Chapter 8

Human factors

8.1 The term 'human factors' refers to the study of 'people's performance in their work and non-work environments.'[1] The term denotes both positive and negative aspects of human performance. In the aviation safety context, the term is often used in reference to factors influencing human error.

8.2 The committee heard about the central importance of human factors to an investigation in order to understand why an accident occurred. However, the committee heard that such information was lacking in the ATSB report.[2] In this chapter the committee will cover some of these areas which witnesses believe should have been included in the ATSB report.

Importance of human factors

8.3 The ATSB acknowledges the importance of human factors:

> The purpose of applying Human Factors knowledge to such investigations is to not only understand what happened in a given accident, but more importantly, why it happened.[3]

8.4 The ATSB's own information notes:

> Human Factors are a critical part of the safety investigation process and are at the heart of most aircraft accidents.[4]

8.5 The ATSB website points out the agencies expertise in and contribution to the field of human factors at both the individual and organisational level which is acknowledged as world class.[5]

8.6 The ATSB Chief Commissioner has also personally emphasised the importance of human factors:

> The field of human factors is—and always will be—an essential part of the ATSB's investigation process.[6]

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1 Civil Aviation Safety Authority, *A practical guide: Human Factors*, available at www.casa.gov.au/scripts/nc.dll?WCMS:STANDARD::pc=PC_101005 (accessed 15 April 2013).

2 See for example Mr Bryan Aherne, *Submission 10*, p. 26; Mr Mick Quinn, *Submission 11*, p. 2; and AIPA, *Submission 8*, p. 4.

3 ATSB, Mr David Adams, *A Layman's Introduction to Human Factors in Aircraft Accident and Incident Investigation*, June 2006, p. vi.

4 ATSB, Mr David Adams, *A Layman's Introduction to Human Factors in Aircraft Accident and Incident Investigation*, June 2006, p. 20.

5 See www.atsb.gov.au/about_atsb/international-recognition.aspx (accessed 29 March 2013).

6 Mr Martin Dolan, InFocus Blog, 'Investigating Human Error', 4 December 2012.

8.7 The importance of human factors principles was also stressed to the committee:

> As we said in our submission to the committee, we have a comprehensive methodology for doing this [assessing whether existing arrangements for managing safety risk are adequate]. That methodology takes as its starting point, its base, the principles of human factors that were initially enunciated by Professor Reason and have been built on by a range of others. So, rather than seeing human factors as a separate issue in our investigations, we have integrated them into our overall processes.[7]

8.8 Mr Bryan Aherne, an independent aviation accident investigator and safety and risk adviser to the aviation industry, pointed out the international requirements for an investigation which include human factors:

> The collection of Human Factors information is an integral part of the investigation. Thus, the Human Factors information should be integrated into the appropriate areas of the factual part of the report, rather than being placed under a separate heading. Human Factors information should be presented in a language that is consistent with the presentation of the other factual information.[8]

Lack of human factors information in the ATSB report

8.9 The Australian and International Pilots Association (AIPA) submitted that from its perspective the ATSB report:

> …lacks any significant analysis of why the pilot in command attempted the task in the manner he did. The presentation of 'facts' alone is unhelpful, since the investigators must have some insight into what, at least in the raw form, appear to be an apparently uninformed approach to conducting a potentially risky flight.[9]

Factors influencing decision making

8.10 Witnesses raised a number of examples where in their opinion a greater analysis of human factors was warranted. Unless otherwise indicated, the committee's analysis of specific VH-NGA flight details relies on material drawn from the ATSB investigation report.

The effect of incorrect weather information provided and weather not provided

8.11 After entering Fijian airspace at 0716,[10] at 0756 Capt. James requested the weather for Norfolk Island. Fijian ATC provided an observation (METAR) that was an hour-and-a-half old (METAR are issued every 30 minutes) (0630) which Capt. James queried by asking for confirmation of the time of issue. It also contained the

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7 Mr Martin Dolan, *Committee Hansard*, 2 October 2012, p. 54.

8 Mr Bryan Aherne, *Submission 10*, p. 26.

9 AIPA, *Submission 8*, p. 14.

10 Time references are to Coordinated Universal Time (UTC), the primary standard used to regulate clocks and time worldwide.

wrong cloud height which was read out as 6000 instead of 600 ft.[11] This was not corrected by Fijian ATC (Air Traffic Control) at the time. It was also not corrected in the ATSB final report until the day after it was published.[12] There is therefore no discussion in the ATSB report of the possible effect of this incorrect cloud height on the decisions made subsequently by Capt. James.

8.12 Very shortly after the METAR with the incorrect cloud height was read out, the controller advised the availability of the latest weather observation for Norfolk Island. The SPECI (0800) was provided by Fijian ATC at 0802 and was only read out because Capt. James queried the time of the 0630 weather report.[13] It reported an observed visibility of greater than 10 km and overcast cloud at 1100 ft above the aerodrome reference point (ARP). The ATSB noted that these conditions were less than the alternate minima but above the landing minima. The report then goes on to say that Capt. James acknowledged the information.[14] The report does not discuss this matter further and the reader is left to conclude for themselves whether or not the information is received and understood by Capt. James.

8.13 To clarify, the two reports read out to Capt. James were issued an hour and a half apart but were provided less than a minute apart.

8.14 At 0803 an amended forecast (TAF) was issued by the Bureau of Meteorology (BoM) which had broken cloud at 1000 ft above the ARP.[15] It indicated conditions below the alternate minima but above the landing minima at the ETA. This also was not passed on to the crew.[16] The ATSB notes that this information was not required to be passed on[17] and this issue is discussed further in Chapter 9. An 0830 SPECI not requested showed a marked deterioration but this also was not passed on.[18]

8.15 The ATSB report mentions that the pilot did not enquire about the availability of an updated forecast.[19] Mr Davies pointed out that they were not required to make this enquiry and they had no compelling reason to do so. At this time they had a valid TAF for Norfolk Island with forecast conditions above the alternate minima and were not aware of the significance of the SPECI that had been passed on.[20]

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11 Mr Martin Dolan, *Committee Hansard*, 21 November 2012, pp 11–12.

12 Mr Bryan Aherne, *Submission 10,* p. 42.

13 Mr Bryan Aherne, *Submission 10,* p. 41.

14 ATSB Report, pp 6–7.

15 Mr Davies, *Submission 12*, p. 9; and Mr Bryan Aherne, *Submission 10,* p. 18 indicated that should be 1000 ft, not 1100 ft as indicated in the ATSB report, p. 7. In a supplementary submission dated 19 October 2012, on p. 1, the ATSB acknowledged that the figure on p. 7 of the ATSB report should read 1000 ft and not 1100 ft.

16 ATSB report, p. 7.

17 ATSB report, pp 7 and 16.

18 Pel-Air, *Submission 7*, p. 3.

19 ATSB report, pp 7 and 16.

20 Mr Richard Davies, *Submission 12*, p. 9.

8.16 The mental picture the crew would have developed as a result is discussed later in this chapter. Discussion around the reasons for the crew not being aware of the information contained in the SPECI is below.

Changing weather reports

8.17 As an example, witnesses highlighted that the crew did not have an awareness or appreciation of the 0800 SPECI[21] so its influence on their in-flight decision making was nugatory. It was argued that the reasons for this lack of awareness or appreciation are not adequately examined in the ATSB report.[22]

8.18 The contention by the ATSB appears to be that the pilot-in-charge was alert to the wrong timing of the requested (0630) observation but then after hearing about the deteriorating conditions in Norfolk shortly afterwards via the SPECI, took no action. The contrasting view would be that because the pilot queried the issue time of the 0630 METAR but did not query the SPECI and took no further action, that this shows the transmission was never heard or assimilated in its entirety. The ATSB report indicates that the crew reported that they were either not aware of or did not recognise the significance of the SPECI, and if they had, would have planned in case an en route diversion was necessary.[23] However, the report does not discuss possible scenarios regarding why the crew were not aware of the relevant information in the SPECI.

High frequency radio issues

8.19 The committee noted some conjecture around whether the pilot-in-command heard the SPECI transmitted by high frequency (HF) radio. Further detail on this is provided below.

8.20 The reliability issues with HF were recognized by the ATSB at a committee hearing but not in any detail in its report. Any possible influence is dismissed by the ATSB report in noting that no difficulties were identified by the flight crew with their radio communications during the flight.[24] However, when discussing the provision of weather information at a hearing Mr Dolan acknowledged that the reliability of HF 'can vary, depending on the time of the day, among other things'.[25] Mr Dolan also admitted that despite the pilot's acknowledgement of the information, the receipt could have been distorted by HF.[26] Mr Dolan added that although the transmission to and from the aircraft that was recorded by Auckland does not appear to show any distortion he recognised that it may have been different in the cockpit.[27]

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21 It should be noted that a SPECI is issued when there has been a significant change to the conditions which could be a deterioration or improvement.

22 For example Mr Richard Davies, *Submission 12,* p. 9; Mr Mick Quinn, *Submission 11,* p. 6.

23 ATSB Report, p. 7.

24 ATSB Report, p. 17.

25 Mr Martin Dolan, *Committee Hansard*, 21 November 2012, p. 9.

26 Mr Martin Dolan, *Committee Hansard,* 21 November 2012, p. 11.

27 Mr Martin Dolan, *Committee Hansard,* 21 November 2012, p. 12.

8.21 At the 21 November 2012 hearing when asked about the number of times the crew asked for information to be repeated, Mr Dolan's response was that it occurred once to Fijian ATC.[28] In answering this question on notice the ATSB maintained that the pilot only used 'say again' once at 0630 to query the time associated with the 0630 METAR.[29] Overall the ATSB indicated that the flight crew used the term 'say again' a total of three times during the conduct of the flight.[30]

8.22 Mr Aherne pointed out that according to the partial transcript provided to Capt. James the words 'say again' appear seven times—five times between Auckland ATC and the aircraft in the period 0600–0637 and twice between the aircraft and Fijian ATC and the aircraft in the period 0716–0801.[31]

8.23 With the transcripts available, which were the same as those referenced by Mr Aherne, the committee concurs with Mr Aherne that the term 'say again' was used at least seven times. As these transcripts were obtained from the ATSB the committee concludes that, in this regard, the ATSB report is factually incorrect.

Expectations/state of mind

8.24 There was no analysis in the ATSB report on what effect the error of the cloud height had on the crew's understanding and mental picture of the weather[32]and subsequent decision making. The information in the 630 METAR and the incorrect cloud base at 6000 instead of 600 ft may have contributed to a mindset or expectation that with an hour and a half until the ETA and cloud at 6000 ft nothing could happen in that time that would close the airfield.

8.25 The mental picture from the initial forecast would have been reinforced by the incorrect cloud height information from the METAR that conditions were good, in fact even better than the original forecast. It would have had the effect of confirming the pre-flight forecast that weather was unlikely to be a problem. Even if the SPECI had been heard clearly and in full, the pilot may already had a mental model of a 6000 foot cloud base. It would be understandable human nature to underestimate or disregard information that does not fit with the model of good weather already developed in the pilot's mind. He may have heard the information but not understood it clearly because he already had a mental picture that conditions were good and so he acknowledged the information without acknowledging the changing weather conditions. He also may have had a picture developed in his mind that replicated his experience of the previous evening when he flew into Norfolk Island on the outbound leg, where the poor weather forecast on departure from Sydney did not match the actual fine conditions on arrival.

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28 Mr Martin Dolan, *Committee Hansard*, 21 November 2012, p. 13.

29 ATSB answer to question on notice from 21 November 2012 hearing, number 1.

30 ATSB answer to question taken on notice from 21 November hearing, number 2.

31 Mr Bryan Aherne, *Supplementary submission*, 8 February 2013, p. 21.

32 Mr Bryan Aherne, *Submission 10*, p. 40.

8.26 There is no discussion of these possibilities in the ATSB report. Other weather information that may have ensured the crew comprehended the deteriorating conditions earlier was not passed on and this is discussed below.

Fatigue

8.27 Another possibility that may have contributed to the information not being heard or assimilated correctly could have been fatigue. The ATSB report has no detailed discussion of fatigue. It concluded that 'there was insufficient evidence available to determine the level of fatigue, or the extent to which it may have contributed to him [the pilot] not comprehending the significance of the 0800 SPECI'.[33] As the timing of the 0630 METAR was questioned by Capt. James, it appears that fatigue alone cannot explain the lack of action. This however should not have precluded the ATSB from analysing the issue of fatigue but adds weight to the need to analyse other factors. A more detailed discussion of the issues around fatigue is below.

8.28 Mr Mick Quinn pointed out there was no Selective Calling[34] so the flight crew had to monitor the frequency for the duration of the trip, listening to white noise, which adds to fatigue.[35]

Committee view

8.29 The committee acknowledges the uncertainty over whether the relevant weather information in the SPECI was received by the flight crew in total and/or assimilated. It too finds it strange that there is no discussion or analysis around the possible reasons for this, particularly given the ATSB re-enactment video of the incident showed that Capt. James was surprised when he heard the word SPECI and was adamant he had not heard it.[36]

8.30 The committee is aware of the issues around HF radio communications and that its reliability varies considerably depending on the frequency used and range. The committee recognises that there are a range of known technical issues associated with HF radio which can make it a poor form of communication particularly over water at some range.[37] While the ATSB report noted that no communication issues were identified by the crew, Mr Dolan acknowledged that the transmissions may have been

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33 ATSB Report, p. 15.

34 Selective Calling, or SELCAL, is a radio system used to notify flight crew that a radio station wishes to communicate with them.

35 Mr Mick Quinn, *Submission 11*, p. 8. See also Mr Bryan Aherne, *Supplementary submission*, 8 February 2013, p. 4. The committee notes that many pilots adjust the squelch control to eliminate the white noise until they have to make a call or are expecting a call. However, the committee is unaware of the effectiveness in this instance.

36 ATSB re-enactment video.

37 It can skip so that an aircraft close to the ATC may miss part of a broadcast but an aircraft much further out will receive it. Clarity can be poor with fading in and out requiring elements of transmissions to be repeated.

heard differently in the cockpit and the committee finds it odd that there is no discussion of this in the report.

8.31 Despite acknowledgement of the information by the pilot, the actions of the crew and the reactions in the re-enactment video show that for whatever reason the information was not heard and assimilated correctly or in its entirety. It may have been heard in a way that the crew was unaware it was incomplete. Despite the care taken by the pilot to check the time of the 0630 METAR, the ATSB appear to conclude that less than a minute later the pilot heard of significantly deteriorating weather conditions and took no action. The committee questions the likelihood of such a scenario.

8.32 While the committee acknowledges that using the term 'say again' is usual to clarify information received, there is currently no requirement to repeat critical information[38] and perhaps there should be and this report could have provided the opportunity for that discussion.

8.33 In the committee's view it would also be important to include some analysis of the possible effect of the incorrect weather information on decision making. The incorrect cloud height was corrected by the ATSB the day after the report was published but no discussion of the effect on decision making was included.

8.34 The committee considers there is no certainty around the transmission and receipt of the information in the SPECI.

Recommendation 16

8.35 The committee recommends that, where relevant, the ATSB include thorough human factors analysis and discussion in future investigation reports. Where human factors are not considered relevant, the ATSB should include a statement explaining why.

Fatigue

8.36 As mentioned above, the possible contribution of fatigue was not examined in any depth by the ATSB. The ATSB report acknowledged that the flight crew had been awake for over 12 hours before being called on duty at 0900 for the departure from Sydney on the previous day. They had been awake for over 22 hours when they landed in Samoa.[39] The report stated:

> After having breakfast they had about 8 hours opportunity at a hotel for rest prior to returning to the airport. The captain initially reported to the ATSB that he slept for most of this period and was well rested, but later reported to the Civil Aviation Authority (CASA) that he had only about 4 hours sleep but did not feel fatigued. The first officer advised of having 5 to 6 hours of sleep and feeling well rested.[40]

38 Mr Bryan Aherne, *Supplementary submission*, 8 February 2013, p. 4.

39 ATSB report, p. 14.

40 ATSB report, p. 14.

8.37 The ATSB noted that based on this information 'it is likely that the flight crew were experiencing a significant level of fatigue on the flight to Samoa, and if the captain only had 4 hours sleep then it is likely he was experiencing fatigue on the return flight at a level likely to have had at least some effect on performance.' However, the ATSB concluded:

> …there was insufficient evidence available to determine the level of fatigue…[41]

8.38 While the ATSB concluded it could not determine the level of fatigue, Mr Quinn pointed out that the crew were still alive and could have been re-interviewed, the crew could have provided a 72 hour history for fatigue analysis and the ATSB could have commissioned an external review by fatigue specialists.[42]

8.39 Mr McCormick commented that only a pilot knows whether or not they are fatigued.[43] Other witnesses highlighted that the individual concerned is usually the worst placed to accurately assess their own level of fatigue which is why best practice involves various tools and systems to support individual and organisational decision making.[44]

8.40 The committee is aware that 'managing fatigue and associated risks are the dual responsibility of employers and employees'.[45] CASA's guidance to industry on this issue states that an employer's responsibilities include:

- develop work schedules that prevent high levels of fatigue from developing during a work shift.
- develop work schedules that allow for adequate rest and recovery periods during between shifts (that allows for an anchor sleep period of seven to eight hours).
- ensure safe work practices, such as limiting overtime to sensible levels.
- implement appropriate and safe shift duration.
- continuously assess, control, and monitor fatigue-related hazards.
- develop policies, procedures, and practices to manage risks related to fatigue. For example, where napping is allowed, there should be clear instructions on how to deal with sleep inertia.
- provide information on workplace hazards, such as fatigue.[46]

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41 ATSB report, p. 15.

42 Mr Mick Quinn, *Submission 11*, p. 21; Mr Bryan Aherne, *Submission 10*, p. 43.

43 Mr John McCormick, *Committee Hansard*, 22 October 2012, p. 47.

44 *Confidential submission*.

45 CASA, *Fatigue management strategies for aviation workers: A training and development workbook*, May 2012, p. 80. See also Bryan Aherne, *Supplementary submission*, 18 March 2013, comments on question 4.

8.41 Mr Dolan was questioned about the view that only a pilot can decide if they are fatigued. He clarified that in the context of a Fatigue Risk Management System (FRMS) there is the ultimate decision of a pilot that needs to be made with appropriate knowledge and training as to whether their fatigue levels make them fit for the flight. The committee reminded the ATSB of the deficiencies with the operators' FRMS and training and asked if it had effectively analysed the issue. Mr Dolan argued that the ATSB analysis was adequate for the purposes of its investigation.[47]

8.42 The committee notes that CASA sought independent advice from the UK Civil Aviation Authority (CAA) which indicated that the scheduled flight would never have received UK CAA approval as it would have exceeded its bio-mathematical model (SAFE[48]) fatigue limits. Accordingly to the UK CAA analysis, the crew exceeded the fatigue limit on arrival in Apia from Norfolk Island and would most certainly have exceeded the fatigue limit during the return flight. The UK CAA went further and criticised the culture of Pel-Air based on the extent to which crews were kept on standby.[49] CASA did not pass this analysis onto the ATSB.

8.43 The ATSB confirmed that it did not obtain any independent analysis of fatigue levels and did not think it necessary to do so. It also questioned aspects of the UK CAA analysis.[50]

8.44 The ATSB's reticence to analyse whether fatigue contributed to the accident was criticised by Mr Aherne who noted:

> …the reader cannot ignore that ATSB's reluctance to develop any analytical arguments regarding fatigue and its potential contribution to the accident sequence despite its statement regarding fatigue in the final report, that…it was likely that on the return flight the pilot in command was experiencing fatigue.[51]

8.45 The ATSB[52] and CASA[53] both played down the usefulness of fatigue modelling. However, the committee heard this is disingenuous as fatigue models such as SAFE are the most accurate tool available and are very accurate in predicting fatigue and retrospectively analysing fatigue. The committee was told that these

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46 CASA, *Fatigue management strategies for aviation workers: A training and development workbook*, May 2012, pp 80–81.

47 Mr Martin Dolan, *Committee Hansard*, 15 February 2013, p. 28.

48 System of Aircrew Fatigue Analysis.

49 CASA, Additional information, number 15.

50 ATSB, answers to written questions on notice, from 15 February 2013 hearing, number 4.

51 Mr Bryan Aherne, *Supplementary submission*, 18 March 2013, comments on question 4, 15 and 16 and comments on written questions on notice, number 1.

52 ATSB, *Supplementary submission*, 11 November 2012, p. 2; ATSB, answers to written questions taken on notice from 15 February 2013 hearing, number 4; Mr Martin Dolan, *Committee Hansardi*, 15 February 2013, p. 29.

53 Mr John McCormick, *Committee Hansard*, 15 February 2013, p. 4.

fatigue models are not perfect but are a significant step forward when compared with the arbitrary limitations established in CAO 48.0.[54]

8.46 Relying on the crew's recollection of fatigue[55] should be treated with caution as any admission by flight crew of flying while knowingly fatigued invites a charge of negligence and second, humans are a poor judge of their fatigue levels.[56]

8.47 Mr Aherne also pointed out the obvious learning opportunity which should be a standalone finding regardless of whether it contributed to the accident or not:

> It is inadvisable for an operator to place the burden of responsibility on the flight crew to determine their level of fatigue prior to commencing a duty and make a prediction as to their likely level of fatigue many hours hence.[57]

Committee view

8.48 It seems a matter of common sense that if the crew had been awake for 22 hours by the time they landed in Samoa the issue of fatigue and management of it would be analysed by the ATSB. The statement that there was insufficient evidence available to determine the precise level of fatigue, despite acknowledging that the PIC was likely to be experiencing fatigue, should not have prevented the ATSB from analysing this issue.

8.49 The ATSB's own documentation prepared for the investigation noted that 'there is a discrepancy between self-reports of fatigue and actual fatigue levels, with people generally underestimating their level of fatigue'.[58] The committee believes that the ATSB report is a lost opportunity to have a detailed discussion on the management of fatigue, particularly given the deficiencies in this area identified in the CASA Special Audit (see Chapter 5).

8.50 The committee notes the ability for CASA to outsource or confirm fatigue analysis by going to the UK CAA. It notes the ATSB concerns with the analysis but that this option would have been available to the ATSB as well, or alternatively CASA could have shared the information it received from its UK counterpart. This aside, the CASA FRMS report (Chapter 5) combined with the evidence received by the committee provide a robust case that the management of fatigue was inadequate.

8.51 The Committee notes the early expectation of ATSB officers that human factors, including fatigue, would form part of the investigation. Worryingly, when the ATSB again looked at fatigue, prompted by the DIP process, the ATSB documentation indicated that the officers wanted to review the operator's FRMS, re-interview the crew and take further action[59] but that ATSB management concluded

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54 *Confidential submission*. Civil Aviation Order 48.0 covers flight time limitations.

55 ATSB report, p. 14.

56 *Confidential submission*.

57 Mr Bryan Aherne, *Supplementary submission*, 18 March 2013, comment on number 10.

58 *Confidential document.*

59 ATSB, Additional information, number 16.

that the investigation could not deviate at this point in the investigation and that the investigation team have to work with what they already have.[60]

8.52 The committee considers that there are questions to be answered around why there was no discussion or analysis of degraded performance due to fatigue when decisions were a) being made in Apia regarding fuel load or b) being made en route in response to weather forecasts. With the latter, the committee is concerned with the inexplicable interaction with Fiji where crucial information appears to not have been heard or assimilated.

8.53 The point of the ATSB report should be to cause other pilots and operators to consider how fatigue may affect their safety. It is an example of why the approach taken by the ATSB is flawed and does not optimise safety outcomes from the investigation which should be about *why* this accident occurred.

Retrieval of the CVR/FDR

8.54 As noted in Chapter 3 of the committee's report, which among other matters highlights the importance of information contained in flight data recorders, the ATSB chose not to retrieve the aircraft after the accident.

8.55 Mr Aherne pointed out that the retrieval of the cockpit voice recorder would have assisted to fill in some gaps in terms of the human factors such as: the relationship between the pilot and the co-pilot; their reaction to the ATC's requests or instructions; their lines of thinking; and the conversations they were having on the flight deck.[61]

Committee view

8.56 The committee agrees that flight recorders can reveal facts which are surely key assets to an investigator as they provide concrete data and information, helping them avoid theories and assumptions.[62] The industry has expended significant capital to equip aircraft with FDR and CVR creating the expectation that having made the investment that the ATSB will recover the records so that any lessons will be evidence based.

Other issues around survivability aspects

8.57 The committee heard that there are numerous aspects relating to the ditching that many pilots would find useful. The committee heard that the adequacy and location of emergency equipment should have been more thoroughly examined after the accident.[63]

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60 ATSB, Additional information, number 17.

61 Mr Bryan Aherne, *Committee Hansard*, 22 October 2012, p. 12.

62 As noted in Chapter 3 of this report, this is required by the International Civil Aviation Organisation (ICAO).

63 *Confidential submission*. The committee also heard *in camera* evidence indicating that the aircraft and cabin structures' crashworthiness, as well as the pilot-in-command's operating technique in executing the ditching, should have been examined.

8.58 Mr Aherne pointed out that without the pilot-in-command's waterproof torch this could easily have been a six-person fatality. The role of failed safety equipment on the lifejackets (lights and inflation chambers and whistles) and the incorrect position of the life raft (positioned untethered in the aisle before ditching) are important issues that in the committee's view should have received more attention in the ATSB report.[64]

Lifejackets

8.59 Reports from the crew and passengers were that the lifejackets did not function appropriately. This was not reflected in the ATSB report. The issues were described by the pilot-in-charge:

> Only three of us managed to fit life jackets before exiting the aircraft—the doctor, David; the nurse, Karen; and the patient's husband, Gary. Zoe and I were far too busy while flying the aircraft to undo our seatbelts and fit the life jackets. The patient, Bernie, was not fitted with a life jacket as per CareFlight's procedures for someone on a stretcher. During the evacuation, there was also no chance to grab additional jackets to make up the shortfall…
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> The jackets themselves had issues. The lights were very dim and did not remain illuminated for very long. I understand they are supposed to be seen from some distance and remain on for eight hours or so. The groin strap of David's life jacket was too long or not able to be tightened sufficiently and at times you needed to hold his jacket down with one hand so he could breathe without difficulty. David's ears were also covered up, making him effectively deaf while we were in the water. The lanyards on the signalling whistles were not long enough or were knotted. This meant you could not use your own whistle and instead someone else was required to. The manual inflation and deflation tubes were a similar size and shape to the whistles and a few times they were accidently activated when they were mistaken for a whistle in the darkness and pulled towards the face of the person wearing the jacket, causing the jacket to deflate.[65]

8.60 Mr Aherne pointed out:

> The lifejacket lights did not work for eight hours as they are required to. Miss Casey's [the flight nurse] life jacket only inflated in the left chamber. She held the patient in her right arm for an hour and a half. She has permanent disabling injuries of her hand. If her other chamber had inflated she would have been able to cradle the patient, who did not have a lifejacket. How that information is omitted is bizarre.[66]

8.61 The survivors reported that most of the lifejacket lights had stopped working by the time they were recovered by the rescue vessel.[67]

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64 Mr Bryan Aherne, *Supplementary submission*, 8 February 2013, pp 6–7.

65 Mr Dominic James, *Committee Hansard*, 22 October 2012, p. 4.

66 Mr Bryan Aherne, *Committee Hansard*, 22 October 2012, p. 13.

67 ATSB report, p. 24.

8.62 The ATSB report noted that the aircraft was equipped with lifejackets for all on board as well as two life rafts.[68]

8.63 The ATSB said that the reports about the performance of the lifesaving equipment varied from the survivors and some of the performance issues might have been due to the dark night or difficulty exiting the aircraft.[69]

8.64 Mr Aherne questioned why after three years the ATSB have been unable to establish the facts around the lifejackets as they were available and should have been examined.[70] He submitted that the ATSB should have been able to determine whether the damage occurred during the accident sequence. He pointed out that in the absence of an examination there is a possibility that there is a serviceability issue with the lifejackets which could potentially affect a large section of the industry.[71]

8.65 Curiously, ATSB documentation showed that the ATSB assumed that CASA has sufficient information in relation to battery life to take some action in relation to the lifejackets. Internal ATSB documents noted that it is up to CASA to investigate lifejacket deficiencies, as it has sufficient information to act and so a recommendation was not made.[72] However, it does not appear that any industry advice or caution regarding the failures has been issued.

8.66 Mr Dolan admitted that:

> As I understand it having reviewed the various materials, we did examine the question of life jackets—on reflection, perhaps not at the level of detail we should. With the life rafts, I do not recall that there was any examination in detail. In terms of the survivability aspect of the report, it is certainly not comprehensive.[73]

8.67 The ATSB committed to re-examine the lifejacket safety issues:

> We will re-examine that part of the report. In light of the evidence that has now been brought to our attention, and that was not brought to our attention during the investigation or in the factual review of the reports...[74]

Life rafts

8.68 The ATSB report noted:

> The life rafts were reported removed from their normal stowed position and placed in the aircraft's central aisle ready for deployment after the ditching.[75]

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68 ATSB report, p. 20.

69 ATSB, *Supplementary submission*, 11 November 2012, pp 6–7; ATSB, answers to written questions on notice from 15 February 2013 hearing, number 14.

70 Mr Bryan Aherne, *Supplementary submission*, 18 March 2013, comments on question 14.

71 Mr Bryan Aherne, *Supplementary submission*, 18 March 2013, comments on question 14.

72 *Confidential document*. See also *Committee Hansard*, 15 February 2013, p. 21.

73 Mr Martin Dolan, *Committee Hansard*, 22 October 2012, p. 63.

74 Mr Martin Dolan, Mr Ian Sangston, *Committee Hansard* 22 October 2012, pp 63–64.

8.69 In relation to the life raft the pilot-in-command noted:

> The Pel-Air ditching preparation procedures called for the 25-kilo life raft to be placed next to the exit on the floor and left there. Unsurprisingly, during the impact, the life raft tumbled forward and was lost in the darkness. I do not know why someone at Pel-Air or CASA did not question the likelihood of a life raft remaining in place during the violent deceleration of an aircraft ditching and did not suggest an alternative procedure.[76]

8.70 He then suggested:

> There needs to be a procedure where the life raft was secured in a fashion which would ensure the raft remained in place during the impact—but allowing it to be recovered without difficulty and put through the exit and deployed on the surface. I understand that is not an easy undertaking, but the processes in place at the time was inadequate.[77]

Committee view

8.71 Again the committee saw in ATSB documentation the expectation from investigation officers that cabin safety, including location of life rafts and the design of lifejackets, would be included.

8.72 After a three-year investigation it seems incredible, given that all on board survived, that some issues with the lifejackets only came to light during the course of this inquiry.

8.73 The committee finds it difficult to comprehend that no caution was issued for the lifejackets, and that the situation and position of the life raft was not discussed as a lesson for the aviation industry. The committee notes the lack of action in relation to lifejackets and battery life appears again to be linked to a decision not to issue a recommendation to CASA. This is yet another disturbing example of an opportunity lost.

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75 ATSB report, p. 21.

76 Mr Dominic James, *Committee Hansard*, 22 October 2012, pp 3–4.

77 Mr Dominic James, *Committee Hansard*, 22 October 2012, p. 4.