in the maximum flight time, maximum flight duty period or maximum duty time being exceeded, the member or other person shall advise the air operator as soon as feasible.

(5) If a flight crew member or any other person becomes aware that the member was not granted their rest period or time free from duty, the member or other person shall advise the air operator as soon as feasible.

Maximum Flight Time

700.27 (1) An air operator shall not assign a flight crew member for flight time, and a flight crew member shall not accept such an assignment, if the member's total flight time will, as a result, exceed

- (a) 112 hours in any 28 consecutive days;
- (b) 300 hours in any 90 consecutive days;
- (c) 1,000 hours in any 365 consecutive days; or
- (d) in the case of a single-pilot operation, 8 hours in any 24 consecutive hours.

(2) For the purpose of subsection (1), a flight crew member's flight time includes

- (a) the flight time accumulated from other flight operations; and
- (b) the total flight time of a flight with an augmented flight crew.

Maximum Flight Duty Period

700.28 (1) An air operator shall not assign a flight duty period to a flight crew member, and a flight crew member shall not accept such an assignment, if the flight duty period exceeds the maximum flight duty period set out in this section.

(2) If the average duration of all scheduled flights is less than 30 minutes, the maximum flight duty period of a flight duty period that begins during a period set out in column 1 of the table to this subsection shall not exceed the number of hours set out in column 2, 3 or 4, according to the number of flights scheduled during the flight duty period.

TABLE

MAXIMUM FLIGHT DUTY PERIOD — AVERAGE FLIGHT DURATION OF LESS THAN 30 MINUTES

	Column 1	Column 2	Column 3	Column 4
Item	Start Time of Flight Duty Period	1 to 11 Flights	12 to 17 Flights	18 or More Flights
1	24:00 to 03:59	9 hours	9 hours	9 hours
2	04:00 to 04:59	10 hours	9 hours	9 hours
3	05:00 to 05:59	11 hours	10 hours	9 hours
4	06:00 to 06:59	12 hours	11 hours	10 hours
5	07:00 to 12:59	13 hours	12 hours	11 hours
6	13:00 to 16:59	12.5 hours	11.5 hours	10.5 hours
7	17:00 to 21:59	12 hours	11 hours	10 hours
8	22:00 to 22:59	11 hours	10 hours	9 hours
9	23:00 to 23:59	10 hours	9 hours	9 hours

(3) If the average duration of all scheduled flights is 30 minutes or more but less than 50 minutes, the maximum flight duty period of a flight duty period that begins during a period set out in column 1 of the table to this subsection shall not exceed the number of hours set out in column 2, 3 or 4, according to the number of flights scheduled during the flight duty period.

TABLE

MAXIMUM FLIGHT DUTY PERIOD — AVERAGE FLIGHT DURATION OF 30 MINUTES OR MORE BUT LESS THAN 50 MINUTES

	Column 1	Column 2	Column 3	Column 4
Item	Start Time of Flight Duty Period	1 to 7 Flights	8 to 11 Flights	12 or More Flights
1	24:00 to 03:59	9 hours	9 hours	9 hours
2	04:00 to 04:59	10 hours	9 hours	9 hours
3	05:00 to 05:59	11 hours	10 hours	9 hours
4	06:00 to 06:59	12 hours	11 hours	10 hours
5	07:00 to 12:59	13 hours	12 hours	11 hours
6	13:00 to 16:59	12.5 hours	11.5 hours	10.5 hours
7	17:00 to 21:59	12 hours	11 hours	10 hours
8	22:00 to 22:59	11 hours	10 hours	9 hours
9	23:00 to 23:59	10 hours	9 hours	9 hours

(4) If the average duration of all scheduled flights is 50 minutes or more, the maximum flight duty period of a flight duty period that begins during a period set out in column 1 of the table to this subsection shall not exceed the number of hours set out in column 2, 3 or 4, according to the number of flights scheduled during the flight duty period.

TABLE

MAXIMUM FLIGHT DUTY PERIOD — AVERAGE FLIGHT DURATION OF 50 MINUTES OR MORE

	Column 1	Column 2	Column 3	Column 4
Item	Start Time of Flight Duty Period	1 to 4 Flights	5 or 6 Flights	7 or More Flights
1	24:00 to 03:59	9 hours	9 hours	9 hours
2	04:00 to 04:59	10 hours	9 hours	9 hours
3	05:00 to 05:59	11 hours	10 hours	9 hours
4	06:00 to 06:59	12 hours	11 hours	10 hours
5	07:00 to 12:59	13 hours	12 hours	11 hours
6	13:00 to 16:59	12.5 hours	11.5 hours	10.5 hours
7	17:00 to 21:59	12 hours	11 hours	10 hours
8	22:00 to 22:59	11 hours	10 hours	9 hours
9	23:00 to 23:59	10 hours	9 hours	9 hours

(5) For the purposes of subsections (2) to (4), a flight crew member is considered to be acclimatized if

- (a) in the case of a time zone difference of less than four hours between local time and the time at the last location where the member was acclimatized, any rest periods required under these Regulations have been provided and the member has spent 72 hours in the same time zone;
- (b) in the case of a time zone difference of four hours or more between local time and the time at the last location where the member was acclimatized, any rest periods required under these Regulations have been provided and the member has spent 96 hours in the same time zone; or
- (c) the member has spent 24 hours in the same time zone for each hour of difference between local time and the time at the last location where the member was acclimatized.

(6) For the purposes of subsections (2) to (4), positioning is not to be considered a flight.

(7) For the purposes of subsection (5), the Canadian time zones are Pacific, Mountain, Central and Eastern, and the Atlantic time zone which includes Newfoundland and Labrador.

(8) The flight duty period for a flight crew member on standby begins at the time at which they report for duty at the location designated by the air operator.

(9) When all scheduled flights are conducted under day VFR, the maximum flight duty period of a flight duty period that begins during a period set out in column 1 of the table to this subsection shall not exceed the number of hours set out in column 2.

TABLE

MAXIMUM FLIGHT DUTY PERIOD — FLIGHTS CONDUCTED UNDER DAY VFR

	Column 1	Column 2
Item	Start Time of Flight Duty Period	Maximum Flight Duty Period
1	24:00 to 03:59	9 hours
2	04:00 to 04:59	10 hours
3	05:00 to 05:59	11 hours
4	06:00 to 06:59	12 hours
5	07:00 to 12:59	13 hours
6	13:00 to 16:59	12.5 hours
7	17:00 to 21:59	12 hours
8	22:00 to 22:59	11 hours
9	23:00 to 23:59	10 hours

Maximum Duty Time

700.29 (1) An air operator shall not assign a duty to a flight crew member, and a flight crew member shall not accept such an assignment, if, as a result, the member's duty time will exceed

- (a) 2,400 hours in any 365 consecutive days; or
- (b) the maximum duty time set out in column 1 of the table to this paragraph, if the air operator has provided the corresponding time free from duty set out in column 2 or 3 of that table.

TABLE

MAXIMUM DUTY TIME

	Column 1	Column 2	Column 3
Item	Maximum Duty Time	Time Free from Duty — Option 1	Time Free from Duty — Option 2
1	192 hours in any 28 consecutive days	(a) 1 single day free from duty in any 168 consecutive hours; and (b) 4 single days free from duty in any 672 consecutive hours	120 consecutive hours in any 504 consecutive hours
2	210 hours in any 28 consecutive days	120 consecutive hours in any 672 consecutive hours and no assignment of (a) early duty, late duty or night duty; or (b) a flight duty period greater than 12 hours	Not applicable
3	60 hours in any 7 consecutive days	(a) 1 single day free from duty in 168 consecutive hours; and (b) 4 single days free from duty in any 672 consecutive hours	Not applicable
4	70 hours in any 7 consecutive days	120 consecutive hours in any 504 consecutive hours and (a) no assignment of early duty, late duty or night duty;	120 consecutive hours in any 672 consecutive hours and no assignment of (a) early duty, late duty or night duty; or

- (b) no assignment of a flight duty period that is longer than 12 hours; and
- (b) a flight duty period greater than 12 hours
- (c) the maximum duty time is 24 hours in any consecutive 48 hours

- (2) Items 1 and 3 of column 2 of the table to paragraph (1)(b) do not apply if suitable accommodation is available for the flight crew member's time free from duty.
- (3) The time free from duty set out in column 2 of item 2 and column 3 of item 4 of the table to paragraph (1)(b) may be used by a flight crew member a maximum of six times during any 365 consecutive days.
- (4) If the beginning of a single day free from duty is delayed by up to two hours due to an unforeseen operational circumstance, the single day free from duty shall be extended by a minimum of two hours.
- (5) If an air operator changes its choice of option with respect to the maximum duty time set out in column 1 to the table to paragraph (1)(b), the air operator shall ensure that the flight crew member has five consecutive days free from duty before beginning the next duty period.
- (6) A flight crew member's duty time is to include
- (a) 33% of the time that the flight crew member on reserve is in a reserve availability period;
 - (b) 100% of the time that the flight crew member is a flight crew member on standby; and
 - (c) 20% of the time that the flight crew member is a flight crew member on deployed standby.

[700.30 to 700.35 reserved]

Home Base

700.36 An air operator shall assign a home base for each of its flight crew members.

Nutrition Break

700.37 An air operator shall provide a flight crew member with not less than 15 minutes every 6 hours within a flight duty period to eat and drink.

[700.38 to 700.39 reserved]

Rest Period — General

700.40 (1) An air operator shall provide a flight crew member with the following rest periods at the end of a flight duty period:

- (a) if the flight duty period ends at home base,
 - (i) either 12 hours, or 11 hours plus the travel time to or from the place where the rest period is taken, or
 - (ii) if the air operator provides suitable accommodation, 10 hours in that suitable accommodation; and
- (b) if the flight duty period ends away from home base, 10 hours in suitable accommodation.

(2) If an air operator assigns a duty to a flight crew member for a period — excluding the time required for positioning — that exceeds by one hour or more the maximum flight duty period referred to in section 700.28, the duration of the rest period shall be the longer of:

- (a) the sum of the maximum flight duty period and the amount of time worked beyond the maximum flight duty period, and
- (b) the rest period referred to in subsection (1).

(3) An air operator shall have a means to determine the travel time referred to in subparagraph (1)(a)(i).

Disruptive Schedules

700.41 (1) In addition to the rest periods referred to in section 700.40, an air operator shall provide a flight crew member with one local night's rest between

- (a) the time at which late duty or night duty ends and the time at which the following early duty begins; or
- (b) the time at which early duty ends and the time at which the following late duty or night duty begins.

(2) Subsection (1) does not apply when a flight crew member is at a location where local time differs by more than four hours from the local time at the last location where the member was acclimatized.

Rest Period — Time Zone Differences

700.42 (1) Despite section 700.40, an air operator shall provide a flight crew member with the following rest periods when their duty period begins in a time zone other than the time zone in which home base is located and ends away from home base:

- (a) 11 consecutive hours in suitable accommodation, if the local time at the location where the flight duty period began differs by up to four hours from

the local time at the location where the flight duty period ends; and

(b) 14 consecutive hours in suitable accommodation, if the local time at the location where the flight duty period began differs by more than four hours from the local time at the location where the flight duty period ends.

(2) Despite section 700.40, an air operator shall provide a flight crew member with the following rest periods when their duty begins in a time zone other than the time zone in which home base is located and ends at home base:

(a) 13 consecutive hours, if the local time at the location where the flight duty period began differs by up to four hours from the local time at home base and the member has been away from home base for more than 36 consecutive hours;

(b) if the local time at the location where the flight duty period began differs by more than four, but not more than 10, hours from the local time at home base, and

(i) the member has been away from home base for 60 consecutive hours or less and no part of the flight duty period occurs during any part of the member's window of circadian low, one local night's rest before the beginning of the next flight duty period, or

(ii) the member has been away from home base for more than 60 consecutive hours, or any part of the flight duty period occurs within any part of the member's window of circadian low, two local night's rest before the beginning of the next flight duty period; or

(c) if the local time at the location where the flight duty period began differs by more than 10 hours from the local time at home base and

(i) the member has been away from home base for 60 consecutive hours or less, two local night's rest before the beginning of the next flight duty period, or

(ii) the member has been away from home base for more than 60 consecutive hours, three local night's rest before the beginning of the next flight duty period.

Rest Period — Positioning

700.43 (1) If a flight crew member is required by the air operator to travel for the purpose of positioning immediately after the completion of a flight duty period and the sum of the flight duty period and the travel time required for positioning would exceed the maximum flight duty period set out in section 700.28, the air operator shall provide the member with a rest period before the beginning of the next flight duty period that is equal to the duration of

(a) the duty time, if the maximum flight duty period is exceeded by three hours or less; or

(b) the sum of the duty time and the amount of time in excess of the maximum flight duty period, if the maximum flight duty period is exceeded by more than three hours.

(2) An air operator shall not require the positioning of a flight crew member if it would result in the member's maximum flight duty period being exceeded by more than three hours unless

(a) the member agrees to the positioning; and

(b) the member's flight duty period is not exceeded by more than seven hours.

[700.44 to 700.49 reserved]

Split Flight Duty

700.50 (1) A flight crew member's flight duty period may exceed the maximum flight duty period set out in section 700.28 by the following amount of time, if the air operator provides the member with a break, in suitable accommodation, of at least 60 consecutive minutes during the flight duty period:

(a) 100% of the duration of the break that is provided to the member during the hours of 24:00 to 05:59;

(b) 50% of the duration of the break that is provided to the member during the hours of 06:00 to 23:59; and

(c) 50% of the duration of the break that is provided to the member in the case of the replanning of a flight duty period after it has begun.

(2) For the purposes of subsection (1), the duration of the break provided to the flight crew member is reduced by 45 minutes before the calculation is made.

(3) If a flight crew member is assigned to night duty, his or her flight duty period may only be extended under subsection (1) for three consecutive nights.

(4) The hours referred to in paragraphs (1)(a) and (b) are the hours at the location where the flight crew member is acclimatized.

(5) If a flight crew member on reserve is assigned to flight duty that includes split duty, the air operator may extend the reserve duty period by two hours if a break in accordance with this section is provided. The flight duty period following the break shall not consist of more than two flights.

Consecutive Night Duty Periods

700.51 (1) An air operator shall not assign to a flight crew member more than three consecutive night duty periods if any part of those periods falls between 02:00 and 05:59, unless the air operator provides the member with one local night's rest at the end of the third duty period.

(2) However, an air operator may assign to a flight crew member up to five consecutive night duty periods even if any part of those periods falls between 02:00 and 05:59 if the member is provided with

(a) a rest period of three hours in suitable accommodation during each night duty period; and

(b) 56 consecutive hours free from duty at the end of the last consecutive night duty period.

Delayed Reporting Time

700.52 (1) If an air operator advises a flight crew member of a delay in the member's reporting time before the member leaves his or her suitable accommodation to report for duty, the duration of the flight duty period shall, for the purposes of determining the maximum flight duty period in accordance with section 700.28, be calculated starting from either the initial reporting time or the delayed reporting time, whichever results in the shorter period.

(2) Despite subsection (1), the beginning of the maximum flight duty period, if the delay in the reporting time

(a) is less than four hours, is the delayed reporting time; or

(b) is four hours or more but less than 10 hours, is four hours after the initial reporting time.

(3) If the delay in the reporting time is 10 hours or more, the duration of the delay is considered to be a rest period if the air operator has advised the flight crew member of the delay before he or she leaves the suitable accommodation, and does not disturb the member's rest period before an agreed time.

(4) Unless the air operator and flight crew member agree on a time when the air operator may disturb the member's rest period referred to in subsection (3), the air operator shall not interrupt the member's rest period

(a) during the 30-minute period before the time the member was initially scheduled to leave the suitable accommodation; or

(b) during the 60-minute period before the initial reporting time.

[700.53 to 700.59 reserved]

Flight Duty Period — In-flight Rest and Augmented Flight Crew

700.60 (1) Despite section 700.28, if the air operator assigns for a flight the number of additional flight crew members set out in column 2 of the table to this subsection and provides, for each additional member, the corresponding rest facility set out in column 3, the maximum flight duty period is the period set out in column 1.

TABLE

MAXIMUM FLIGHT DUTY PERIOD — AUGMENTED FLIGHT CREW AND REST FACILITY

	Column 1	Column 2	Column 3
Item	Maximum Flight Duty Period (Hours)	Additional Flight Crew Members	Rest Facility
1	14	1	class 3
2	15	1	class 1 or class 2
3	15.25	2	class 3
4	16.50	2	class 2
5	18	2	class 1

(2) The maximum flight duty period set out in subsection (1) applies only to a flight duty period that consists of three or fewer flights if

(a) for a flight duty period that consists of one flight, all flight crew members are provided with in-flight rest in a rest facility; and

(b) for a flight duty period that consists of two or three flights,

(i) the flight crew member who will be at the controls for the final landing is provided with two consecutive hours of in-flight rest in a rest facility; and

(ii) all other flight crew members are provided with 90 consecutive minutes of in-flight rest in a rest facility.

(3) A flight crew member's flight duty period shall include all time spent in the rest facility.

(4) The flight duty period for all flight crew members shall begin and end at the same location. However, if the period consists of more than one flight and the first flight is scheduled to be less than 105 minutes long, an air operator may assign additional flight crew members to join a flight after the first flight, but all flight crew members shall end their flight duty period at the same location.

(5) At least one additional flight crew member shall be on the flight deck during all take-offs and landings, other than for the first flight, if additional flight crew members join the flight after the first flight in the case referred to in subsection (4).

- (6) In-flight rest shall occur between the time at which the aircraft reaches 3 048 m (10,000 feet) above aerodrome elevation and 15 minutes before the scheduled beginning of the descent.
- (7) If a flight duty period has been extended, an air operator shall provide each flight crew member with a rest period that is the longer of
- (a) the duration of the duty period just completed, and
 - (b) 14 hours in suitable accommodation, or 16 hours when the member's duty period ends at home base.

Long-range Flights

700.61 No air operator shall assign a flight duty period to a flight crew member, and no flight crew member shall accept such an assignment, if the flight duty period includes a flight that follows a scheduled flight of more than seven hours and occurs within the flight crew member's window of circadian low.

Ultra Long-range Flights

700.62 (1) No air operator shall assign a flight duty period of more than 18 hours to a flight crew member and no flight crew member shall accept such an assignment.

(2) No air operator shall assign a flight crew member to a flight with a scheduled flight time of more than 16 hours, and no flight crew member shall accept such an assignment.

Unforeseen Operational Circumstances — Flight Duty Period and Rest Period

700.63 (1) If the pilot-in-command is of the opinion that an unforeseen operational circumstance that occurs after the beginning of the flight duty period could lead to a level of fatigue that may adversely affect the safety of the flight, the pilot-in-command may, after consulting with all crew members on their level of fatigue,

- (a) reduce a flight crew member's flight duty period;
- (b) extend a flight crew member's flight duty period by the following number of hours in excess of the maximum flight duty period set out in section 700.28 by
 - (i) one hour for a single-pilot operation,
 - (ii) two hours, if the flight crew is not augmented,
 - (iii) three hours, if the flight crew is augmented and the scheduled flight duty period consists of one flight, and
 - (iv) two hours, if the flight crew is augmented and the scheduled flight duty period consists of two or three flights; or
- (c) extend a flight crew member's rest period.

(2) If a further unforeseen operational circumstance arises after take-off on the final flight for which the maximum flight duty period was extended under subsection (1), the pilot-in-command may, despite that subsection, continue the flight to the destination aerodrome or to an alternate aerodrome.

(3) An air operator shall extend the rest period after a flight duty period is extended under this section by an amount of time that is at least equal to the extension of the flight duty period.

(4) At the end of a flight duty period, the pilot-in-command shall notify the air operator of any change to a flight duty period made under this section.

Unforeseen Operational Circumstances — Split Flight Duty

700.64 (1) In the event of an unforeseen operational circumstance that occurs after the beginning of the flight duty period, an air operator may change a flight crew member's flight duty period to include a split flight duty in accordance with section 700.50 if the pilot-in-command agrees and the change is made before the scheduled break on the ground.

(2) The pilot-in-command shall not agree to the change if he or she is of the opinion, after consulting with all other crew members, that a split flight duty could lead to a level of fatigue that may adversely affect the safety of the flight.

[700.65 to 700.69 reserved]

Flight Crew Member on Reserve

700.70 (1) An air operator shall notify a flight crew member on reserve of the start and end times of the reserve availability period and the location where it will take place no later than

- (a) 12 hours before the start time of the reserve availability period, if no part of that period falls during the member's window of circadian low; or
- (b) 32 hours before the start time of the reserve availability period, if any part of that period falls during the member's window of circadian low.

(2) An air operator shall not change the start time of a reserve availability period of a flight crew member by

- (a) more than two hours before, or four hours after, the start time that was communicated to the flight crew member under subsection (1); or
- (b) more than eight hours before or after the start time that was communicated to the member under subsection (1) in any period of 168 consecutive

hours, unless the member is provided with two consecutive days free from duty within that period.

- (3)** If the start time of a reserve availability period is changed to a time after 02:00, the air operator shall not assign another reserve availability period to the flight crew member unless the member is provided with two consecutive days free from duty before the start time of that period.
- (4)** An air operator shall not change the start time of a reserve availability period so that it falls in a flight crew member's window of circadian low unless the air operator notifies the member of the change at least 24 hours before the revised start time.
- (5)** An air operator shall not assign to a flight crew member a reserve availability period that exceeds 14 consecutive hours.
- (6)** An air operator shall provide a flight crew member with a rest period of at least 10 consecutive hours between reserve availability periods.
- (7)** An air operator shall not assign to a flight crew member a reserve duty period that exceeds
- (a)** 18 consecutive hours, if the period begins between 02:00 and 17:59;
 - (b)** 17 consecutive hours, if the period begins between 18:00 and 8:59;
 - (c)** 6 consecutive hours, if the period begins between 19:00 and 20:59;
 - (d)** 15 consecutive hours, if the period begins between 21:00 and 22:59; and
 - (e)** 14 consecutive hours, if the period begins between 23:00 and 01:59.
- (8)** Despite subsection (7), an air operator may assign to a flight crew member a reserve duty period of
- (a)** no more than 20 hours, if the flight crew is augmented by one additional flight crew member and a class 1 rest facility or a class 2 rest facility is provided for the member; and
 - (b)** no more than 22 hours, if the flight crew is augmented by two additional flight crew members and a class 1 rest facility or a class 2 rest facility is provided for each of the members.
- (9)** If the reserve availability period begins between 02:00 and 05:59 at the location where the flight crew member is acclimatized and the member is not contacted by the air operator during that period, the air operator may extend the reserve duty period by two hours or 50% of the reserve availability period that falls between 02:00 and 05:59, whichever is shorter.
- (10)** An air operator shall not assign to a flight crew member a flight duty period that exceeds the maximum reserve duty period set out in subsection (7) or (8) or the maximum flight duty period set out in section 700.28, whichever is shorter, unless the air operator
- (a)** provides the member with at least 24 hours' notice of the assignment before the beginning of the flight duty period;
 - (b)** does not provide the notice during the period that begins at 22:30 and ends at 7:30; and
 - (c)** assigns no duties to the member between the time the notice is provided and the beginning of the flight duty period.

Flight Crew Member on Standby

- 700.71 (1)** An air operator shall provide a flight crew member on standby with a place that provides adequate protection from the elements, where it is possible to sit and to access food and drink and, if possible, that is not accessible to the public.
- (2)** If the flight crew member on standby is not assigned to flight duty, the air operator shall provide them with the following rest periods:
- (a)** if the member is at home base,
 - (i)** 12 hours, or 11 hours plus the travel time to or from the member's lodging, or
 - (ii)** if the air operator provides suitable accommodation, 10 hours in that suitable accommodation; or
 - (b)** if the member is away from home base, 10 hours.

Flight Crew Member on Deployed Standby

- 700.72 (1)** No air operator shall assign a flight duty period to a flight crew member on deployed standby unless
- (a)** the flight duty period begins and ends on the same day, beginning no earlier than 07:00 local time and ending no later than 23:00 local time; and
 - (b)** the member has been provided with a rest period of at least 11 consecutive hours before the beginning of the flight duty period.
- (2)** The time free from duty set out in column 2 of the table to paragraph 700.29(1)(b) does not apply to a flight crew member on deployed standby.

Controlled Rest on the Flight Deck

- 700.73 (1)** No flight crew member shall take a controlled rest on the flight deck of an aircraft that is operated by an air operator unless
- (a)** the rest is 45 minutes or less, is taken during the cruise portion of the flight and is completed at least 30 minutes before the scheduled beginning of the descent;
 - (b)** no other flight crew member is taking a rest at that time; and
 - (c)** at least two flight crew members remain on the flight deck.

- (2) Before taking a controlled rest on the flight deck, a flight crew member shall
- (a) transfer their duties to a flight crew member who is not taking a rest;
 - (b) review the status of the flight, including any specific duties to be performed during the rest;
 - (c) review the wake-up criteria; and
 - (d) advise the flight attendants of the start and end times of the rest.
- (3) A flight crew member who takes a controlled rest on the flight deck shall not assume any duties, and no other flight crew member shall transfer any duties to them, until 15 minutes after the end of the rest.
- (4) When a flight crew member returns to duty, another flight crew member shall provide him or her with an operational briefing.

[700.74 to 700.99 reserved]

Division IV — Fatigue Risk Management System

Initial Exemption

700.100 (1) Subject to subsections (3) and (4), an air operator to which sections 700.20 to 700.73 apply is exempt, in respect of a flight, from the application of the provisions set out in the notice of intent referred to in section 700.101, if

- (a) the air operator has sent to the Minister a notice of intent that complies with section 700.101; and
- (b) the air operator has established and implemented the following components of the fatigue risk management system:
 - (i) the fatigue risk management plan, and
 - (ii) the fatigue risk management process.

(2) Subject to subsections (3) and (5), an air operator to which sections 702.91 to 702.98 apply is exempt, in respect of a flight, from the application of the provisions set out in the notice of intent referred to in section 700.101, if

- (a) the air operator has sent to the Minister a notice of intent that complies with section 700.101; and
- (b) the air operator has established and implemented the following components of the fatigue risk management system:
 - (i) the fatigue risk management plan, and
 - (ii) the fatigue risk management process.

(3) The exemptions set out in subsections (1) and (2) continue to apply in respect of a flight as long as the air operator demonstrates compliance with the requirements of sections 700.102 to 700.109 but cease to apply, in respect of that flight, on the earlier of

- (a) the date the exemption set out in section 700.112 comes into effect with respect to the same provisions and for the same flight, and
- (b) two years after the date on which the notice of intent was sent.

(4) The exemption set out in subsection (1) may be in respect of any of the requirements set out in sections 700.27 to 700.73 except for the following provisions

- (a) paragraph 700.27(1)(c);
- (b) paragraph 700.29(1)(a);
- (c) section 700.36; and
- (d) section 700.37.

(5) The exemption set out in subsection (2) may be in respect of any of the requirements set out in sections 702.92 to 702.98 except for paragraph 702.92(1)(a).

(6) The exemptions set out in subsection (1) or (2) may apply to a series of flights if

- (a) the flights in the series of flights are operated by the same flight crew members; and
- (b) the flight crew members operate the flights during the same flight duty period or during consecutive flight duty periods.

Notice of Intent

700.101 An air operator shall send a notice of intent to the Minister that sets out the following elements:

- (a) a statement that the air operator intends to establish, implement and maintain a fatigue risk management system in accordance with this Division;
- (b) a description of the flight that will be operated under an exemption set out in section 700.100;
- (c) the provisions from which the air operator will be exempt;
- (d) a description of the manner in which the flight will vary from the requirements of the provisions referred to in paragraph (c);
- (e) the expected day on which the flight will begin to be operated under an exemption set out in section 700.100;
- (f) a description of the safety case that will be developed for the flight;

- (g) a statement that the air operator intends to validate a safety case in accordance with subsection 700.109(4) and to conduct an initial audit under subsection 700.110(1); and
- (h) the name and contact information of the person who will be responsible for implementing the fatigue risk management system.

Fatigue Risk Management System — Establishment and Implementation

700.102 (1) An air operator shall establish and implement a fatigue risk management system.

(2) The operations manager appointed under paragraph 700.09(1)(a) is responsible for ensuring that the fatigue risk management system complies with the requirements of this Division.

(3) The operations manager shall, when a finding resulting from a quality assurance program for fatigue risk management system established under section 700.108 is reported to them,

- (a) determine what, if any, corrective actions are required and take those actions; and
- (b) notify the accountable executive of any systemic deficiency and of the corrective action taken.

(4) The operations manager may assign the management functions for the fatigue risk management system to another person.

(5) The responsibility of the operations manager is not affected by the assignment of management functions to another person under subsection (4).

(6) When the operations manager assigns the management functions for the fatigue risk management system to another person under subsection (4), that other person shall report to the operations manager the fatigue-related hazards, risks and incidents identified under the fatigue risk management system.

Fatigue Risk Management System — Components

700.103 (1) An air operator shall have a fatigue risk management system that includes, in respect of the provisions that apply to its air operator certificate, the following components:

- (a) a fatigue risk management plan;
- (b) a fatigue risk management process;
- (c) a program for fatigue risk management promotion; and
- (d) a quality assurance program for the fatigue risk management system.

(2) The air operator shall update its fatigue risk management system in any of the following circumstances:

- (a) a change in the size and scope of its operations;
- (b) any action taken as a result of an audit of the fatigue risk management system conducted under subsection 700.110(1) or section 700.113;
- (c) any finding of an increase in the level of fatigue or a decrease in the level of alertness of flight crew members resulting from the air operator's validation of the safety case in accordance with subsection 700.109(4); or
- (d) an indication, following data analysis conducted in accordance with the process set out in section 700.105, that flight crew members are subject to an increase in their level of fatigue or a decrease in their level of alertness.

Fatigue Risk Management Plan

700.104 The air operator's fatigue risk management plan shall include the following elements:

- (a) a fatigue risk management policy — signed by the accountable executive — that establishes the shared responsibility of the air operator and flight crew members in managing fatigue;
- (b) safety objectives, including the identification and reduction of fatigue-related hazards and the effective management of fatigue in flight operations;
- (c) safety performance indicators to measure the attainment of the safety objectives;
- (d) defined responsibilities in relation to fatigue management for
 - (i) the air operator's managers,
 - (ii) the persons managing the fatigue risk management system, and
 - (iii) other employees;
- (e) a training plan that identifies the content of the initial and annual training;
- (f) a plan for communicating the information referred to in paragraphs 700.107(2)(a) to (f) to flight crew members; and
- (g) a policy for the internal reporting of fatigue by flight crew members, without fear of reprisal.

Fatigue Risk Management Process

700.105 (1) The air operator's fatigue risk management process shall include procedures for

- (a) reporting fatigue internally by flight crew members;

- (b) confirming in writing, to flight crew members, receipt of each fatigue report and advising of any follow-up action;
- (c) collecting information to identify fatigue-related hazards, including
 - (i) flight crew member performance data,
 - (ii) accident and incident information,
 - (iii) data from work schedules,
 - (iv) data resulting from comparisons of planned schedules in relation to time worked, and
 - (v) data from a review of operational or administrative duties;
- (d) developing a list of the safety data and scientific studies used in support of the processes that form part of the fatigue risk management system;
- (e) managing the data and information referred to in this subsection;
- (f) identifying and assessing the level of fatigue through modelling with respect to flight crew members' schedules; and
- (g) analyzing planned schedules in relation to time worked in order to assess whether fatigue is being managed.

(2) The air operator's fatigue risk assessment process shall be based on the information referred to in subsection (1) and shall include a procedure for

- (a) identifying the cause of fatigue-related hazards;
- (b) assessing the likelihood that a fatigue-related event will occur and the degree of severity of its consequences;
- (c) identifying and prioritizing the risks that need to be managed;
- (d) developing and updating a record of the risks that are identified;
- (e) determining the actions to be taken to manage the risks referred to in paragraph (c) including the preventive measures or corrective actions to be taken with respect to those risks; and
- (f) developing safety performance indicators to measure the effectiveness of the measures and actions taken under paragraph (e).

Collaboration with Employees

700.106 The air operator shall develop a policy and a procedure allowing flight crew members to internally report situations that could lead to fatigue in collaboration with the bargaining agents or, if there is no bargaining agent, with its employees or a representative selected by its employees.

Fatigue Risk Management Promotion

700.107 (1) In the case of an air operator to which sections 700.20 to 700.73 apply, its program for fatigue risk management promotion shall include training for its employees on

- (a) the components and the functioning of the fatigue risk management system and the employees' responsibilities with respect to the system;
- (b) the actions to be taken with respect to fatigue-related risks; and
- (c) the requirements of these Regulations in respect of fatigue management.

(2) In the case of an air operator to which sections 702.91 to 702.98 apply, its program for fatigue risk management promotion shall include training for its employees on

- (a) the components and the functioning of the fatigue risk management system and the employees' responsibilities with respect to the system;
- (b) the actions to be taken with respect to fatigue-related risks;
- (c) the requirements of these Regulations in respect of fatigue management;
- (d) personal fatigue management strategies relating to
 - (i) sleep hygiene,
 - (ii) lifestyle, exercise and diet, and
 - (iii) the consumption of alcohol and drugs;
- (e) the impact of fatigue on aviation safety;
- (f) sleep requirements and the science relating to fatigue;
- (g) the causes and consequences of fatigue;
- (h) how to recognize fatigue in themselves and in others;
- (i) sleep disorders and their impact on aviation safety and treatment options; and
- (j) human and organizational factors that may cause fatigue, including
 - (i) sleep quality and duration,
 - (ii) the impact of shift work and overtime,
 - (iii) the circadian rhythm, and
 - (iv) the effects of changes of time zones.

(3) The programs set out in subsections (1) and (2) shall include

- (a) competency-based training for persons who have been assigned duties in respect of the fatigue risk management system; and
- (b) means of measuring the level of competency attained by each person who receives the training.

(4) For the purposes of promoting fatigue risk management, an air operator shall have a procedure for communicating the following information to its employees:

- (a) industry reports on fatigue;
- (b) industry best practices in respect of fatigue risk management;
- (c) advancements in the science relating to fatigue;
- (d) the results of the analysis of data obtained through the application of the process set out in section 700.105;
- (e) updates to the fatigue risk management system; and
- (f) the results of the review of the fatigue risk management system.

Quality Assurance Program for the Fatigue Risk Management System

700.108 (1) The air operator's quality assurance program for the fatigue risk management system shall include a process for the audit of the fatigue risk management system that includes procedures for

- (a) auditing the extent to which the air operator has implemented its fatigue risk management system, including
 - (i) a checklist setting out all of the components of the air operator's fatigue risk management system that are to be audited, and
 - (ii) a plan establishing the frequency of the audits and the manner in which they will be conducted;
- (b) auditing the effectiveness of the fatigue risk management system in the event of an accident or incident;
- (c) analyzing findings of the audit and determining the contributing factors of those findings;
- (d) developing, implementing and monitoring preventive measures and corrective actions to address the findings of the audit; and
- (e) keeping and updating records, including the findings of the audit, the preventive measures and corrective actions to address the findings of the audit and any follow-up taken in respect of those measures and actions.

(2) The air operator's process for the periodic review of the effectiveness of its fatigue risk management system shall include procedures for the assessment of the following elements:

- (a) the fatigue risk management processes;
- (b) the accuracy of the safety performance indicators; and
- (c) the attainment of the safety objectives.

(3) An air operator shall have procedures for the ongoing monitoring of the effect of the variance described in the notice of intent on the levels of fatigue and alertness of the flight crew members.

Safety Case

700.109 (1) The air operator shall ensure that a safety case is established in respect of a flight to demonstrate that the variance described in the notice of intent does not increase the level of fatigue or decrease the level of alertness of the flight crew members.

(2) The safety case shall consist of the following:

- (a) a description of the flight that is operated under the exemption and of the variance from the provisions identified in the notice of intent;
- (b) the data collection methodology and data that will be used initially to establish the baseline levels of fatigue and alertness of the flight crew members with respect to the flight and to identify fatigue-related hazards and risks;
- (c) the data collection methods used to evaluate the safety case on an ongoing basis;
- (d) an analysis of the impact of the variance on the flight crew members' levels of fatigue and alertness that considers the flight crew members' schedule before and after the flight that is subject to the variance and the findings of the fatigue risk assessment;
- (e) the fatigue risk controls that are implemented to address the findings of the risk assessment;
- (f) procedures to measure the impact of the deviation on the levels of fatigue and alertness;
- (g) the preventive measures or corrective actions that are taken to address any adverse impact of the variance on the levels of fatigue and alertness; and
- (h) the means that will be used to monitor the effectiveness of the fatigue risk management system in managing the safety case.

(3) A safety case that is established in respect of a flight may be used in respect of another flight if the following requirements are met:

- (a) the difference in the duration of the flights does not exceed 30 minutes;
- (b) the flights are operated in the same time zone or across the same number of time zones in the same direction;
- (c) the flights are operated with aircraft of the same type and configuration;

- (d) the flights are operated with the same number of flight crew members;
- (e) the operating environments of the flights are similar;
- (f) the flights start within 30 minutes of each other; and
- (g) the other hazards and risks associated with the flights are similar.

(4) A safety case is validated when the air operator meets the following conditions:

- (a) fatigue and alertness data have been collected over a period of not less than one year, in respect of not less than 20 consecutive flights described in the notice of intent, of which not more than 5% of those flights have an adverse impact of more than 5% on the levels of fatigue and alertness determined by means of the methodology described in paragraph (2)(b);
- (b) the fatigue risk assessment has been conducted and the findings of the assessment have been analyzed;
- (c) mitigation measures have been implemented to manage the hazards and risks related to the variance to correct increases in the level of fatigue and decreases in the level of alertness of flight crew members;
- (d) the mitigation measures have been monitored to determine their effect on the levels of fatigue and alertness of flight crew members;
- (e) corrective actions have been taken if the mitigation measures monitored under paragraph (d) do not achieve the desired effect on the levels of fatigue and alertness of flight crew members; and
- (f) the effectiveness of the mitigation measures and, if applicable, the corrective actions in maintaining the established levels of fatigue and alertness of flight crew members is demonstrated.

(5) For the purposes of paragraph (4)(a), an air operator may use not more than 25% of the required data respecting a flight from a flight operated by another air operator if the flights meet the requirements of paragraphs (3)(a) to (g).

Fatigue Risk Management System — Initial Audit

700.110 (1) An air operator shall ensure that an initial audit of its fatigue risk management system is conducted after validation of the safety case in accordance with the process established under subsection 700.108(1).

(2) The air operator shall analyze the findings of the audit and shall, if deficiencies are identified,

- (a) investigate and analyze their root cause and contributing factors; and
- (b) develop and implement preventive measures and corrective actions to address the findings.

(3) The air operator shall assess the preventive measures and corrective actions to ensure that they are effective and are used on an ongoing basis to improve the fatigue risk management system.

(4) An air operator who already has implemented a fatigue risk management system and prepares a safety case for a subsequent variance is not required to conduct the audit required under subsection (1).

Non-availability of Exemption

700.111 An air operator who was exempt from the application of provisions in respect of a flight under section 700.100 and who has not validated a safety case in the time set out in subsection 700.100(3) shall not be exempted from the application of the same provisions set out in the notice of intent and in respect of the same flight for a period of five years after the expiry of that period.

Continuing Exemption

700.112 (1) An air operator who was exempt under section 700.100, for the purposes of preparing a safety case in respect of a flight, is exempt from the application of the same provisions for the same flight if the air operator

- (a) conducts an initial audit in accordance with section 700.110;
- (b) validates a safety case in accordance with subsection 700.109(4); and
- (c) sends, at least 30 days before operating a flight under an exemption, a letter of confirmation to the Minister.

(2) The exemption under subsection (1) takes effect 30 days after the date that the letter of confirmation is sent to the Minister and continues to have effect as long as the air operator

- (a) maintains the fatigue risk management system in accordance with this Division;
- (b) monitors the effectiveness of the safety case in managing the fatigue and alertness of the flight crew members in accordance with section 700.114; and
- (c) corrects any adverse impacts of the variance on the levels of fatigue and alertness on the flight crew members no later than 60 days after the date the adverse impact is identified in the course of monitoring.

(3) The letter of confirmation shall set out

- (a) a confirmation that a safety case has been validated for the flight and that any variance from the requirements set out in sections 700.27 to 700.73

or in sections 702.91 to 702.98, as the case may be, has no adverse impact on the levels of fatigue or alertness of the flight crew members;

- (b) a confirmation that the fatigue risk management system has been audited under section 700.110;
- (c) a statement that the fatigue risk management system meets the requirements of this Division; and
- (d) the date on which the first flight will be operated under an exemption in section 700.112.

Fatigue Risk Management System — Audit

700.113 The air operator who has implemented a fatigue risk management system in accordance with this Division shall ensure that an audit of its system is conducted, in accordance with the process established under subsection 700.108(1),

- (a) within 12 months after the initial audit is conducted under subsection 700.110(1);
- (b) within 12 months after the day on which the previous audit was completed;
- (c) after a major incident where fatigue was a contributing factor; and
- (d) after a major change in the air operator's activities that could impact the levels of fatigue or alertness of the flight crew members.

Variance — Monitoring of Effects

700.114 (1) The air operator shall monitor, in accordance with the procedures established under subsection 700.108(3), the effect of the variance described in the notice of intent on the levels of fatigue and alertness of the flight crew members for each period of six months over which the flight that is subject to the exemption set out in subsection 700.112(1) is operated.

(2) The air operator shall collect data in respect of a representative number of flights conducted over the period of six months in accordance with the methodology set out in the validated safety case.

(3) If the monitoring referred to in subsection (1) shows that the variance described in the notice of intent has an adverse impact on the levels of fatigue or alertness of the flight crew members, the air operator shall develop and take corrective actions to eliminate the adverse impact of the variance.

(4) If corrective actions are developed and taken, the air operator shall assess their effectiveness in eliminating the adverse impact of the variance on the levels of fatigue and alertness.

(5) If the corrective actions eliminate the adverse impact of the variance on the levels of fatigue and alertness, the air operator shall modify the safety case to take into account the corrective actions and inform the Minister of the modification within 60 days after it is made.

Fatigue Risk Management System — Review

700.115 (1) The air operator shall conduct a review of the fatigue risk management system, in accordance with the procedures established under subsection 700.108(2), at least once every twelve months after the initial audit required by subsection 700.110(1) is conducted.

(2) The review of the fatigue risk management system shall assess the following:

- (a) the fatigue risk management processes;
- (b) the accuracy of the safety performance indicators; and
- (c) the attainment of the safety objectives.

(3) The air operator shall

- (a) determine what corrective actions are necessary to address any deficiency identified by the review and carry out those actions;
- (b) keep a record of any determination made under paragraph (a) and the reason for it; and
- (c) if the air operator has assigned management functions to another person, provide that person with a copy of the determination.

(4) An air operator shall not assign a duty relating to the quality assurance program for the fatigue risk management system to a person who is responsible for carrying out a task or an activity evaluated by that program unless

- (a) owing to the size, nature and complexity of the air operator's operations and activities, it is impractical to assign the duty to a person who is not responsible for carrying out the task or activity;
- (b) based on a risk analysis, assigning the duty to a person who is responsible for carrying out the task or activity will not result in an increased risk to aviation safety; and
- (c) the audit of the fatigue risk management system will not be compromised.

Training

700.116 (1) The air operator shall ensure that training is conducted every twelve months and covers the subjects set out in section 700.107.

(2) The air operator shall ensure that there is a training record that includes

- (a) a description of all the training that each employee has received in accordance with this section; and

(b) evaluation results for each employee who has received training in accordance with this section.

Documentation — Keeping up to Date

700.117 (1) An air operator shall ensure that the fatigue risk management system documentation reflects the procedures and processes that have been established and implemented.

(2) An air operator shall notify the Minister of any changes to the fatigue risk management process within 60 days after the change is made.

Data and Documentation

700.118 (1) The air operator shall collect data and keep documentation in respect of flight crew members on the following subjects:

- (a) the fatigue model used to assess the levels of fatigue and alertness;
- (b) records of testing for fatigue and alertness;
- (c) fatigue surveys; and
- (d) the evaluation of the level of fatigue against the baseline level established for comparative analysis.

(2) The air operator shall keep documentation in respect of the following:

- (a) records and documents created in the course of conducting an audit or a review under this Division; and
- (b) other material created under the fatigue risk management system.

Preservation of Information

700.119 The air operator shall keep the information collected and created under this Division for four years after the day on which the information was collected or created.

Access to Documentation

700.120 The air operator shall make available to the Minister on request any documentation that it is required to collect or create under this Division.

14 Part VII of the Regulations is amended by adding the following before Subpart 3:

Division X — Flight Time and Flight Duty Period Limitations and Rest Periods

Monitoring System

702.91 (1) An air operator shall have a system that monitors the flight time, flight duty periods and rest periods of each of its flight crew members and shall include in its company operations manual the details of that system.

(2) If a person who is assigned by an air operator to act as a flight crew member, or any other person, becomes aware that the assignment would result in the maximum flight time referred to in section 702.92 or the maximum flight duty period referred to in section 702.93 being exceeded, the person shall advise the air operator as soon as feasible.

Maximum Flight Time

702.92 (1) Subject to subsection (2), no air operator shall assign flight time to a flight crew member, and no flight crew member shall accept such an assignment, if the member's total flight time will, as a result, exceed

- (a) 1,200 hours in any 365 consecutive days;
- (b) 300 hours in any 90 consecutive days;
- (c) 120 hours in any 30 consecutive days or, in the case of a flight crew member on call, 100 hours in any 30 consecutive days;
- (d) 60 hours in any 7 consecutive days; or
- (e) if the member conducts single-pilot IFR flights, 8 hours in any 24 consecutive hours.

(2) However, an air operator may assign flight time to a flight crew member, and a member may accept such an assignment, even if the member's flight time will, as a result, exceed the flight time referred to in subsection (1) as long as

- (a) the extension of flight time is authorized in the air operator certificate; and
- (b) the air operator and the member comply with the *Commercial Air Service Standards*.

(3) Subject to section 702.94, a flight crew member who reaches a flight time limitation established by this section is considered to be fatigued and shall not remain on flight duty or be reassigned to flight duty until the member has been provided with the rest period required by section 702.93 or the time free from duty required by section 702.96.

Maximum Flight Duty Period and Rest Periods

702.93 (1) Subject to subsections (3) and (5), an air operator shall not assign a flight duty period to a flight crew member, and a flight crew member shall not accept such an assignment, if the member's flight duty period will, as a result, exceed 14 consecutive hours in any 24 consecutive hours.

(2) Following a flight duty period, an air operator shall provide a flight crew member with the minimum rest period and any additional rest period required by this Subpart.

(3) When a flight duty period includes a rest period, the flight duty period may be extended beyond the maximum flight duty period referred to in subsection (1) by one-half the length of the rest period referred to in paragraph (b), to a maximum of 3 hours, if the air operator

- (a)** provides the flight crew member with advance notice of the extension of the flight duty period;
- (b)** provides the member with a rest period of at least 4 consecutive hours in suitable accommodation; and
- (c)** does not interrupt the member's rest.

(4) An air operator shall extend the rest period that follows the flight duty period referred to in subsection (3) and that is provided before the next flight duty period by an amount of time that is at least equal to the length of the extension of the flight duty period.

(5) An air operator may assign a flight duty period to a flight crew member, and a flight crew member may accept such an assignment, even if the flight duty period will, as a result, exceed the flight duty period referred to in subsection (1) as long as

- (a)** the extension of the flight duty period is authorized in the air operator certificate; and
- (b)** the air operator and the member comply with the *Commercial Air Service Standards*.

Unforeseen Operational Circumstances

702.94 The total flight time referred to in subsection 702.92(1) and the maximum flight duty period referred to in subsection 702.93(1) may be exceeded if

- (a)** the flight is extended as a result of an unforeseen operational circumstance that occurs after the beginning of the flight duty period;
- (b)** the pilot-in-command, after consulting with the other flight crew members, considers it safe to exceed the total flight time and maximum flight duty period; and
- (c)** the air operator and the pilot-in-command comply with the *Commercial Air Service Standards*.

Delayed Reporting Time

702.95 If a flight crew member is notified of a delay in reporting time before leaving a rest facility and the delay is in excess of three hours, the member's flight duty period is considered to have begun three hours after the original reporting time.

Requirements for Time Free from Duty

702.96 (1) An air operator shall provide each flight crew member with the following time free from duty:

- (a)** at least 24 consecutive hours 13 times within any 90 consecutive days and 3 times within any 30 consecutive days; and
- (b)** when the member is a flight crew member on call, at least 36 consecutive hours within any 7 consecutive days or at least 3 consecutive calendar days within any 17 consecutive days.

(2) However, an air operator may provide a flight crew member with time free from duty other than as required by paragraph (1)(a) if

- (a)** the time free from duty is authorized in the air operator certificate; and
- (b)** the air operator and the member comply with the *Commercial Air Service Standards*.

(3) An air operator shall notify a flight crew member on call of the beginning and duration of the member's time free from duty.

Flight Crew Member Positioning

702.97 If a flight crew member is required by an air operator to travel for the purpose of positioning after the completion of a flight duty period, the air operator shall provide the member with an additional rest period that is at least equal to one-half the time spent travelling that is in excess of the member's maximum flight duty period.

Long-range Flights

702.98 (1) A flight duty period that consists of one flight or a series of flights and that terminates more than 4 one-hour time zones from the point of departure, other than a series of flights that is conducted entirely within Northern Domestic Airspace, shall be limited to three flights, in the case of a series of flights, and shall be followed by a rest period that is at least equal to the length of the flight duty period.

(2) If a flight referred to in subsection (1) is a transoceanic flight, the maximum number of flights that may be conducted after the transoceanic flight is one, excluding one unscheduled technical stop that occurs during the flight.

15 Section 703.98 of the Regulations is amended by adding the following after subsection (3):

- (4) Every air operator shall have a fatigue management training program for its flight crew members that contains the following components:
- (a) personal fatigue management strategies relating to
 - (i) sleep hygiene,
 - (ii) lifestyle, exercise and diet, and
 - (iii) the consumption of alcohol and drugs;
 - (b) the impact of fatigue on aviation safety;
 - (c) sleep requirements and the science relating to fatigue;
 - (d) the causes and consequences of fatigue;
 - (e) how to recognize fatigue in themselves and in others;
 - (f) sleep disorders and their impact on aviation safety and treatment options; and
 - (g) human and organizational factors that may cause fatigue, including
 - (i) sleep quality and duration,
 - (ii) the impact of shift work and overtime,
 - (iii) the circadian rhythm, and
 - (iv) the effects of changes of time zones.

16 Section 704.115 of the Regulations is amended by adding the following after subsection (3):

- (4) Every air operator shall have a fatigue management training program for its flight crew members that contains the following components:
- (a) personal fatigue management strategies relating to
 - (i) sleep hygiene,
 - (ii) lifestyle, exercise and diet, and
 - (iii) the consumption of alcohol and drugs;
 - (b) the impact of fatigue on aviation safety;
 - (c) sleep requirements and the science relating to fatigue;
 - (d) the causes and consequences of fatigue;
 - (e) how to recognize fatigue in themselves and in others;
 - (f) sleep disorders and their impact on aviation safety and treatment options; and
 - (g) human and organizational factors that may cause fatigue, including
 - (i) sleep quality and duration,
 - (ii) the impact of shift work and overtime,
 - (iii) the circadian rhythm, and
 - (iv) the effects of changes of time zones.

17 Section 705.124 of the Regulations is amended by adding the following after subsection (3):

- (4) Every air operator shall have a fatigue management training program for its flight crew members that contains the following components:
- (a) personal fatigue management strategies relating to
 - (i) sleep hygiene,
 - (ii) lifestyle, exercise and diet, and
 - (iii) the consumption of alcohol and drugs;
 - (b) the impact of fatigue on aviation safety;
 - (c) sleep requirements and the science relating to fatigue;
 - (d) the causes and consequences of fatigue;
 - (e) how to recognize fatigue in themselves and in others;
 - (f) sleep disorders and their impact on aviation safety and treatment options; and
 - (g) human and organizational factors that may cause fatigue, including
 - (i) sleep quality and duration,
 - (ii) the impact of shift work and overtime,
 - (iii) the circadian rhythm, and
 - (iv) the effects of changes of time zones.

18 The Regulations are amended by replacing “flight duty time” with “flight duty period”, with any necessary modifications, in the following provisions:

- (a) the heading of Division VI of Subpart 4 of Part VI;
- (b) subsection 604.98(2);
- (c) the heading before section 604.99;
- (d) the portion of subsection 604.99(1) before paragraph (a) and subparagraph 604.99(1)(b)(i);
- (e) the heading before section 604.100;
- (f) the portion of section 604.100 before paragraph (a) and paragraphs 604.100(a) and (c);
- (g) the heading before section 604.101 and the portion of section 604.101 before paragraph (a);
- (h) the portion of subsection 604.102(1) before paragraph (a) and paragraph 604.102(1)(d);
- (i) the portion of section 604.103 before paragraph (a);
- (j) section 604.105; and
- (k) paragraph 604.197(1)(l).

Transitional Provisions

Subparts 3 and 4 of Part VII

19 The references “Subsection 700.14(1)” to “Subsection 700.21(2)” in column I of Part VII of Schedule II to Subpart 3 of Part I of the *Canadian Aviation Regulations* and the corresponding amounts in Column II, and Division III of Part VII of the *Canadian Aviation Regulations*, as they read on the day before the day on which these Regulations came into force continue to apply to an air operator who operates an aircraft under Subpart 3 or 4 of Part VII of the *Canadian Aviation Regulations* and to a flight crew member who operates an aircraft under either of those Subparts until four years after the day on which these Regulations are registered.

Coming into Force

20 (1) These Regulations, except for sections 2, 9, 12 and 13, come into force on the day on which they are registered.

(2) Sections 2, 9, 12 and 13 come into force on the first anniversary of the day on which these Regulations are registered.

[26-1-o]

Footnote 1

Occurrences reportable to the Transportation Safety Board of Canada include accidents and incidents, as per the *Transportation Safety Board Regulations*, SOR/2014-37, Part 1 (<http://laws-lois.justice.gc.ca/eng/regulations/SOR-2014-37/page-1.html#h-4>, accessed March 17, 2017).

Footnote 2

Standards adopted by the ICAO Council at the fifth meeting of its 186th Session on March 2, 2009.

Footnote 3

Class 3 rest facility means a seat that reclines at least 40 degrees from vertical and that has leg and foot support.

Footnote 4

Class 1 rest facility means a bunk or other horizontal surface located in an area

- that is separate from the flight deck and passenger cabin;
- that is temperature-controlled;
- in which the flight crew member can control light; and
- that minimizes the level of noise and exposure to other disturbances.

Footnote 5

Class 2 rest facility means a seat that allows for a horizontal sleeping position in an area that

- is separated from passengers by a curtain or other covering that provides some darkness and reduces noise;
- is equipped with portable oxygen equipment; and
- minimizes disturbances by passengers and crew members.

Footnote 6

FRMS Implementation Guide for Operators, July 2011, International Air Transport Association (IATA), ICAO, International Federation of Air Line Pilots' Association (IFALPA).

Footnote 7

Occurrences reportable to the Transportation Safety Board of Canada include accidents and incidents, as listed in the *Transportation Safety Board Regulations* SOR/2014-37, Part 1 (<http://laws-lois.justice.gc.ca/eng/regulations/SOR-2014-37/page-1.html#h-4>, accessed March 17, 2017.).

Footnote 8

National Aviation Company Information System (NACIS).

Footnote 9

Based on the number of crew members, Subpart 705 represents about 61% of Canadian commercial airline industry, and it is dominated by Air Canada, Jazz Aviation and WestJet Airlines Ltd.

Footnote 10

Janssen, N., et al., "Fatigue as a predictor of sickness absence: results from the Maastricht cohort study on fatigue at work", 2003.

Footnote 11

Federal Aviation Administration (FAA): Flightcrew Member Duty and Rest Requirements, 2011.

Footnote 12

Ibid.

Footnote 13

Ibid.

Footnote 14

The hourly wage rate of the curriculum developer in 2016 is assumed to be the average hourly wage rate in Canada: \$25.72 (plus 25% overhead). Source: Table 282-0152 Labour force survey estimates (LFS), wages of employees by type of work, National Occupational Classification (NOC), sex, and age group, annual (current dollars) [1,2,8].

Footnote 15

Some Perspectives on Fatigue Risk Management Systems, March 2012, European Organisation for the Safety of Air Navigation (EUROCONTROL).

Footnote 16

The wage rates (wage rate + 25% for overhead) are based on 2016 Statistics Canada wage survey results, and are calculated as follows:

- Management occupations = \$41.71 + (25% overhead) = \$52.14 per hour; and
- Office support occupations = \$20.74 + (25% overhead) = \$25.93 per hour.

Footnote 17

An accident is assumed to cause at least one fatality or one serious injury or significant structural damage to an aircraft. An incident is a less severe occurrence such as an engine failure or precautionary shutdown, or a crew member whose duties are directly related to the safe operation of the aircraft being unable to perform their duties as a result of a physical incapacitation that poses a threat to the safety. The full list of reportable incidents is available at <http://laws-lois.justice.gc.ca/eng/regulations/SOR-2014-37/page-1.html#h-4>, accessed March 17, 2017.

Footnote 18

Akerstedt T. et al.: Paper prepared for the European Transport Safety Council "Meeting to discuss the role of EU FTL legislation in reducing cumulative fatigue in civil aviation" in Brussels on Wednesday, February 19, 2003, <https://www.eurocockpit.be/pages/fatigue-in-accidents> and <https://www.eurocockpit.be/sites/default/files/Akerstedt-Mollard-Samel-Simons-Spencer-2003.pdf>, accessed March 17, 2017.

Footnote 19

Statistics Canada: Based on data from Statistics Canada, the number of air passengers at Canadian airports has increased by 4.47% per year on average from 2010 to 2016.

Footnote 20

Federal Aviation Administration (FAA): Flightcrew Member Duty and Rest Requirements, page 68. 2014.

Footnote 21

The VSL is defined as the risk-money trade-off equivalent to a statistical life. It is based on the risk-money trade-off for small death risk reductions — empirical studies that estimate the VSL typically consider risk reductions between 1/10 000 and 1/100 000. The VSL is the sum of what individuals would pay for risk reductions that, together, sum to one statistical life. Hence, if the average person is willing to pay \$50 for a fatality risk reduction of 1/100 000, then 100 000 people would be willing to pay \$5,000,000 (100 000 times \$50) to save one statistical life, leading to a VSL of \$5,000,000. In other words, individuals' willingness-to-pay (WTP) for small fatality risk reductions is aggregated up to one statistical life saved to obtain the VSL.

No value judgment is made when estimating the VSL; rather, human behaviour with respect to avoiding or decreasing small risks of death is observed or elicited, and then quantified. It is worth noting that the VSL is not the value of preventing a certain death; that value would be infinite. It is not the value of saving a specific person's life either. Rather, the VSL values small changes in death risks in a population in general, based on the death risk trade-off preferences of that population.

Footnote 22

Transport Canada. 2014. *The Value of a Statistical Life: Estimates used in Transport Canada's Social Cost of Collision Model*. Motor Vehicle Safety Directorate, Transport Canada, RDIMS No. 6340877.

Footnote 23

One year of perfect health is 1.0 QALY, less than perfect health translates into lower QALY; death is 0.0 QALY.

Footnote 24

Miller, T. R. and B. A. Lawrence. 2015. *Fractions of Value of Statistical Life Lost to Injury by Severity*. Final Report, Transport Canada Contract T8080-1 40190.

Footnote 25

Carlsson et al. (2004). Is Transport Safety More Valuable in the Air. Retrieved at http://www.economics.handels.gu.se/digitalAssets/1388/1388421_17-transport-safety-jru.pdf (2017/03/08).

Footnote 26

Ball et al. (2010). *Total Delay Impact Study*. Retrieved at http://www.nextor.org/pubs/TDI_Report_Final_11_03_10.pdf (accessed March 8, 2017).

Footnote 27

Airliner Price Guide, Future Market Values, Volume 7/79, Winter 2007.

Footnote 28

Ball et al. (2010). *Total Delay Impact Study*. Retrieved at http://www.nextor.org/pubs/TDI_Report_Final_11_03_10.pdf (accessed March 8, 2017).

Footnote 29

The WTP of flight crews to avoid fatigue is at least as high as the salary portion of their sick leave due to fatigue.

Footnote 30

Wu et al (2016). Airplane pilot mental health and suicidal thoughts: a cross-sectional descriptive study via anonymous web-based survey. Retrieved at <https://ehjournal.biomedcentral.com/articles/10.1186/s12940-016-0200-6> (accessed March 10, 2017).

Footnote 31

Report on Plans and Priorities, Transportation Safety Board of Canada, 2016–2017. <http://www.bst-tsb.gc.ca/eng/publications/priorites-priorities/2016/2016.pdf> (accessed January 10, 2017).

Footnote 32

Undiscounted. Due to rounding, some of the numbers may not add up.

Footnote 33

Undiscounted. Due to rounding, some of the numbers may not add up.

Footnote 34

Undiscounted. Due to rounding, some of the numbers may not add up.

Footnote 35

Fletcher A., and Klemets T.: Analysis of Flight Crew Duty Limitation Rules and Proposed Amendments with Regard to Safety and Operational Efficiency, Integrated Safety Support, 2014. Subpart 703 was not covered by the Study. The analysis assumed 5% for Subpart 703.

Footnote 36

The percentage for each line by industry group is the increase in flight crew needed to satisfy the prescriptive rule.

Footnote 37

https://www.Transport Canada.gc.ca/media/documents/policy/2015_TRANSPORT CANADA_Annual_Report_Overview-EN-Accessible.pdf (accessed January 10, 2017).

Footnote 38

A fatigue management plan requires an air carrier to manage fatigue and assess the ability of the program to improve alertness and mitigate performance errors. This is not quite a fatigue risk management system, but approximately two thirds of one FRMS.

Footnote 39

Wright K. P., Hughes R. J., Hull J. T., Czeisler C. A., *Cumulative Neurobehavioral Performance Deficits on a 24-hr Day with 8-hr of Scheduled Sleep*, Journal Of Sleep And Sleep Disorders, Research Vol. 23, 15 April 2000, Abstract Supplement 2, page 36.

Footnote 40

Belenky G., Wesensten N., Thorne D., Thomas M., Sing H., Redmond D., Russo M., Balkin T., *Patterns of performance degradation and restoration during sleep restriction and subsequent recovery: a sleep dose-response study*. Journal of Sleep Research, 11 December 2003, Vol. 12, 1-12.

Footnote 41

Folkard S., Tucker P., *Shift work, safety and productivity*, Occupational Medicine, 1 February 2003, Vol. 53, No. 2, 95-101.

Footnote 42

Odette Madore, Daniel J. Shaw, The Canadian Airline Industry: its structure, performance and prospect, <http://publications.gc.ca/Collection-R/LoPBdP/BP/bp329-e.htm>.

Footnote 43

<http://www.conferenceboard.ca/topics/energy-enviro/drivenaway.aspx>

Footnote 44

Standards adopted by the ICAO Council at the fifth meeting of its 186th Session on March 2, 2009.

Footnote 45

SOR/96-433

Footnote a

S.C. 2014, c. 39, s. 144

Footnote b

S.C. 1992, c. 4, s. 8

Footnote c

S.C. 2004, c. 15, s. 9

Footnote d

S.C. 2015, c. 20, s. 12

Footnote e

S.C. 2004, c. 15, s. 18

Footnote f

R.S., c. A-2

Government of Canada activities and initiatives

Canada Service Corps



We're proposing changes to the Fisheries Act!



Explore new heights



<https://www.canada.ca/en/employment-social-development/services/canada-service-corps.html>
Young Canadians building a better Canada.

http://www.dfo-mpo.gc.ca/campaign-campagne/fisheries-act-loi-sur-les-peches/index-eng.html?utm_source=dfo-en&utm_medium=fr-cdn&utm_campaign=2018FishAct
Restoring lost protections and adding modern safeguards.

https://www.canada.ca/en/department-national-defence/campaigns/in-demand-jobs.html?utm_source=Website&utm_medium=Priority-button&utm_campaign=Canada.a%20Priority%20
Check out the 100+ jobs in the Canadian Armed Forces.