

Senate Rural and Regional Affairs and Transport References Committee

**Written Questions on Notice – Friday, 15 February
2013**

CANBERRA, ACT

Inquiry into aviation accident investigations

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**SENATE RURAL AND REGIONAL AFFAIRS AND TRANSPORT
REFERENCES COMMITTEE**

Inquiry into aviation accident investigations

**Written Questions Taken on Notice – Civil Aviation Safety Authority from
Public Hearing – Friday, 15 February 2013**

Written Questions on Notice- Senator Xenophon

The Investigation

1. When CASA conducts a parallel investigation into an incident or accident (such as occurred here), in what way is the ATSB process immediately relevant to CASA?
2. How does CASA decide when to conduct a parallel investigation into an incident or accident?
3. When CASA does not conduct a parallel investigation into an incident or accident, in what way is the ATSB process immediately relevant to CASA?
4. The Transport Safety Investigation Act 2005 contains some important protections in relation to investigatory material. What statutory protections are available to investigatory material acquired by CASA in the course of a parallel investigation into an incident or accident such as the Pel-air accident?
5. How do operators and other aviation stakeholders get to learn the lessons from these sorts of events in a timely fashion? What does CASA do to get the maximum system improvement from exploring all of the related issues in these sorts of events?
6. Did CASA consider any changes to the ATPL syllabus or CAAP 234-1 as a result of this accident?
7. It appears that you believe that there is adequate guidance out there. In answer to a QON, you say:

The issue had been discussed with CASA, where it was argued that the decision-making training undertaken by pilots **is sufficient** and that more detailed guidance may interfere with their decision-making process, considering all the variables that may apply in a dynamic environment.

How does that reconcile with the suggestion that a sample of your inspectors had divergent views about diverting to an alternate rather than pressing on to Norfolk Island?

8. On page 26 of their report, the ATSB refer to AIP ENR 1.10 and quote from AIP ENR 1.5 in terms of the use of “meteorological forecasts and reports”. All other references to meet planning requirements relate only to forecasts.
 - a. What is the regulatory distinction between a forecast and a report?

- b. What is the validity period of a report?
- c. Is it appropriate for a pilot to decide to continue to a destination on the basis of a report that is better than a forecast that would otherwise require a diversion?
- 9. Should an aircraft divert when the forecast falls below the alternate minima but not below the landing minima and it is clear that alternate fuel will not be available at the destination?
- 10. The Accident Report says:

The operator's procedures and flight planning guidance managed risk consistent with regulatory provisions but did not minimise the risks associated with aeromedical operations to remote islands. In addition, clearer guidance on the in-flight management of previously unforecast, but deteriorating, destination weather might have assisted the crew to consider and plan their diversion options earlier.

What sort of organisational response from CASA would language such as this consistently engender?

- 11. In evidence, Mr Farquharson said:

The general aviation training group, and it was quite a revelation to me given they were people who had a general aviation background, were of the view that at the time they were notified that the weather had dropped below alternate planning minima, invoking a requirement for an alternate, it was at that time that you should divert—and yet the weather might be above landing minima.

Given that the regulatory framework applicable to this operation clearly indicates that it is an acceptable risk to plan to a remote aerodrome without an alternate and without additional holding fuel when the weather is forecast to be above the alternate minima, once the weather deteriorated below alternate minima:

- a. was Mr Farquharson suggesting that it was appropriate to continue beyond the last point of safe diversion because the reported weather was still above the landing minima?
- b. What benefit did he envisage in not diverting once it was known that the fuel on board was insufficient to meet the planning requirements for an alternate?
- c. was there any doubt that a diversion was required?
- d. in the circumstances, what did he expect the general aviation approach to this problem to be?

- 12. In evidence in relation to fatigue and fatigue risk management, Mr McCormick said (15 Feb 13 Hansard, page 8):

Mr McCormick: Regarding the numerical systems, when you say that one is operationally validated, what does that mean? As far as I know, the only research that has been done on long-haul operations or night operations—back-of-the-clock circadian dysrhythmia—was done by Dr Curtis Graeber back at the turn of the century with Northwest Airlines, on flights from Hawaii to Tokyo and from Tokyo to Minneapolis-Saint Paul.

I am told that CASA participated in a quadripartite research project that looked specifically at Qantas long-haul operations and the final report was agreed between the parties in 2007. I am also told that this project ultimately collected over 13,500 sleep nights of data, which is still the largest body of sleep research data on civilian pilots in the world. fatigue risk management?

13. In 2001, CASA commissioned the University of South Australia to conduct a fatigue analysis of the so-called Standard Industry Exemptions to CAO 48. That Report identified that: "...the analysis of worst-case scenarios indicates that the eight standard industry exemptions to CAO 48.1 may allow flight crew to work flight and duty schedules that result in unacceptable levels of fatigue." What was CASA's response to that research?

14. At the time of the accident, who was approving FRMSs within CASA and what specific training for that task were they provided?

Information Privacy and Data Protection

15. Following your previous appearance, there was widespread industry feedback that "CASA clearly plays the man and not the ball". Given that the ATSB is proposing to give CASA unlimited access to mandatory reports made by the industry, what effect do you think this perception of CASA's approach to enforcement will have on the quality and quantity of incident reporting?

16. I note that CASA is championing the view that all safety data and reports must be provided to it for enforcement purposes. Of course, this is for "demonstrably safety-related purposes". Has this policy has been approved by the Department and by the Minister?

17. What is "punitive action"? How is it distinguished from "demonstrably safety-related action"?

18. Who decides what a "demonstrably safety-related purposes" actually is? Does it matter that your action may well end up causing loss of employment and related hardships, regardless of whether you get it right or wrong?

19. Most Flight Operations Quality assurance (FOQA)/Flight Data Analysis Programs (FDAP) have as a feature de-identified reporting as a response to ICAO guidance on non-punitive approaches to handling safety-related data. It has been suggested that CASA considers all such information as "fair game" and will not respect any workplace privacy arrangements currently in place – is that true?

20. Does CASA believe that it is appropriate to conduct "fishing expeditions" for evidence of non-compliance by examining data held by operators within their Safety Management Systems, even though that data is not required to be reported under either the *Transport Safety Investigation Act 2005* or the *Civil Aviation act 1988*?

The Chambers Report

21. Was the author of this report independent of the office responsible for AOC oversight or was he the responsible manager of the oversight office?

22. Had the concerns and deficiencies highlighted in the Chambers Report been formally raised with CASA management previously?

23. In designing the various approaches to conducting surveillance and oversight activities, has CASA ever completed related manpower planning to properly conduct the required tasks?
24. What has been CASA management's guidance to inspectors and local offices about how to cope with resource and budgetary constraints?
25. Could you please advise CASA's response to each of the 7 recommendations and the progress to date in completing the identified actions?

Questions in relation to previously in-camera documents

26. Did you discuss the ATSB report with Mr Dolan? How do you explain the ATSB email of 9 Feb 2010 where Mr Dolan refers to speaking with you and the ATSB approach to their investigation? Is this interaction the type of cooperation envisaged by the MoU?
27. Has the CASA board been kept informed of developments? Have they been informed of the internal concerns about the lack of CASA oversight? (ie. the Chambers Report) Have they initiated any action?

Questions around public information

28. Is it usual practice to conduct a special audit of an operator after an accident of this nature?
29. CASA's view of the critical safety issue was that the current legislative regime combined with sufficient aeronautical knowledge and compliance with training requirements was sufficient. Please explain again how the fact that the 50/50 split in your own FOIs does not indicate guidance would be helpful?
30. Take us through the work that led up to the decision to suspend the pilot's licence on 24 December 2009. Do you accept that this action was taken prematurely and instead his licence could have been placed on hold until further investigation of any systemic deficiencies?
31. Did CASA at any point consider suspending the co-pilot's licence? Why or why not, given that the co-pilot did not indicate any divergence from the pilot's in-flight judgement or decision-making during interviews conducted after the accident?
32. Mr McCormick, you mentioned that the operator could have done better. For the record, can you please take the committee through each of these areas of deficiency.
33. At the 22 October 2012 hearing you mentioned that there is a regulatory policy, issued in August 2011, to guide CASA staff in interaction with the ATSB. Could you please provide a copy to the committee? Why was this considered necessary in addition to the MOU?
34. What has the aviation industry learnt from the ATSB report?



Australian Government
Civil Aviation Safety Authority

OFFICE OF THE DIRECTOR OF AVIATION SAFETY

Trim Ref: G113/302

14 March 2013

Senator the Hon Bill Heffernan
Chair
Senate References Committee on Rural and
Regional Affairs and Transport
Parliament House
CANBERRA ACT 2600

Dear Senator Heffernan

Inquiry into Aviation Accident Investigations (Pel-Air) - written questions

I refer to Ms Lauren Carnevale's email of 22 February 2013 forwarding a number of written questions relating to the above Inquiry.

Please find attached the responses to those questions.

Yours sincerely

John F. McCormick
Director of Aviation Safety

Encl.

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Written Questions on Notice- Senator Xenophon

The Investigation

1. *When CASA conducts a parallel investigation into an incident or accident (such as occurred here), in what way is the ATSB process immediately relevant to CASA?*

CASA may conduct its own independent parallel investigation into an aircraft accident or incident that is also being investigated by the ATSB. Section 4 of the CASA-ATSB Memorandum of Understanding (MOU) covers the conduct of parallel investigations with specific protocols for such investigations set down in section 4.1 of the MOU.

2. *How does CASA decide when to conduct a parallel investigation into an incident or accident?*

As set down in paragraph 4.1.1 of the CASA-ATSB MOU, the ATSB may undertake 'no-blame' safety investigations in accordance with the *Transport Safety Investigation Act 2003* (TSI Act) and CASA may separately undertake investigations with a view to possible safety-related action pursuant to its functions under Section 9 and/or Part IIIA of the *Civil Aviation Act 1988* (CA Act). The decision to undertake a parallel investigation is undertaken by the appropriate CASA senior managers in conjunction with technical specialists who consider a range of factors relating to aviation safety.

3. *When CASA does not conduct a parallel investigation into an incident or accident, in what way is the ATSB process immediately relevant to CASA?*

Except as described in response to question 2, the ATSB process is not immediately relevant to CASA. CASA meets requests made by the ATSB for evidence under section 32 of the TSI Act and the ATSB may also request assistance in accordance with paragraph 4.2 of the CASA-ATSB MOU.

4. *The Transport Safety Investigation Act 2005 contains some important protections in relation to investigatory material. What statutory protections are available to investigatory material acquired by CASA in the course of a parallel investigation into an incident or accident such as the Pel-air accident?*

Except as required under and pursuant to the Freedom of Information Act, CASA does not normally release information gathered as part of its own accident investigations into the public domain. Applicable provisions of the Privacy Act and general obligations governing the protection of confidential information are similarly respected. Consistent with CASA's statutory mandate, and

international best practice, information gathered in the course of a CASA investigation may properly be used for appropriate regulatory purposes, in accordance with the applicable provisions of the legislation and CASA's enforcement policies.

5. *How do operators and other aviation stakeholders get to learn the lessons from these sorts of events in a timely fashion? What does CASA do to get the maximum system improvement from exploring all of the related issues in these sorts of events?*

In accordance with its authorised functions under Section 9 of the CA Act, CASA will implement, or take other appropriate safety related actions, to improve the safety performance of the Australian aviation system. Actions taken may be short term (such as suspending or otherwise limiting an authorisation) or longer term (which may involve changes to legislation and the publication of guidance material or mounting a safety education initiative). CASA has two related management committees that deal with such issues:

- The Accident Investigation Review Committee (AIRC), which, amongst other things, reviews and advises on how CASA may effectively respond to ATSB safety issues;
- The Safety Review Committee (SRC), which, amongst other things, reviews the safety performance of the Australian aviation industry with a view to recommending to the Director of Aviation Safety initiatives for strategic interventions to improve system performance.

CASA's safety promotion arm is the prime vehicle for communicating safety information to industry. The Safety Education and Promotion Division utilises a wide range of channels and mediums to communicate essential safety messages, one of which is the *Flight Safety Australia* magazine.

6. *Did CASA consider any changes to the ATPL syllabus or CAAP 234-1 as a result of this accident?*

A single instance of non-compliance with the regulations by an individual is not normally considered sufficient, in itself, to trigger regulatory or syllabus changes. Outside of the regulatory documentation, CASA considers safety education material as a means to educate pilots on the requirements. CASA safety education has, on many occasions, published articles about the need for careful fuel planning and in-flight decision making.

7. *It appears that you believe that there is adequate guidance out there. In answer to a QON, you say:*

The issue had been discussed with CASA, where it was argued that the decision-making training undertaken by pilots is sufficient and that more detailed guidance may interfere with their decision-making process, considering all the variables that may apply in a dynamic environment.

How does that reconcile with the suggestion that a sample of your inspectors had divergent views about diverting to an alternate rather than pressing on to Norfolk Island?

See response to Question 29.

8. On page 26 of their report, the ATSB refer to AIP ENR 1.10 and quote from AIP ENR 1.5 in terms of the use of "meteorological forecasts and reports". All other references to meet planning requirements relate only to forecasts.

- a. What is the regulatory distinction between a forecast and a report?
- b. What is the validity period of a report?
- c. Is it appropriate for a pilot to decide to continue to a destination on the basis of a report that is better than a forecast that would otherwise require a diversion?

a. The Civil Aviation Regulations 1988 place the same emphasis on the use of meteorological forecasts and reports. Under the fuel requirements of Civil Aviation Regulation (CAR) 234 (3)(b) the pilot in command and operator must take into account the meteorological conditions in which the aircraft is, or may be, required to fly. This means that actual and forecast conditions must be taken into account. Under the flight planning requirements of CAR 239 (1)(a) the pilot in command must carefully study current weather reports and forecasts for the route to be followed and at aerodromes to be used.

b. The validity periods of reports are as follows:

- Routine Reports (METAR) are issued at fixed times, identify routine observations hourly or half hourly and are valid at the time of observation;
- Special Reports (SPECI) are aerodrome weather reports issued whenever weather conditions fluctuate about or are below specified criteria;
- Trend Type Forecasts (TTF) are defined as aerodrome weather reports (METAR/SPECI) to which a statement of trend is appended. The validity period is normally three hours, commencing at the time of observation.

c. The pilot in command, before making a decision to continue or divert, would be required to be satisfied that meteorological conditions are appropriate, in accordance with Civil Aviation Regulation CAR 257, which states that:

(4) If an element of the meteorological minima for the landing of an aircraft at an aerodrome is less than that determined for the aircraft operation at the aerodrome, the aircraft must not land at that aerodrome; ...

(6) This regulation does not prevent a pilot from:

- (a) making an approach for the purpose of landing at an aerodrome; or*
- (b) continuing to fly towards an aerodrome of intended landing specified in the flight plan;*

if the pilot believes, on reasonable grounds, that the meteorological minima determined for that aerodrome will be at, or above, the meteorological minima determined for the aerodrome at the time of arrival at that aerodrome. (emphasis added)

In order for the pilot in command to make a decision "on reasonable grounds" he or she needs to refer to as much pre-flight and in-flight information that can be practically sourced. The information can be obtained from various sources, for example, pre-flight planning information, in-flight meteorological reports and reports from other pilots. If the meteorology reports, whether they are forecasts or observations, indicate, "on reasonable grounds" that the weather

has improved or deteriorated, as the case may be, then the pilot is expected to make the appropriate decision to either continue or divert.

9. *Should an aircraft divert when the forecast falls below the alternate minima but not below the landing minima and it is clear that alternate fuel will not be available at the destination?*

The provisions and requirements for the nomination of an alternate aerodrome are planning requirements. There is no requirement in the Aeronautical Information Publication, or in the regulations, regarding an in-flight requirement for the alternate minima to set the landing minima at the destination. Once airborne, and not in a planning situation, the pilot in command is required to comply with meteorological minima for the aerodrome, as required by Civil Aviation Regulation 257 and to consider other operational variables that may exist. The decision to divert is a decision for the pilot in command, based on the many variables that need to be considered at the time.

10. *The Accident Report says:*

The operator's procedures and flight planning guidance managed risk consistent with regulatory provisions but did not minimise the risks associated with aeromedical operations to remote islands. In addition, clearer guidance on the in-flight management of previously unforecast, but deteriorating, destination weather might have assisted the crew to consider and plan their diversion options earlier.

What sort of organisational response from CASA would language such as this consistently engender?

The above text was identified in part in an ATSB Safety Issue which CASA addressed by formal discussions with the ATSB. This is the normal response where a possible safety issue is identified in an ATSB report. In this particular case CASA agreed to review and amend the relevant legislation which involved publishing a Notice of Proposed Rule Making and the associated consultation with industry.

CASA had also conducted a special purpose audit which had identified deficiencies in the operator's procedures as described in part in the ATSB accident report text. As a result of the special purpose audit, CASA had already taken corrective action with the operator to minimise the risk associated with aeromedical operations to remote islands. CASA also reviewed the relevant procedures of other Air Operator's Certificate holders conducting similar operations to determine if these required revision. None were found to be deficient in this regard.

11. *In evidence, Mr Farquharson said:*

The general aviation training group, and it was quite a revelation to me given they were people who had a general aviation background, were of the view that at the time they were notified that the weather had dropped below alternate planning minima, invoking a requirement for an alternate, it was at that time that you should divert—and yet the weather might be above landing minima.

Given that the regulatory framework applicable to this operation clearly indicates that it is an acceptable risk to plan to a remote aerodrome without an alternate and without additional holding fuel when the weather is forecast to be above the alternate minima, once the weather deteriorated below alternate minima:

- a. *was Mr Farquharson suggesting that it was appropriate to continue beyond the last point of safe diversion because the reported weather was still above the landing minima?*
- b. *What benefit did he envisage in not diverting once it was known that the fuel on board was insufficient to meet the planning requirements for an alternate?*
- c. *was there any doubt that a diversion was required?*
- d. *in the circumstances, what did he expect the general aviation approach to this problem to be?*

a. No. Mr Farquharson's evidence did not relate specifically to the Norfolk Island circumstances. He stressed that his intervention in the email discussion with Standards Division personnel (only selected excerpts of which were presented by the Committee at CASA's appearance on 22 October 2012), was directed to a broader consideration of issues to do with the fuel-related regulatory project that CASA had initiated some months prior to the ditching event.

b. The question has misinterpreted what was said, noting again that the discussion centred about fuel planning in general and not the particular flight.

However, with regard to the flight in question:

- Up to the point of last safe diversion there was sufficient fuel remaining to divert and land with the statutory fixed reserve intact.
- While the aircraft remained at cruise altitude, for a period after passing the point of last safe diversion the option remained open to divert and land with less than the fixed reserve fuel. (Note that the purpose of mandating a fixed reserve is to provide a pilot in command with a small fuel margin for use in extreme circumstances.)
- There was insufficient fuel on board to continue to the destination, descend, make an instrument approach then divert.

Once the aircraft left the top of descent for Norfolk Island the pilot in command had only two available options:

- Attempt a landing, knowing that the weather was below published landing minima; or
- Hold for as long as possible and hope the weather improved.

c. There was no doubt that a diversion was required. The captain should have been aware by 0904 UTC that continued flight to Norfolk meant that he would arrive at his destination with minimal fuel reserves in circumstances where the weather reports indicated a strong possibility of marginal conditions, and with no alternate options. Paragraph 9.11.5.1 of the Pel-Air operations manual states:

If a successful approach and landing at the destination aerodrome appears marginal due to weather or any other reason, the PIC shall determine the latest divert time or position to

proceed to a suitable alternate. The divert time/position shall be determined so as to allow the aircraft to land at the alternate with the required fixed reserves intact.

d. In the circumstances of this accident given the information available concerning the deteriorating weather situation, CASA would expect the general aviation approach to this problem would be for the aircraft to divert at, or before, the last point of safe diversion.

The fundamental issue with this operation is that the pilot did not plan according to the requirements of the Pel-Air operations manual (which requires fuel calculation conducted every 30 minutes for flights beyond 3 hours) or the requirements of Civil Aviation Regulation 234. Mr James conducted some of the processes required; however he did not conduct all the processes according to the requirements of the operations manual. This resulted in a situation arising that was worse than it should have been and left a relatively short period of time to make a positive decision to divert when the weather deteriorated to a state that a landing could not be assured. On his own admission Mr James does not appear to have used the available information to make a positive decision to divert. By not making a positive decision to divert, he allowed the flight to continue to the point where he had no other choice but to ditch the aircraft.

12. *In evidence in relation to fatigue and fatigue risk management, Mr McCormick said (15 Feb 13 Hansard, page 8):*

Mr McCormick: Regarding the numerical systems, when you say that one is operationally validated, what does that mean? As far as I know, the only research that has been done on long-haul operations or night operations—back-of-the-clock circadian dysrhythmia—was done by Dr Curtis Graeber back at the turn of the century with Northwest Airlines, on flights from Hawaii to Tokyo and from Tokyo to Minneapolis-Saint Paul.

I am told that CASA participated in a quadripartite research project that looked specifically at Qantas long-haul operations and the final report was agreed between the parties in 2007. I am also told that this project ultimately collected over 13,500 sleep nights of data, which is still the largest body of sleep research data on civilian pilots in the world. fatigue risk management?

Mr McCormick's response was specifically in relation to studies that have contributed to validation of one or more biomathematical models for use in the commercial aviation industry. The research referred to as a quadripartite research project was released in 2008 by the Centre for Sleep Research, University of South Australia. The research specifically looked at Qantas long-haul operations, with some focus on Qantas domestic operations, and was multi-faceted. This research may have been used in the validation of a biomathematical model but, if it has been used for this purpose, CASA is unaware of it. Where it is pertinent, the results of the research have been used, along with other peer-reviewed research, in the development of CASA standards relating to flight and duty limitations.

13. *In 2001, CASA commissioned the University of South Australia to conduct a fatigue analysis of the so-called Standard Industry Exemptions to CAO 48. That Report identified that: "...the analysis of worst-case scenarios indicates that the eight standard industry exemptions to CAO 48.1 may allow flight crew to work flight and duty schedules that result in unacceptable levels of fatigue." What was CASA's response to that research?*

The Dawson and Roach (2001) review of the Standard Industry Exemptions was undertaken using a specific plan to understand the consequences of pushing the Standard Industry Exemptions to their absolute limit, regardless of current rostering practice and current demands on the industry. Therefore the report created unrealistic rosters that were not being flown at the time and tested them using a biomathematical model that had not been validated in the aviation environment. Regardless of these significant limitations, CASA posted the report on the CASA website as information that should be considered when building rosters under the Standard Industry Exemptions.

CASA subsequently pioneered the use of Fatigue Risk Management Systems as a means of managing flight and duty time limitations. CASA was an active member of the ICAO working group that, from 2006 to 2012, developed the amendments to the ICAO requirements relating to flight and duty time limits and the provision of FRMS. CASA is using an international body of experience and knowledge to develop the proposed changes to Civil Aviation Order 48.

14. *At the time of the accident, who was approving FRMSs within CASA and what specific training for that task were they provided?*

At the time of the Pel-Air accident, approval to be exempted from the prescriptive limits within Civil Aviation Order 48, via the use of an approved Fatigue Risk Management System (FRMS), was delegated to CASA Regional Managers and Team Leaders. FRMS approvals were granted, based on a recommendation by a specialist Flying Operations Inspector, who had significant experience and training in fatigue risks and fatigue risk management systems. CASA specialists were available to support inspectors with specific fatigue science based questions.

At the time of the accident, CASA had just commenced a formal FRMS assessment course to be delivered over a five day period. Prior to the availability of the formal training course, and with the purpose of increasing CASA's FRMS approval and oversight capability, the specialist Flying Operations Inspector provided several training workshops to selected Flying Operations Inspectors.

Information Privacy and Data Protection

15. *Following your previous appearance, there was widespread industry feedback that "CASA clearly plays the man and not the ball". Given that the ATSB is proposing to give CASA unlimited access to mandatory reports made by the industry, what effect do you think this perception of CASA's approach to enforcement will have on the quality and quantity of incident reporting?*

CASA is not seeking unlimited access to mandatory reports made by the industry, as stated above. CASA also does not accept that the view 'CASA clearly plays the man and not the ball' is either true or widespread among the majority of the Australian aviation industry. There is a very small group within the industry which has long-standing grievances with CASA over past regulatory action, and who are quick to come to the fore in Inquiries like the current one with criticisms of this kind.

CASA does not consider their views to be representative of the responsible sections of the Australian aviation industry. CASA is confident that any reporting arrangement made with the ATSB will have the appropriate protections in place and will enhance Australian aviation's already strong safety culture.

16. *I note that CASA is championing the view that all safety data and reports must be provided to it for enforcement purposes. Of course, this is for "demonstrably safety-related purposes". Has this policy has been approved by the Department and by the Minister?*

CASA's approach is consistent with current and long-standing practice in most modern aviation jurisdictions. Safety-related information that lawfully comes to CASA's attention has always been available for regulatory purposes in the interests of safety. Clarifying, refining and confirming this principle is consistent with direction being taken by the International Civil Aviation Organization (ICAO), most major aviation States and other relevant international stakeholders in relation to the use and protection of safety information. Policies relating to CASA's enforcement and safety oversight activities are not normally provided for approval to the Department or the Minister. CASA is an independent safety regulator. However, the fundamental principles reflected in CASA's approach to the protection and use of safety information is grounded in the position Australia has advocated at ICAO since at least 2008. Australia's submissions on these issues to the Accident Investigation and Prevention (AIG) Divisional Meeting in 2008, the High-Level Safety Conference and the 37th Assembly (both in 2010) were settled by the Department.

As recognised individual experts in the field, representatives of CASA and the ATSB have participated in the work of a special ICAO multi-disciplinary task force on the protection of safety information (the SIP Task Force), which has recently endorsed the approach outlined above. In addition to participants from the regulatory authorities and accident investigation agencies of a number of Contracting States, representatives of the airline industry, air traffic control agencies (including the chair of EUROCONTROL's Just Culture Task Force) and the International Federation of Air Line Pilots Associations were all active participants in the work, and supporters of the work-product of the SIP Task Force.

17. *What is "punitive action"? How is it distinguished from "demonstrably safety-related action"?*

In the Australian aviation environment, 'punitive action' is action that involves a criminal prosecution of a person, or the issuance of an infringement notice. In this respect CASA's *Enforcement Manual* explains at page 2-4:

... CASA has the power to initiate action with a view to penalising persons for contravening regulatory requirements, *although the pursuit of such action is in the hands of the CDPP*. From CASA's perspective, the implementation of such punitive action as may be necessary and appropriate is meant to deter those persons (specific deterrence) and others (general deterrence), from contravening the safety standards specified in the legislation in the future, by encouraging them to reflect on the consequences of their conduct. [Emphasis provided]

The taking of administrative action against an authorisation holder, with a view to limiting, temporarily suspending or permanently cancelling their privileges, because CASA has found that it would be unsafe to permit the authorisation holder to continue to exercise those privileges (or to exercise them without specified limitations) until a required level of proficiency and compliance has been demonstrated, is not punitive action. Such action is protective and/or remedial in nature, and is so regarded by all modern aviation authorities.

Notably, the issuance of an infringement notice or a conviction or finding of guilt as the result of a criminal prosecution will not, of itself, have any effect on an authorisation holder's eligibility to hold an authorisation or to exercise the privileges of that authorisation.

18. *Who decides what a "demonstrably safety-related purposes" actually is? Does it matter that your action may well end up causing loss of employment and related hardships, regardless of whether you get it right or wrong?*

As Australia's aviation safety regulator, CASA quite properly makes this determination in the first instance. Paragraph 3.7 of CASA's *Enforcement Manual* specifies the range of factors to be taken into account in considering whether CASA should take enforcement action of this type, as follows:

The key factors that will be considered in the Coordinated Enforcement Meeting when deciding whether enforcement action should be taken are:

- *The nature, number and seriousness of the non-compliance detected and the safety issues or implications they raise, including whether the non-compliance was intentional;*
- *The nature and sufficiency of the evidence of non-compliance that is available. This may have been obtained through information received from industry, from surveillance, an initial or further operational/technical investigation or through the use of a Part IIIA investigator;*
- *The kind(s) of action that will effectively and efficiently address the safety issues that have arisen, or are likely to arise, in the particular circumstances;*
- *The need to obtain expert assistance on any complex technical or legal issues;*
- *The obligation to be fair, consistent, impartial and proportional in taking any enforcement action (see Chapters 2 and 6 and Appendix 2);*
- *The Prosecution Policy of the Commonwealth (PPC), where recommendation for referral to the Commonwealth Director of Public Prosecutions (CDPP) is contemplated.*

In some cases, a breach of the aviation law may only require a compliance-related response, such as counselling. In other cases, an Aviation Infringement Notice may be necessary and sufficient to deter a repetition of conduct involving a contravention of the safety regulations. In other cases it may be that both a prospective, safety-related response and a retrospective punitive response are called for. In yet other cases, CASA may agree to a person or organisation entering into an Enforceable Voluntary Undertaking with CASA.

Except to the extent such considerations may bear on the application of the criteria contemplated by CASA's enforcement policy, it is not appropriate for CASA to have regard to the fact that its safety related action may cause inconvenience or hardship for a person when making such safety-related protective decisions.

In all cases, the fairness and propriety of CASA's decision to vary, suspend or cancel a civil aviation authorisation in the interests of safety is subject to independent review by a court or tribunal, and where a court or tribunal finds that it is appropriate to do so, it is within the power of that court or tribunal to grant a stay of CASA's action pending further determination of the matter.

19. *Most Flight Operations Quality assurance (FOQA)/Flight Data Analysis Programs (FDAP) have as a feature de-identified reporting as a response to ICAO guidance on non-punitive approaches to handling safety-related data. It has been suggested that CASA considers all such information as "fair game" and will not respect any workplace privacy arrangements currently in place – is that true?*

FDAP programs provide automated data about the aircraft's performance and handling. Paragraph 3.3.7 of Annex 6 to the Chicago Convention requires a flight data analysis programme shall be non-punitive (by the employer) and contain adequate safeguards to protect the source(s) of the data. In Australia, this is reflected in paragraph 2A.3 of Civil Aviation Order 82.5. As the safety regulator, it is important for CASA to have access to information held by any authorisation holder.

ICAO is in the process of reviewing its guidance on these issues, with a view to the recognition that the use of such information by regulatory authorities in the demonstrable interests of safety and, subject to appropriate safeguards, is appropriate.

20. *Does CASA believe that it is appropriate to conduct "fishing expeditions" for evidence of non-compliance by examining data held by operators within their Safety Management Systems, even though that data is not required to be reported under either the Transport Safety Investigation Act 2005 or the Civil Aviation act 1988?*

CASA does not conduct 'fishing expeditions', but has the legislative function under paragraph 9(1)(f) of the CA Act, to conduct 'comprehensive aviation industry surveillance including assessment of safety related decisions taken by industry management at all levels for their impact on aviation safety.'

In order to effectively discharge this function, it is important for CASA to be able to access information held by an authorisation holder. This includes information held by an authorisation holder that is received by an internal communication or reporting regime. It is critical for CASA to be able to identify that the authorisation holder has taken appropriate safety related action to deal with a safety issue and to prevent a reoccurrence.

The Chambers Report

21. *Was the author of this report independent of the office responsible for AOC oversight or was he the responsible manager of the oversight office?*

Mr Chambers was the acting manager of the oversight office.

22. *Had the concerns and deficiencies highlighted in the Chambers Report been formally raised with CASA management previously?*

The appropriateness and resourcing of CASA audit and surveillance was, and continues to be, under constant examination by CASA management.

23. *In designing the various approaches to conducting surveillance and oversight activities, has CASA ever completed related manpower planning to properly conduct the required tasks?*

Yes. As part of the Director's continuous improvement program, CASA has further developed its approaches to workforce planning.

24. *What has been CASA management's guidance to inspectors and local offices about how to cope with resource and budgetary constraints?*

CASA expects its senior staff to manage their resources and budgets according to stated CASA policies and financial instructions, consistent with Australian Government policy. The relevant policies are available to staff.

25. *Could you please advise CASA's response to each of the 7 recommendations and the progress to date in completing the identified actions?*

Since the Chambers report was submitted in August 2010 CASA has implemented a number of significant initiatives, which capture the recommendations of the Chambers report, to improve information gathering and storage and establish consistency and standardisation in surveillance activities, inspector training and teamwork.

CASA has revised its surveillance procedures and put in place a supporting IT platform for capturing and referencing surveillance-related data. Activities in relation to system development began in October 2011 and concluded in January 2013. Operational staff are trained in the procedures and use of the IT platform and the revised processes are now in use across CASA. In particular these changes have provided operational staff with increased capability to manage surveillance priorities and activities.

In May 2011 CASA embarked on a major organisational change, which consisted of a move from single technical discipline streams (e.g. Airworthiness and Flying Operations), to a permanent multi-disciplined team-based approach called Certificate Management Teams (CMT). The roll out was completed in 2012 and has resulted in enhanced communication and sharing of information, a standard structure nationally and standardised processes and reporting.

Questions in relation to previously in-camera documents

26. *Did you discuss the ATSB report with Mr Dolan? How do you explain the ATSB email of 9 Feb 2010 where Mr Dolan refers to speaking with you and the ATSB approach to their investigation? Is this interaction the type of cooperation envisaged by the MoU?*

Assuming the question refers to discussion between Mr McCormick and Mr Dolan, Mr McCormick discussed the Pel-Air report with Mr Dolan on at least two occasions including on 26 May 2010 as indicated in paragraph 4.8 of CASA's second supplementary submission. The objectives of the CASA-ATSB MOU are:

- a) maximisation of beneficial aviation safety outcomes;
- b) enhancement of public confidence in aviation safety;
- c) support for the adoption of systemic approaches to aviation safety;
- d) development of knowledge of the operations and the safety impact of each organisation's actions;
- e) promotion and conduct of ATSB independent no-blame safety investigations and CASA regulatory activities in a manner that assures a clear and publicly perceived distinction is drawn between each agency's complementary safety-related objectives, as well as CASA's specialised enforcement-related obligations;
- f) to the extent practicable, the avoidance of any impediments in the performance of each other's functions;
- g) acknowledgement of any errors and a commitment to seeking constant improvement; and
- h) fostering strategic discussion between both organisations.

Given these objectives, CASA considers that discussions between the chief executives of each agency are essential to the effective operation of the MOU, and effectively service CASA's functions under paragraph 9(3)(a) of the CA Act.

27. *Has the CASA board been kept informed of developments? Have they been informed of the internal concerns about the lack of CASA oversight? (ie. the Chambers Report) Have they initiated any action?*

Yes. The first meeting of the CASA Board after the accident was on 7 December 2009. The Minutes of this meeting record:

The Pel-Air Incident at Norfolk Island. The Director advised that a special audit of Pel-Air and Regional Express had been initiated. It would focus on the company's fuel policy and practice, elements of flight planning and in-flight operations during changing meteorological conditions, the check and training of pilots, and other critical safety elements.

Consistent with the functions of the Board and its relationship with the Director of Aviation Safety, who has statutory responsibility for all regulatory decision-making, at subsequent Board meetings the Director has continued to keep the Board informed of the high-level changes and internal reforms he had initiated, or intended to initiate, to address operational and organisational improvements, including those cited in the answer to question 25. Specifically, the Director informed the Board of the proposed reforms and actions that were contained in the 'Chambers report'. Major reform initiatives have been reflected in each annual Corporate Plan, as well as forming the genesis of a number of major projects for which progress is formally reported and reviewed at each Board meeting.

Questions around public information

28. *Is it usual practice to conduct a special audit of an operator after an accident of this nature?*

The CA Act empowers CASA to conduct surveillance appropriate to address particular situations and CASA determines whether the circumstances warrant a special audit. The title 'Special Audit' is used to distinguish such actions from a scheduled audit.

29. *CASA's view of the critical safety issue was that the current legislative regime combined with sufficient aeronautical knowledge and compliance with training requirements was sufficient. Please explain again how the fact that the 50/50 split in your own FOIs does not indicate guidance would be helpful?*

The FOIs were asked generally whether, during flight, the receipt of an amended forecast indicating weather at a destination had decreased below alternate planning minima but remained above landing minima, constituted an imperative to divert immediately.

The legislation, guidance material and the AIP provide no mandate to divert based solely on a weather report or forecast. The pilot-in-command is required to formulate a decision to divert or not, taking into account all available information (which may require requesting additional or updated information). Clearly the amount of fuel remaining is the critical determinant.

Application of either interpretation, as literally required or interpreted, will still provide the basis for a safe flight, as long as the required regulations and instructions are followed. The rules are clear on this issue. At the planning stage, should a forecast indicate that an alternate is appropriate, additional fuel must be carried to enable a diversion from the planned destination to a suitable alternate. Because of the breadth of guidance that would be required to cover all the possible scenarios for en-route decision-making, any unnecessarily complex guidance material, beyond the scope of fundamental in-flight planning, risks becoming a contributor to unsafe decisions.

30. *Take us through the work that led up to the decision to suspend the pilot's licence on 24 December 2009. Do you accept that this action was taken prematurely and instead his licence could have been placed on hold until further investigation of any systemic deficiencies?*

CASA suspended Mr James's pilot licences after taking into account information known to it about the accident, after:

- (a) making enquiries of Pel-Air;
- (b) obtaining relevant operational and flight planning information (including flight plan and weather information); and
- (c) interviewing Mr James on 16 December 2009.

Primarily, the interview answers displayed the poor standard of flight planning exhibited by Mr James. In particular CASA's investigation into the circumstances of this flight revealed that the fuel planning that Mr James undertook for the flight was well below the standard required of an Air Transport Pilot Licence (ATPL) holder. Mr James did not receive an area forecast for the route he intended to fly (Samoa – Norfolk), nor did he source any information relating to the strength of the prevailing high level winds along the route, as indicated in the relevant sections of the transcript of Air Traffic Control communications. It did not appear that Mr James took into account contingencies such as the possibility of a depressurisation or an engine failure or not gaining access to RVSM airspace in calculating the amount of fuel taken on board at Samoa. Mr James did not sufficiently consider the ramifications of the deteriorating weather conditions at Norfolk Island when there was sufficient time to divert.

These matters indicated to CASA that he may not have had the necessary aeronautical skill and knowledge to make appropriate command judgements about the likely effect of the weather. Based on information available, CASA considered that Mr James had displayed deficiencies in aeronautical knowledge and skill applicable to the holder of an ATPL, Commercial Pilot Licence and Command (Multi Engine) Instrument Rating.

CASA does not accept its decision to suspend Mr James's licence was premature. Further, there is no legislative basis to place a licence 'on hold'. CASA could have suspended the licence on the basis Mr James engaged in conduct that caused a serious and imminent risk to safety, pursuant to section 30DC of the CA Act, but the ultimate outcome would likely have been the same as what ultimately eventuated, namely, a suspension pending the passing of examinations and flight tests.

31. *Did CASA at any point consider suspending the co-pilot's licence? Why or why not, given that the co-pilot did not indicate any divergence from the pilot's in-flight judgement or decision-making during interviews conducted after the accident?*

CASA did consider suspending the co-pilot's licences, but did not do so because the relevant legislative requirements were imposed on the pilot in command – not the co-pilot, as follows:

- (a) A pilot in command who does not have evidence that fuel supplies are sufficient for a flight or who does not have the latest aeronautical maps, charts and other aeronautical information applicable to the route to be flown commits a criminal offence – see CAR 233(1).
- (b) If all available weather information entitled an aircraft to take off, but in flight a pilot in command becomes aware of a change in weather conditions, CAR 224(2) imposes a regulatory responsibility on the pilot in command to be responsible for the "start, continuation, diversion and end of a flight by the aircraft";
- (c) A pilot in command who fails to take reasonable steps to ensure an aircraft carries sufficient fuel to enable a proposed flight to be undertaken in safety commits a criminal offence – see CAR 234(1);
- (d) A pilot in command who does not make a careful study of all available information such as current weather reports and forecasts will contravene CAR 239(1).

Further, the co-pilot had limited involvement, if at all, in the flight planning undertaken by Mr James. CASA did however require the co-pilot, Ms Cupit, to provide records of subsequent training she undertook under the Virgin International Airlines Air Operators' Certificate in order for CASA to determine if there was any residual risk of inadequate aeronautical knowledge or skills evident. CASA determined that Ms Cupit continued to hold the required aeronautical knowledge and skills of an Air Transport Pilot Licence holder.

32. *Mr McCormick, you mentioned that the operator could have done better. For the record, can you please take the committee through each of these areas of deficiency.*

The issues with the operator are set out in the Executive Summary of the Special Audit Report on Pel-Air and are discussed in detail in the body of the Report (which the Committee already has and has published on its web site). The key shortcomings were in fuel policy and practice, obstacle

clearance requirements, maintenance control and defect reporting, operational control, training, fatigue management and drug and alcohol testing.

33. *At the 22 October 2012 hearing you mentioned that there is a regulatory policy, issued in August 2011, to guide CASA staff in interaction with the ATSB. Could you please provide a copy to the committee? Why was this considered necessary in addition to the MOU?*

A copy is attached. This is an internal CASA policy intended to guide the actions of all CASA staff in their interaction with the ATSB, and thus support the provisions of the MOU.

34. *What has the aviation industry learnt from the ATSB report?*

CASA has no formal way of assessing what lessons the aviation industry may have learned from an ATSB report, but in this instance it is hoped that the importance of flight planning and fuel calculation would be evident.



Australian Government
Civil Aviation Safety Authority

CASA Regulatory Policy – DAS-PN015-2010
ATSB Cooperation Policy

Sponsor: Deputy Director of Aviation Safety.
Issue No: One
Policy Issue Date: August 2011
Policy Review Date: August 2012
Regulatory Provision Civil Aviation Act (1988): s9(3)(a)

Responsibility

The Director of Aviation Safety is responsible for approving all CASA regulatory policy.

The Deputy Director of Aviation Safety is responsible for the development, maintenance and publication of this policy.

All amendments to this policy shall be made in accordance with CASA Document Control policy and procedures.

Purpose of the Policy

The purpose of this policy is to govern the way in which CASA performs its functions under paragraph 9(3)(a) of the *Civil Aviation Act (1988)* and fulfils its obligations under the Memorandum of Understanding (MoU) established between CASA and the Air Transport Safety Bureau (ATSB).

Application of the Policy

This policy is intended to guide the actions of all CASA staff in their interaction with the ATSB.

ATSB Cooperation Policy		August 2011
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Legislative Basis

With respect to cooperation with the ATSB, the *Civil Aviation Act 1988* relevantly states that:

Section 9:

- (3) *CASA also has the following functions:*
(a) *co-operating with the Executive Director of Transport Safety Investigation in relation to investigations under the Transport Safety Investigation Act 2003 that relate to aircraft;*

Policy

In addition to meeting any obligations under the Transport Safety Investigation Act 2003 and the *Civil Aviation Act (1988)*, CASA is committed to cooperation with the ATSB in accordance with the Memorandum of Understanding (MoU) established between the two agencies.

CASA has established an Accident Liaison and Investigation Unit (ALIU) to manage the day-to-day interaction and to act as a contact point for the ATSB. The ALIU is headed by the Manager Accident Liaison and Investigation Unit (MALIU) who reports to the Deputy Director of Aviation Safety.

Under the terms of the MoU, all requests from the ATSB for assistance, advice or interviews should be coordinated through the Accident Liaison and Investigation Unit (ALIU).

If CASA personnel are contacted directly by the ATSB in respect to any investigation or requests for information they should refer the request to the ALIU.

The ALIU also acts as the conduit for advice back to the ATSB. Staff should not contact or provide advice to the ATSB without first consulting the ALIU.

CASA officers participating in or supporting ATSB investigations have a responsibility to keep Manager ALIU informed of the progress of an investigation and to advise him immediately of information which indicates a need for CASA to take urgent safety-related action.

Links

- [CASA-ATSB MOU](#)

John F. McCormick
Director of Aviation Safety

Date 03 August 2011

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**SENATE RURAL AND REGIONAL AFFAIRS AND TRANSPORT
REFERENCES COMMITTEE**

Inquiry into aviation accident investigations

**Written Questions Taken on Notice – Australian Transport Safety Bureau
from Public Hearing – Friday, 15 February 2013**

Written Questions on Notice- Senator Xenophon

Questions in relation to previously in-camera documents

1. An email on 9 Feb 2010 appears to show that you were looking for a way to assist CASA with their early intervention with Mr James. Can you explain that please?
2. Is this level of consultation around reports standard practice? Are reports routinely compared in this way? What if a major difference is found?
3. Were you aware of any internal CASA concerns regarding their oversight of Pel-Air prior to your report being published?
4. Did the ATSB think to obtain some independent analysis of fatigue levels from another investigation bureau/aviation authority? Were you aware that CASA asked the UK Civil Aviation Authority to analyse the fatigue levels of the crew?
5. What is a 'normal' number of reviews for a draft report?

Questions around public information

6. What has the aviation industry learnt from this report?
7. The ATSB says it focuses on obtaining its own evidence. You obtained the various Pel-Air manuals but found no safety issues in respect of CASA's oversight. Given what we know from the CASA Special Audit, does that show a lack of expertise or do you just trust that if CASA has approved a manual, it must be right?
8. How has the ATSB satisfied itself that the deficiencies listed in the CASA Special Audit have been addressed? Do you just trust they have been based on the list of actions provided? As we now know CASA had a history of accepting actions had occurred which had not, do you check whether CASA has checked the actions have been completed?
9. You connected the dots between the ATSB report and the CASA Special Audit after you received the latter. Given that your review of the Special Audit did not lead you to make

significant changes to your report prior to publishing, is the committee to understand that, in your view, nothing of any great import to your investigation came out of CASA's audit?

10. In relation to collecting your own evidence, the ATSB mentioned in answers to question on notice that you obtained a copy of the operators fatigue risk management system (FRMS) 'but did not conduct a detailed review of the operator's FRMS'. How does this support collection of your own evidence if you don't conduct a detailed review of it?
11. Do you stand by the new 'beyond Reason' methodology you are using? Is it international best practice?
12. Can you provide the committee with an outline of the 'beyond Reason' methodology the ATSB now applies to conduct its investigations and produce its reports?
13. Do your investigators undertake investigation courses with overseas counterparts?
14. In answers to questions on notice regarding safety equipment you note that 'no safety issue was identified in respect of the adequacy of the safety equipment standards affecting the flight'. You also note no issues with servicing. These answers just ignore the issues that the crew had in the water. Why?
15. In answers to questions on notice you note the discrepancies in the CASA and ATSB report about the levels of fatigue reported by the crew and say 'the existence of both reports provided some doubt regarding how much sleep was obtained'. Why given the ATSB report acknowledges that "there was insufficient evidence available to determine the level of fatigue" did the ATSB not see the need for further fatigue analysis?
16. In light of CASA material published by the committee and discussed at the hearing on 15 February, do you believe a review of and changes to your report are warranted?

**SENATE RURAL AND REGIONAL AFFAIRS AND TRANSPORT
REFERENCES COMMITTEE**

Inquiry into aviation accident investigations

**Written Questions Taken on Notice – Australian Transport Safety Bureau
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Questions in relation to previously in-camera documents

- 1. An email on 9 Feb 2010 appears to show that you were looking for a way to assist CASA with their early intervention with Mr James. Can you explain that please?**

ATSB response: The email exchange was in the context of a discussion about the complementary but distinct roles of CASA and the ATSB in maintaining aviation safety. The interest of the ATSB officer involved was in CASA's concentrating on improvements to the regulatory and other guidance for the future safety of such flights as the Norfolk Island one. He was of the view that this would be the most effective way for CASA to address the issues arising from the investigation. My response was to advise him that CASA's assessment of what was required was now focussing on compliance-related interventions, rather than changes to the regulatory framework.

- 2. Is this level of consultation around reports standard practice? Are reports routinely compared in this way? What if a major difference is found?**

ATSB response: The level of consultation with all directly involved parties (DIPs), including the Civil Aviation Safety Authority (CASA) is in accordance with the ATSB's Safety Investigation Quality System (SIQS). In addition, a Memorandum of Understanding between the two organisations seeks to optimise each agency's separate but complementary safety functions. This includes in the conduct of safety education initiatives, establishing lines of communication in the case of parallel investigations, identifying the possibility for each agency to provide assistance to the other, setting protocols for the management of evidence, and so on.

In terms of consultation with CASA about the ATSB's investigation reports, this is consistent with the requirements of the SIQS and is applied to the ATSB's consultation with all DIPs to an investigation. This process is not 'comparative', and was described in pages 29 to 34 of the ATSB's initial submission to the Committee: *Communications between Agencies and Directly Involved Parties during an Investigation*. As indicated in that submission, the DIP process is more correctly an opportunity for those parties to:

- Present evidence in support of what they view to be factual inaccuracies or omissions in the ATSB's draft investigation report.
- Indicate that their interests, rights or legitimate expectations may be adversely affected by the release of a final report.
- Provide information on, or updates to any safety action taken or proposed in response to an identified safety issue.

All DIP submissions, including any supporting evidence, are formally assessed against information previously gathered by the ATSB during an investigation. This assessment may result in changes to a draft report. If these changes are substantive in terms of report

content, structure or investigative findings, a supplementary draft report incorporating the changes will be provided to DIPs and further submissions sought.

3. Were you aware of any internal CASA concerns regarding their oversight of Pel-Air prior to your report being published?

ATSB response: Not specifically, although the ATSB was generally aware that CASA was conducting an internal review of its regulatory oversight.

4. Did the ATSB think to obtain some independent analysis of fatigue levels from another investigation bureau/aviation authority? Were you aware that CASA asked the UK Civil Aviation Authority to analyse the fatigue levels of the crew?

ATSB response: The ATSB has several human factors specialists. During the course of investigation activities, the ATSB will on a case-by-case basis obtain information and advice from external specialists in a specific human factors area, such as fatigue, when provision of this advice is necessary or will enhance the ATSB's understanding of an issue. With regard to this investigation, the ATSB did not obtain any independent analysis of fatigue levels, nor did it think it was necessary to do so.

The ATSB was not previously aware that the UK Civil Aviation Authority (CAA) had provided CASA with an analysis of the fatigue levels associated with the accident flight (which was provided in the email titled 'Air Amb Supp' from a UK CAA officer to a CASA officer on 11 December 2009). The ATSB notes that the analysis did not appear to warrant inclusion in CASA's Accident Investigation Report.

With regard to the UK CAA analysis, there are several aspects that would limit its usefulness. Firstly, it is based only on using a bio-mathematical model of fatigue (BMMF), and secondly it appears to use data inputs that are significantly incorrect.

Use of bio-mathematical models of fatigue

As previously stated in the ATSB's answer to Question on Notice 14 from 12 November 2012:

A bio-mathematical model was not used as part of the ATSB's assessment. As noted in the ATSB's submission to the Inquiry of 11 November 2012, there are limitations associated with such models. It is generally regarded that these models are best used as part of an FRMS [fatigue risk management system] to evaluate differences between various rosters, and are inappropriate to use for evaluating the fatigue level of specific individuals. The ATSB assessment of the crew's potential fatigue levels considered all of the factors that are incorporated into such models.

Similarly, a recent paper (Dawson, D., et al., 2012, 'Modelling fatigue and the use of fatigue models in work settings', *Accident Analysis and Prevention*, vol. 43, pp. 549-564) stated:

Fatigue 'predictions' can be reasonable for group data in highly controlled lab settings, but the models do not yet have high levels of validity for chronic partial sleep restriction protocols at the individual level and/or when used to predict fatigue in the workplace. Thus, their use for the prediction of actual fatigue associated with an individual's line of work or in the analysis of a specific incident is probably inappropriate at this stage.

Similarly, the CASA 2010 document titled 'Biomathematical fatigue modelling in civil aviation fatigue risk management: Application guidance' stated:

Limitations of currently used fatigue models include a restriction to predicting fatigue probabilities from a population average rather than an instantaneous fatigue levels of a specific individual, incomplete description of all fatigue physiology factors, qualitative data being misinterpreted as quantitative data and limited validation against aviation specific data.

In short, BMMFs deal with average, estimated levels of fatigue for a given population rather than predict fatigue levels for a specific individual in a specific situation, and the estimated levels of fatigue are often derived from sleep data from laboratory studies in a controlled environment. Such models do not consider all of the factors that can influence fatigue, and they are also based on many assumptions that need to be clearly understood prior to using them for any purpose.

UK CAA analysis

The UK CAA analysis of 11 December 2009 was conducted using a BMMF called SAFE (System For Aircrew Fatigue). The model was developed based on research sponsored by the UK CAA. The ATSB is not aware of what information CASA provided to the UK CAA at the time. However, based on the information in the email, it appears the UK CAA used inappropriate data inputs into the model. More specifically:

- First duty (including the trip Sydney-Norfolk Island-Samoa): the UK CAA analysis appeared to use a duty period starting at 0900 local (Sydney) time on 17 November and finishing at 0700 on 18 November. The crew were first contacted for the task at 2000 Sydney time and probably did not sign on for duty until about 2100 (the aircraft departed at 2230). In addition, the aircraft landed at Samoa at 0510, and the duty probably finished at about 0530 (all times Sydney time). Therefore a duty time of 2100 to 0530 is more appropriate to use in the model than 0900 to 0700.
- Second duty (Samoa-Norfolk Island-Melbourne): the UK CAA analysis appeared to use a duty period starting at 1430 and finishing 2145 (all times Sydney time). The crew arranged to meet in the hotel lobby at 1500 and did not depart for the airport until after 1530. However, the pilot in command commenced flight planning prior to 1530. The 1430 time start time therefore could be used to be most conservative. However, the full expected duty period extended to 0200 the next day (estimated end of duty after arriving at Melbourne). It is important to use the full duty expected by the crew as this can significantly affect the amount of sleep estimated to occur in Samoa. Therefore, a duty period of 1430 to 0200 is more appropriate to use in the model when considering the crew's suitability to undertake the duty.

In the UK CAA email, it is stated that its analysis assumes the crew received 5 hours good quality sleep at Samoa. This is not the case. Recreating the analysis using the same inputs produces the same Samn-Perelli scores, but it also indicates under these (incorrect) conditions, an average crew would be estimated to obtain less than 2 hours sleep. If the planned duty period was longer (as was the case), it estimates a crew would use the available opportunity and obtain more sleep.

Revised SAFE analysis

Using the revised inputs into SAFE (and with two crew and two sectors per duty) produces the following Samn-Perelli scores:

- at 2230, when the flight departed Sydney – 2.8
- at 0500, when aircraft landed at Samoa – 4.7 (gradually increasing up until that time)

- at 0530, the end of the first duty – 4.8 (not 5.7 as reported)
- at 1500, when flight planning for the return flight to Norfolk Island – 2.4
- at 1645, when departing Samoa – 2.5
- at 1900, when the SPECI call was provided – 2.8
- at 2100, about the expected time into Norfolk Island – 3.4
- at 2145, the time used by the UK CAA – 3.5 (not 4.4 as reported)
- at 0200, the expected end of second duty in Melbourne – 4.7.

It should be noted that when using the standard settings, SAFE assumes a crew will sleep normally prior to the first duty. The model also estimates a short (45-minute) sleep period at 1715 prior to the first duty. If this sleep period is deleted, the scores at the end of the first duty increase slightly (by about 0.3 points) but the scores for the second duty are not affected. Similarly, if a short nap is included during the first duty (which reportedly occurred and would be expected), the scores at the end of the first duty reduce slightly (about 0.3 points). The same would apply for scores during the return trip if a short nap was undertaken.

Using the revised inputs, the standard SAFE model assumes a sleep period of 4.5 hours in Samoa. The accident flight crew's reports to the ATSB shortly after the accident indicated that they received more than this estimated sleep period. The information provided by the pilot in command to CASA indicates that he may have got slightly less than this estimated period (4 hours total).

Using a scenario where a crew member obtained no nap in the afternoon prior to the first duty, a 30-minute nap during the first duty and only 4 hours sleep in Samoa, would result in an estimated Samn-Perelli score of 2.5 at 1500, 2.9 at 1900, and 3.4 at 2100 on 18 November. Using a scenario where 5 hours sleep was obtained in Samoa produced scores of 2.2, 2.6 and 3.1 respectively.

As previously stated, the ATSB did not use a bio-mathematical model when conducting its assessment of potential fatigue levels, and it cautions against using such models to estimate individual levels of fatigue in this way. However, the results of the above revised analyses appear to be broadly consistent with what ATSB would have expected.

In summary, the UK CAA analysis appeared to use inappropriate inputs into SAFE, which indicated that the crew were on duty for 12 hours prior to them actually commencing duty at about 2100 on 17 November 2009. Accordingly, its analysis produced much higher estimated fatigue levels for an average crew than would be expected from the actual duties undertaken by the accident flight crew. Overall, for a crew undertaking the duty that occurred on 17-18 November 2009, the estimated fatigue levels using SAFE near the end of both duty periods were approaching but not exceeding the reported UK CAA limit of 5.0, and the estimated fatigue level for the accident flight itself was much lower.

For background information, SAFE actually produces a predicted level of alertness, which the program then equates to a Samn-Perelli score. The Samn-Perelli scale is used in research to obtain subjective estimates of alertness. The 7-point scale is defined as:

1. fully alert, wide awake
2. very lively, responsive, but not at peak
3. okay, somewhat fresh
4. a little tired, less than fresh
5. moderately tired, let down
6. extremely tired, very difficult to concentrate

7. completely exhausted, unable to function effectively.

5. What is a 'normal' number of reviews for a draft report?

ATSB response: As indicated in the ATSB's initial submission to the Committee, the draft report review and approval process includes internal team, peer and management reviews and then review and approval for release by the Commission. These reviews take place before a draft report is forwarded to directly involved parties (DIP) for comment and, apart from the peer review, after consideration and incorporation as required of any DIP comments.

Questions around public information

6. What has the aviation industry learnt from this report?

ATSB response: The safety issues and action to address them and the safety message from the investigation are summarised in the *Safety Summary* section of the investigation report (see page iii of investigation report AO-2009-072). The investigation findings are developed in the *Analysis* section of the investigation report (pages 37 to 41) and listed at pages 43 and 44.

Importantly, the *Safety Action* section of the report discusses the safety issues identified by the ATSB and the safety action proposed or being taken by the respective parties in industry in order to prevent a recurrence of the accident.

7. The ATSB says it focuses on obtaining its own evidence. You obtained the various Pel-Air manuals but found no safety issues in respect of CASA's oversight. Given what we know from the CASA Special Audit, does that show a lack of expertise or do you just trust that if CASA has approved a manual, it must be right?

Neither. The ATSB focuses on establishing safety factors and issues that contributed to the occurrence under investigation. There is nothing in the CASA special audit that would establish CASA oversight as a contributing safety factor to the accident. A lack of regulatory compliance or oversight is not the sole determinant for establishing whether a safety issue exists. See Part 3 (page 11) of ATSB (44 page) initial submission.

8. How has the ATSB satisfied itself that the deficiencies listed in the CASA Special Audit have been addressed? Do you just trust they have been based on the list of actions provided? As we now know CASA had a history of accepting actions had occurred which had not, do you check whether CASA has checked the actions have been completed?

ATSB response: CASA's special audit was a regulatory/compliance audit against which action was proposed or taken by the operator. CASA could be expected to have assessed whether the regulatory/compliance deficiencies and observations in the special audit were adequately addressed by the operator.

The ATSB's safety investigation identified a safety issue in respect of the operator's procedures and flight planning guidance as it affected the operator's aeromedical operations to remote islands. Safety action in response to that safety issue is reported at pages 48 and 49 of the investigation report.

As indicated on page 28 of the ATSB's initial submission to the Committee, where the ATSB is advised that safety action in response to identified safety issues is in progress or is proposed to be undertaken, the safety action is placed on 'Monitor' pending

finalisation/implementation of the safety action. Once an organisation has taken safety action, an assessment of the residual safety risk is undertaken to determine whether the level of risk has reduced to an acceptable level. If this level of risk remains significant, the ATSB will consider whether there is a realistic prospect of reducing the risk further and if necessary pursue further safety action.

- 9. You connected the dots between the ATSB report and the CASA Special Audit after you received the latter. Given that your review of the Special Audit did not lead you to make significant changes to your report prior to publishing, is the committee to understand that, in your view, nothing of any great import to your investigation came out of CASA's audit?**

ATSB response: The CASA special audit was undertaken for a different purpose than the ATSB investigation. It identified a number of concerns with the operator's processes, and initiated significant safety action by the operator to address these problems. The stated scope of the audit was very broad, and covered many areas that were not related to the circumstances of the accident and therefore were not considered in the ATSB investigation.

As indicated in the ATSB's supplementary submission of 19 October 2012, the ATSB considered the content of the special audit and relevant factual information and analysis resulting from that examination was included in the final investigation report. This information was highlighted in tabular form in Appendix A to that supplementary submission. An updated table was provided in the ATSB's response to the Questions Taken on Notice of 21 November 2012 showing that a large proportion of the information had already been included in the ATSB's draft report before the special audit was obtained.

- 10. In relation to collecting your own evidence, the ATSB mentioned in answers to question on notice that you obtained a copy of the operators fatigue risk management system (FRMS) 'but did not conduct a detailed review of the operator's FRMS'. How does this support collection of your own evidence if you don't conduct a detailed review of it?**

ATSB response: The ATSB obtained Pel Air's full operations manual as a routine part of its investigation process, and the manual contained the FRMS manual. As is normal practice, the investigation team focussed its review of the operations manual on sections relevant to the scope of the investigation. As previously stated in ATSB's answer to question on notice 13 from 21 November 2012, the available evidence led the ATSB to conclude that establishing fatigue as a contributing factor was unlikely. In addition, the ATSB was aware that CASA was conducting a review of the operator's FRMS as part of its special audit conducted in November 2009, and the operator was modifying its FRMS as a result, and therefore the safety enhancement value of the ATSB considering the issue further in its investigation was limited.

Safety investigations are not audits, and it is not within the default scope of any investigation to review all of an operator's manuals or conduct a full audit on an operator's systems.

- 11. Do you stand by the new 'beyond Reason' methodology you are using? Is it international best practice?**

ATSB response: In response to question 32 of the questions on notice from 21 November 2012, the ATSB stated:

The ATSB's analysis methodology is based on best-practice elements, where any exist, from a range of different fields. The methodology has also been presented at several industry forums and conferences, both in Australia and overseas. Informal feedback from other organisations and investigators has generally been very positive.

The ATSB's analysis methodology is international best practice. It should also be noted that, as far as the ATSB is aware, the ATSB has explicitly included Reason-model concepts into its analysis methodology more than any other similar, independent transport safety investigation agency.

12. Can you provide the committee with an outline of the 'beyond Reason' methodology the ATSB now applies to conduct its investigations and produce its reports?

ATSB response: The ATSB provided an outline of its analysis approach in its initial submission of 12 October 2012 (Sub03_ATSB, parts 2 and 3). It also provided additional information in response to question 32 of the questions on notice from 21 November 2012.

13. Do your investigators undertake investigation courses with overseas counterparts?

ATSB response: Yes, some ATSB courses conducted in Australia have had attendees from our collegiate agencies in Indonesia, Singapore, New Zealand and PNG. In addition, ATSB investigators have attended overseas training offered by other agencies. The last of these was the attendance by a Senior Transport Safety Investigator at an investigation course that was administered by the French Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile (BEA) in Noumea in August 2012.

14. In answers to questions on notice regarding safety equipment you note that 'no safety issue was identified in respect of the adequacy of the safety equipment standards affecting the flight'. You also note no issues with servicing. These answers just ignore the issues that the crew had in the water. Why?

ATSB response: The survivability aspects of the accident were addressed in the ATSB's supplementary submission of 11 November 2012. That submission related the performance of the safety equipment that was used by some of the aircraft's occupants in the context of a very traumatic, disorienting, and life-threatening situation in which the aircraft had partially broken up and was submerging.

The as-reported recollections of the performance of the lifesaving equipment varied among the survivors and some of the performance issues identified may have been as a result of the dark night and other ambient conditions; the occupants' difficulty exiting the aircraft; to snagging, tangling or damage of equipment during that exit; a potential inadvertent deflation of life jacket inflation chamber and so on. For example, and as reported in the 11 November supplementary submission:

- Whereas the pilot in command reported that the nurse's life jacket light was not working, the nurse reported that her light was generally underneath the patient.
- The pilot in command also reported that one of the whistle lanyards was too short and was unusable. It was not possible to determine whether this was due to the tangling or snagging of the lanyard.
- The passenger reported that whistles were not available on two jackets. The possibility that these whistles might have snagged and detached on exit from the wreckage could not be discounted.
- The doctor reported that all three jackets that were taken from the aircraft worked satisfactorily and that, once near rescue, he wasn't sure that a whistle would have helped.

The serviceability of the safety equipment was certified by qualified technical staff as part of the aircraft's routine technical inspections prior to the accident. The issues with the equipment as reported by the aircraft occupants occurred after a difficult exit from a damaged and submerging aircraft. In this context, it was not possible to discount that equipment damage during exit from the aircraft precluded its subsequent normal operation once on the surface.

- 15. In answers to questions on notice you note the discrepancies in the CASA and ATSB report about the levels of fatigue reported by the crew and say 'the existence of both reports provided some doubt regarding how much sleep was obtained'. Why given the ATSB report acknowledges that "there was insufficient evidence available to determine the level of fatigue" did the ATSB not see the need for further fatigue analysis?**

ATSB response: It is worth noting that the pilot in command's reports to both the ATSB and CASA about his level of fatigue was the same – to both agencies he indicated that he did not believe he was fatigued. However, he provided different information about the amount of sleep he obtained in Samoa.

The inability to more precisely determine the estimated level of fatigue was not due to a lack of analysis, but due to limits in the consistency of a key piece of information – the amount of sleep obtained in Samoa. In terms of evaluating the likely fatigue level during the accident flight, the answer would be somewhat different depending on how much sleep a crew member obtained. The pilot in command provided one answer to the ATSB, shortly after the accident, and different information to CASA, over 1 month after the accident.

If the pilot in command obtained a similar amount of sleep as the reported by the copilot (5 to 6 hours), then it would seem that the level of fatigue during flight planning and the flight from Samoa to Norfolk Island was at least minor, but not significant, as would be expected after a recent sleep opportunity. If the pilot in command actually obtained 4 hours of sleep, then his fatigue level would have been slightly higher but still not significant. The answer to question 4 above provides a relative indication of the likely fatigue at different points of time of the planned duties, although caution should be taken to avoid considering such figures from a bio-mathematical model as accurate answers. See also the ATSB's answer to question on notice 14 (a) from 21 November 2012.

In summary, the crew members were likely experiencing at least a minor level of fatigue prior to and during the accident flight, as would be expected with any such trip involving night operations. However, the available evidence is not reliable enough to conclude that the pilot in command's fatigue level was actually higher, and none of the available evidence is sufficient to conclude that either crew member was significantly affected by fatigue during the accident flight (Samoa to Norfolk Island).

- 16. In light of CASA material published by the committee and discussed at the hearing on 15 February, do you believe a review of and changes to your report are warranted?**

ATSB response: The implications for the ATSB investigation and report of the content of the Chambers report were discussed in the ATSB's response to the written questions on notice from the ATSB's appearance on 15 February 2013.

In respect of the email between the UK CAA and CASA on 11 December 2009, the ATSB considers that no changes to its report are warranted (see answer to question 4 above for more information).

With regard to the CASA FRMS audit, the ATSB notes that the audit report provides more detailed information and evidence to support the FRMS findings listed in CASA's Special Audit (which were briefly summarised in the CASA Accident Investigation Report). The CASA FRMS audit identified several important issues associated with Pel Air's FRMS. However, the audit report did not provide any new information that would assist with determining the level of fatigue associated with the accident flight, and the main themes of the report do not appear to be associated with the circumstances of the accident.

As noted in the ATSB's answer to question on notice 13 from 21 November 2012, the judgement regarding whether to include matters that are not contributory in the scope of a safety investigation involves considering a range of factors. In this case, the ATSB was aware that CASA was conducting a review of the operator's FRMS. Accordingly, the safety enhancement value of the ATSB considering the issue in its investigation was limited. Some of the key themes discussed in the FRMS audit are discussed below:

- Many safety check processes within the FRMS appear not to have been followed: The content of the FRMS audit suggests that this finding was primarily associated with cases where crews conducted duties in excess of 15 hours and the relevant form and follow-up actions were not completed. This situation did not apply to the accident flight.
- Over-reliance by operations staff on the FAID bio-mathematical modelling score to provide a fly/no-fly decision: Unfortunately this is not a novel finding for many organisations in aviation or rail in Australia. Accordingly, regulatory agencies in Australia have issued guidance information and alerts regarding the use of BMMF in general, and FAID in particular. In this case the assignment of the duty was based on a low anticipated FAID score, and also that there would be a minimum rest break in Samoa of 10 hours. There was an obligation on the crew to report if they were fatigued, but they did not believe they were.
- From the interviews conducted with crew, it appears that permanent standby has resulted in 'psychological fatigue'. The content of the FRMS audit suggests that this finding was primarily associated with situations where crews were on continuous standby for several weeks at a time. This was not the case with the accident flight crew. The ATSB acknowledges that in some situations, extended periods of standby could lead to stress and therefore fatigue. However, in this case the pilot in command was on his second day of standby (after 2 days off duty), and the copilot was on her first day of standby. Both reported sleeping normally prior to being contacted for the duty. In addition, it is worth noting that the crew were conducting minimal actual flying duties in the weeks prior to the accident, which reduces one potential source of fatigue.
- Lack of FRMS policy regarding fatigue management for multiple time zone changes: The accident trip involved flying from Sydney to Samoa and return to Melbourne. This involved a time zone change of 2 hours. Given that the period in Samoa was relatively short, and all during the daytime, the effects of time zone changes were not likely to have been problematic.

The FRMS audit clearly indicates concern with the processes used by the operator to manage fatigue risk to an appropriate standard. In terms of assessing whether a particular trip was acceptable in terms of fatigue risk, the operator's processes had limitations. However, it is unlikely that, even if the operator had more robust processes, a different decision about whether to conduct this trip would have been made. There was elevated risk associated with the flight from Norfolk Island to Samoa (due to the hours awake) and there would have been

elevated risk on the flight from Norfolk Island to Melbourne (due to factors such as likely hours sleep in the last 24 hours and circadian factors). The flight from Samoa to Norfolk Island was associated with less inherent fatigue risk. However, with suitable risk controls in place, the risk of these flights could have been reduced to an acceptable level for the type of operation. As previously noted by the ATSB in its answer to question on notice 14 from 21 November 2012, the crew appeared to be managing the potential risk by using strategic naps and taking advantage of their sleep opportunity in Samoa. These practices were consistent with the FRMS.

Appendix E of the FRMS Audit discusses a mock trial of the operator's FRMS system. This trial involves applying the prior sleep wake model (PSWM) to a scenario with some similarities to the accident trip. Under the operator's FRMS, the PSWM appeared to be only required to be used to assess extension of duty periods (more than 15 hours), and therefore was not required to be used for the 17-18 November 2009 duty periods. Based on hypothetical prior sleep and wake data, the mock trial concluded that some crew members should not be allowed to conduct the duties associated with the scenario trip. However, it needs to be noted that the scenario used had the aircraft departing from Samoa at 2000, which would lead to a significantly higher risk level towards the end of the trip than the actual duty period relevant to the accident flight (aircraft departing at 1645). Applying the PSWM to the actual trip from Sydney to Samoa or from Samoa to Melbourne would have probably indicated an elevated but not unacceptable risk if suitable risk controls were applied.