QUEENSLAND COURTS

CORONERS COURT OF QUEENSLAND

FINDINGS OF INQUEST

CITATION:	**Inquest into the deaths of Martinus Van Hattem & Trista-Lea Applebee**
TITLE OF COURT:	Coroners Court
JURISDICTION:	SOUTHPORT
FILE NO(s):	2019/2516; 2019/2553
DELIVERED ON:	4 April 2023
DELIVERED AT:	Southport
HEARING DATE(s):	13 to 15 December 2022
FINDINGS OF:	Carol Lee, Coroner
CATCHWORDS:	Coroners: Inquest- operation of limited category, ex-military “Warbirds” aircraft in Australia- airworthiness and maintenance- pilot training for aerobatic flight activity- regulatory framework- reporting systems.

REPRESENTATION:

Counsel Assisting:	Mr Ian Harvey
Australian Transport Safety Bureau (ATSB):	Mr Ming Li Mr Patrick Hornby
Civil Aviation Safety Authority (CASA):	Mr Mark Eade
Australian Warbirds Association Limited (AWAL):	Mr Christopher McKeown

Contents

Introduction

1. On the morning of Wednesday 5 June 2019, a two seat, single engine, YAK model 52 aircraft, VH-PAE, impacted the sea near the Jumpinpin channel, at the northern tip of South Stradbroke Island, Queensland. The pilot of the aircraft, Martinus Van Hattem (aged 52), and sole passenger, Trista-Lea Applebee (aged 31), were killed.
2. Following completion of external investigations, the Inquest was held over 3 consecutive days in the Southport Court House commencing 13 December 2022.
3. The purpose of this Inquest is to make findings pursuant to section 45 of the *Coroner's Act* 2003 (**CA**) and, if appropriate, make recommendations to prevent deaths from occurring in similar circumstances in the future.
4. Family members of the deceased attended the Inquest, either in person or remotely via a courtroom video link[1], unrepresented.
5. I am indebted to the parties' representatives for their comprehensive submissions following the Inquest.[2] In particular, I acknowledge the submissions of Counsel Assisting me during the course of these proceedings, Mr Ian Harvey, which I have largely accepted and adopted in these findings.

The Issues

6. Having regard to the extent of the investigations undertaken by both the Australian Transport Safety Bureau (**ATSB**) and the Queensland Police Service (**QPS**) Forensic Crash Unit, the results of which are detailed in their respective reports, it was considered appropriate to refine the focus of the inquest issues, connected with the crash of VH-PAE, primarily to matters in relation to which oral evidence should be called. Those issues, which are considered in the context of the ATSB's Aviation Occurrence Report AO-219-027[3] (**the ATSB report**), the QPS Forensic Crash Unit Coronial Investigation Report[4] (**the QPS report**) as well as the evidence adduced in the course of the inquest, are as follows:
    I. Circumstances of the flight of VH-PAE on 5 June 2019
    II. Airworthiness and maintenance of VH-PAE as a YAK 52 aircraft flown in Australia.
    III. Level and adequacy of Mr Van Hattem's pilot training for aerobatic flight activity endorsements and his aviation proficiency.

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[1] Including Hanneke Duurland, Alexander Van Hattem, Julian Van Hattem, Edwin van der Voort, Casper Burkhardt, Leanne and Ronald Bunker, Brock Alexander and Glen Wilson.
[2] Submissions of Mr Ian Harvey, Counsel Assisting dated 30 January 2023, Mr Ming Li on behalf of Australian Transport Safety Bureau dated 15 February 2023, Mr Mark Eade on behalf of the Civil Aviation Safety Authority dated 20 February 2023 and Mr Christopher McKeown on behalf of The Australian Warbirds Association Limited dated 20 February 2023.
[3] Exhibit C1.
[4] Exhibit B1.

IV. Adequacy of oversight and regulation of Warbird flying operations.

V. Matters relevant to the prevention of similar accidents in the future and whether any recommendations may be made to reduce the likelihood of deaths occurring in similar circumstances.

Non-Publication Order

7. On 18 November 2022, I made the following non-publication order (NPO), prohibiting the publication of the following information relating to, or arising at, the inquest:

8. Exhibit E1.1- Video taken by Ms Bursill of flight with Mr Van Hattem.

9. The PowerPoint presentation by Stephanie Sabadas for her evidence at the Inquest.

10. Subject to clauses 1.2,1.3 and 1.4 of certificate no 2, restricted information from ATSB accident investigation AO 2019-027 involving aircraft registration VH-PAE, necessary for Stephanie Sabadas to disclose in order to provide evidence directly related to the ATBS's findings.

11. The NPO was made pursuant to subsection 60(7) of the *Transport Safety Investigation Act* 2003 (Commonwealth) (**TSI Act**) and subsection 41(1) of the CA.

12. A reminder of the existence of the NPO was reiterated daily at the Inquest, both verbally and a paper copy was attached to the courtroom door.

The evidence

13. A large bundle of exhibits was tendered into evidence, comprising documents[5] numbered A.1.1- A2.3, B1.1-B1.63, C1-C2, D1-D2, E1.1- E4, F1- F18.1 and G.

14. The following persons were called as witnesses to give oral evidence at the Inquest:

- Senior Constable Kyle Hutchinson (FCU investigator).
- Ms Stephanie Sabadas (ATSB investigator).
- Mr Glen Wilson.
- Mr Kevin Murphy.
- Ms Deborah Severino.
- Ms Irina Bursill (via video link).
- Mr Steven Rance.
- Mr Gary Klein.
- Mr Douglas Field (via video link).

[5] Including video footage and photographs.

- Mr Nigel Arnot.
- Mr Mark Awad (AWAL).
- Dr Anthony Stanton (CASA).

The Coronial Jurisdiction

15. Under the CA, a coroner has jurisdiction to investigate a "*reportable death*".[6] A violent or otherwise unnatural death that happened in Queensland is a reportable death.[7] An inquest may be held into a reportable death (including multiple deaths) if the coroner investigating the death considers it desirable to hold an inquest.[8]

16. In this case, the former Deputy State Coroner Jane Bentley and Coroner Nerida Wilson decided that an Inquest was required, and the required notice of inquest was given to the parties on 27 April 2022.

The scope of the coroner's inquiry and findings

17. A coroner has jurisdiction to inquire into the cause and the circumstances of a reportable death. If possible, the coroner is required to find: -

    - who the deceased person is;
    - how the person died;
    - when the person died;
    - where the person died;
    - what caused the person to die.[9]

18. The scope of a coroner's jurisdiction to inquire into the circumstances of a death and make statutory findings goes beyond merely establishing the medical cause of death.[10]

19. A coroner may, whenever appropriate, comment on matters connected with a death investigated at an inquest and make preventive recommendations concerning public health or safety, the administration of justice or ways to prevent deaths from happening in similar

[6] CA, s 11.
[7] ibid, s 8.
[8] ibid, ss 28, 33.
[9] Ibid s 45(2).
[10] However, it has been held that the "*findings*" referred to in s 45 of the CA are "*to the matters required to be 'found' in s45(2) of the Act*". It is said to be "*clear*" from the text of the CA that these "*findings*" are "*the ultimate findings which a coroner is required to make by s 45(2)*": *Hurley v Clements & Ors* [2009] QCA 167 at [20] per McMurdo P, Keane JA and Fraser JA.

circumstances in the future.[11] A coroner must not include in the findings or comments made any statement that a person is, or may be, guilty of an offence or civilly liable for something.[12]

20. As a former State Coroner of Queensland has observed: "*an inquest is not a trial between opposing parties but an inquiry into the death…..The focus is on discovering what happened, not on ascribing guilt, attributing blame or apportioning liability. The purpose is to inform the family and the public of how the death occurred with a view to reducing the likelihood of similar deaths*".[13]

21. Fundamentally, an inquest is "*investigative, inquisitorial and does not result in findings which bind participants inter partes. The standard of proof which applies is not the criminal standard*." [14]

The admissibility of evidence and the standard of proof

22. The Coroner's Court is not bound by rules of evidence but may inform itself in any way it considers appropriate. The inquiry undertaken by a coroner "*must be sufficient for the purpose of investigating the death and making, if possible, the findings required by the Act*". *The coroner "cannot be limited to investigating the material placed before (the coroner) by other persons*".[15] That doesn't mean that any and every piece of information however unreliable will be admitted into evidence and acted upon. However, it does give a coroner greater scope to receive information that may not be admissible in litigated proceedings and to have regard to its provenance when determining what weight should be given to the information.

23. This flexibility has been explained by reference to the nature of an inquest as a fact-finding exercise rather than a means of attributing blame: an inquiry rather than a trial.[16]

24. It is generally accepted that the civil standard of proof applies in coronial investigations in relation to factual findings that are to be made. However, the "*clarity*" of the proof required (or the degree of satisfaction called for by application of the civil standard) may vary according to the "*gravity*" of

[11] ibid, s 46(1).
[12] ibid, s 45(5), s 46(3).
[13] Findings of State Coroner Barnes in the Hamilton Island air crash *Inquest into the deaths of Joanne Bowles, Michael Bowles, Sophie Bowles, Kevin Bowles, Andrew Morris & Christopher Andre le Gallo*, Brisbane, p 2.
[14] See *Domaszewicz v The State Coroner* (2004) 11 VR 237 at par [81]; cf *Musumeci v Attorney-General (NSW)* (2003) 57 NSWLR 193 at 199 where the juristic nature of an inquest was described as a "*hybrid process*" containing both adversarial and inquisitorial elements.
[15] *Plover v McIndoe* (2000) 2 VR 385 at [19] per Balmford, J.
[16] *R v South London Coroner; ex parte Thompson* per Lord Lane CJ, (1982) 126 S.J. 625.

the factual matter to be determined.[17] A coroner must apply the civil standard in a way that is "*appropriate to the gravity of the allegations*" made against a person; if a finding may have an "*extremely deleterious effect*" upon a person's character, reputation or employment prospects, that circumstance will generally demand "*a weight of evidence that is commensurate with the gravity of the allegations*".[18]

25. A coroner is not required to exclude every possibility, but rather to establish, if possible, what is more likely to have occurred upon findings "*reasonably supported by the evidence*".[19]

26. It is also clear that a Coroner is obliged to comply with common law rules of natural justice and act judicially.[20] This means that no findings adverse to the interest of a person may be made without that person first being given a right to be heard in opposition to that finding. That includes being given an opportunity to make submissions against findings that might be damaging to the reputation of any individual or organisation.[21]

The investigation

Factual background

27. On the morning of Wednesday 5 June 2019, a two seat, single engine, YAK model 52 aircraft, VH-PAE (VH-PAE) was engaged in a private flight along the Gold Coast in Queensland. On board the VH-PAE was the pilot and owner Martinus Van Hattem, and sole passenger, Trista-Lea Applebee.

28. Mr Van Hattem was a member of the Southport Flying Club (**Club**). The Club was, and is, the operator of Southport Airport. As a member of the Club, Mr Van Hattem had a right to fly to and from the airport.

29. On 5 June 2019, Ms Applebee attended Southport Airport with her friend, Mr Glen John Wilson. Mr Wilson had made arrangements with Mr Van Hattem to undertake two flights; one for Ms Applebee, whose 31st birthday was on 6 June 2019, and one for himself. He gave Mr Van Hattem $200 as payment for the intended flights.[22] Mr Wilson was to undertake a similar flight with Mr Van Hattem immediately after Ms Applebee's flight. It was intended that each flight would be a 30-minute scenic flight departing from the airport and travelling along the coast with Mr Van Hattem performing some aerobatics.

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[17] See *Briginshaw v. Briginshaw* (1938) 60 CLR 336 at p 362 per Dixon J, as qualified by *Rejfek v. McElroy* (1965) 112 CLR 517.
[18] *Anderson v Blashki* [1993] 2 V.R. 89 at 96-97 per Gobbo J.
[19] *Hurley v Clements & Ors* [2009] QCA 167 at [16].
[20] *Harmsworth v State Coroner* [1989] VR 989 at 994.
[21] *Annetts v McCann* (1990) 65 ALJR 167 at 168.
[22] Exhibit B 1 -28 and oral evidence of Mr Wilson.

30. Records of primary radar returns, available to the ATSB from installations operated by Airservices Australia (**Airservices**) and Department of Defence, indicate that, at 09:46:43 hours on 5 June 2019, an aircraft departed Southport Airport and, by 09:50 hours, the aircraft was tracking in a southerly direction away from Southport Airport.[23]

31. Shortly thereafter, the pilot of the tracked aircraft was heard making a radio call on the common traffic advisory frequency (**CTAF**) for the area by another pilot. The caller indicated that he was "*overhead Pacific Fair* (a shopping centre located at Broadbeach) *at an altitude of 500 feet, northbound*".[24] The ATSB determined that this call was made from VH-PAE.

32. At about 09:58 hours, the tracked aircraft was detected flying in a northerly direction at a constant speed of around 120kt. The final CTAF radio call from VH-PAE, heard by a pilot who had also departed from Southport Airport, was that VH-PAE was "*at Porpoise Point and heading seaward for aerobatics at 3,500 feet*".[25]

33. Shortly thereafter, the aircraft was radar detected, over Stradbroke Island, being flown in a manner consistent with the performance of aerobatic manoeuvres.[26] At about 10:03 and 10:04 hours, the aircraft was detected at a reduced speed and overhead South Stradbroke Island "*at or above 1,200 feet*".[27] The last radar returns were recorded at 1005:36 and 1005:48. No further radar returns were recorded for the aircraft in that location that day.[28]

34. When VH-PAE had not returned to Southport Airport about an hour after the estimated time for the flight, Mr Wilson spoke to a member of the Club, Tony Alder.[29] At about 1310, a representative from the Club contacted Airservices who (at 13:14 hours[30]) reported to the Australian Maritime Safety Authority (**AMSA**) that the Club had concern for an overdue aircraft with two persons on board.

35. At about 14:00 hours, AMSA's Joint Rescue Co-ordination Centre (**JRCC**) in Canberra, together with Gold Coast Water Police, initiated a search for VH-PAE.[31] The JRCC tasked four helicopters to search several locations on and near South Stradbroke Island. At about 16:30 hours, some aircraft

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[23] Exhibit C1, p 8.
[24] Exhibit C1, p 1.
[25] Exhibit C1, p 2.
[26] Exhibit C1, p 2.
[27] Exhibit C1, p 8.
[28] The ATSB noted that VH-PAE was not detected by radar numerous times in the course of its last flight, which indicates that "*it was either below the radar coverage of three local radar sites and/or (was) due to terrain shielding*": Exhibit C1, p 20.
[29] Exhibit B1-14, p 2; Exhibit B1-28.
[30] The available records from AMSA note that the "*alert*" was received by that authority on 5 June 2019 at 03:14 UTC which is 13:14 EST – see Exhibit B1-25.1.
[31] Exhibit C1, p 2.

wreckage (part of a propeller) was located in the surf break on the eastern side of South Stradbroke Island by the local Council Ranger.[32] Part of an aircraft seat was then found late that afternoon on the first day of the search.[33] The search for further aircraft wreckage was delayed due to poor weather conditions. In following days, additional aircraft wreckage was located adjacent to South Stradbroke Island and near the mouth of Jumpinpin Channel.[34]

36. First responders concluded that the debris indicated a non-survivable impact had occurred over water[35]. Queensland Police (including Gold Coast Water Police) assumed overall coordination and continued a recovery operation.

Police investigation

37. Senior Constable Kyle Hadley Hutchinson, as the Coronial Investigating Officer, gave evidence as to the role that he and other officers from the Forensic Crash Unit at Coomera and the Gold Coast Water Police had in the QPS coronial investigation.

38. The Gold Coast Water Police provided co-ordination of the local Search and Rescue (**SAR**) resources. On the morning of 6 June 2019, the crew of a search helicopter operated by Surf Lifesaving Queensland observed various items of aircraft debris in the waters of Jumpinpin Bar. Police divers then located some wreckage of VH-PAE with human remains entangled in the wreckage.[36]

39. In the QPS report, Senior Constable Hutchinson noted that the pilot's body was "*twisted in control and electrical cabling*" in the section of portside fuselage that was recovered.[37] The police arranged for the transportation of those human remains to the Gold Coast University Hospital mortuary for identification, later confirmed to be Mr Van Hattem[38].

40. Although the rear passenger seat was recovered at the same time as the portside fuselage and tail sections, it appears that the body of Ms Applebee was not identified or located at that time. During the continuing

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[32] Exhibit A1-1, p 9; confirmed in AMSA record Ex B1.25.1, p 6.
[33] Exhibit B1-25.1, p 7 read with Exhibit B1-29.
[34] A JRCC officer reported that the most southern piece of debris found was an air cylinder which was subject to both leeway and current/wave action. The officer opines that: "*For this piece to come ashore where it has, the aircraft has impacted with the water to the East or Southeast of the items location* (*sic*) *due to known weather at the time*". The officer concludes that "*the aircraft likely impacted the surface at or just East of the outer surf break on the day in question and therefore the items located were easily sucked into the wave action zone*": Exhibit B1.31, p 3.
[35] See https://www.amsa.gov.au/safety-navigation/search-and-rescue/search-and-rescue-incidents-2018-19; also Exhibit B1 at p 25 (par [5.6]).
[36] Exhibit A1.1, p 9.
[37] Exhibit B1, p 28.
[38] Exhibit A1.1, p 9; Exhibit A1.2.

search, police received advice on 7 June 2019 from a person fishing on North Stradbroke Island of the sighting of the body of a female person floating on the shoreline near Point Lookout. The body was recovered and later transported to the John Tonge Centre in Brisbane for autopsy with confirmation that the body was that of Ms Applebee.[39]

41. Police officers made appropriate reports of the deaths to the coroner (in accordance with ss7(4) CA)[40]. Police assisted the ATSB when they arrived at the scene. The police officers did not set out to determine the cause of the accident, as it was not primarily their role to do so.

42. Senior Constable Hutchinson promptly set about identifying potential witnesses, taking statements from many of those persons and otherwise securing evidentiary material for the purposes of the coronial investigation. The QPS report later prepared is a valuable source of relevant evidentiary material.

Australian Transport Safety Bureau investigation

43. The investigation into the circumstances of the accident was undertaken by the ATSB in accordance with the provisions of the TSI Act. The Transport Safety Investigation Director must, as soon as practicable after completion of an investigation, publish a report in relation to the investigation.

44. In this instance, a multi-disciplinary team utilized the expertise of appropriately qualified and experienced aviation engineers, human factors experts, flying operations personnel and other professionals. The lead investigator, Ms Stephanie Sabadas, gave evidence at the Inquest including a detailed power point presentation of how the ATSB's investigation was conducted.

45. The final report of the investigation was published on 24 February 2022 following a comprehensive consultation process. The ATSB report is divided into five main parts. The first part briefly contains some factual information as to the circumstances surrounding "*the occurrence*". The second part headed "*Context*", contains further factual information, including de-identified witness observations, details of the assessment of the recovered wreckage, operational information and details of the regulatory context within which Warbird operations are conducted, pertinent to an understanding of the circumstances surrounding the occurrence.

[39] Exhibit A2.1, p 10; Exhibit A 2.2.
[40] Exhibit A1.1; Exhibit A 2.1.

46. The third part of the ATSB report – headed "*Safety Analysis*" - provides a succinct evaluation of much of the factual information presented in part two (although part two also contains evaluative material). Part four presents the findings of the authors of the ATSB report and part five records safety-related action taken by the ATSB as a result of its investigation.

The evidence

Issue I. Circumstances of the flight on 5 June 2019

47. The radar surveillance data obtained by the ATSB was consistent with the scenic route apparently intended to be flown by Mr Van Hattem on the 5 June 2019. The evidence given by Mr Wilson confirmed his understanding of the intended flight.

48. Mr Wilson gave evidence that after arriving at the Club, he and Ms Applebee entered airside (without being required to sign into the Club) and they had a conversation with the pilot. Mr Van Hattem explained that the flights would be conducted by first flying inland towards Broadbeach, then "*low-level*" flight along the coast towards South Stradbroke Island where "*he would ascend and perform aerobatics*". They would take off downwind on runway 01 as "*the aircraft could accept the tailwind component*". The flight was to be approximately 30 minutes all up.[41]

49. While airside, Mr Wilson took photographs of VH-PAE on the runway and made videos on his iPad of Ms Applebee on board the aircraft and the take-off and a left turn conducted shortly thereafter with the plane "*airborne at approximately 09:49AM*".[42] The ATSB's analysis of Mr Wilson's videos estimates that the left turn was conducted at about 200 feet AGL.[43]

50. Mr Wilson said that Ms Applebee did not take her own mobile phone with her on the flight but borrowed his Samsung smartphone so that she could take photographs during the flight. The available evidence is that no phone was located in or recovered from the wreckage by any investigator.[44]

51. The videos taken by Mr Wilson show that Mr Van Hattem assisted Ms Applebee with securing her harness and provided a short passenger briefing. Mr Wilson acknowledged that the only briefing given to Ms

[41] Exhibit B1.14, p 2; also Exhibit C1, p1.
[42] Exhibits B1.17 – B1.24 are the recordings made by Mr Wilson as displayed in evidence at the inquest.
[43] Exhibit C1, p 1.
[44] A piece of "*plastic chain-like necklace*" is referred to in the autopsy report for Ms Applebee as having been "*present loosely with the body*": Exhibit A2.3, p 2. There is no indication that anything was attached to that necklace and no indication that any part of the seat harness was attached or present with the body.

Applebee was that which he had recorded. To the extent that the briefing given by Mr Van Hattem is audible, the need for the passenger to ensure in-flight security of the mobile phone in her possession was mentioned. However, there was no audible statement of the matters referred to in the *Civil Aviation Safety Regulations* (**CASR**) including that travel in the aircraft is at the passenger's own risk.[45]

52. Mr Wilson provided his statement to police on 5 June 2019. He explained that he had known Ms Applebee for about 8 – 9 months and they were good friends. About a month earlier, Mr Wilson had been working on another friend's plane at Kooralbyn airport and saw Mr Van Hattem flying his YAK aircraft. He was then introduced to Mr Van Hattem and asked if there was a chance that he could be taken for a flight. On 1 or 2 June 2019, Mr Wilson phoned Mr Van Hattem and made arrangements for the 5 June 2019 flights.

53. Various witnesses interviewed by the QPS and/or ATSB provided statements of observing an aircraft matching the description of VH-PAE on 5 June 2019:

    - **Angela Curtis** - reported that she observed an aircraft south of Pacific Fair performing aerobatics "*at an altitude of about half the general height of buildings*" before the aircraft "*continued north, straight and level*".[46] Noting that Mr Van Hattem's penultimate radio call was that he was "*overhead*" Pacific Fair at "*an altitude of 500 feet, northbound*", Ms Curtis' depiction of the flight path of the aircraft that she saw tends to confirm the flight path of VH-PAE at a time shortly before 10:00 hours that day.

    - **Gregory Harris** – reported sighting an aircraft, just after 10:00 hours, flying straight and level in a northerly direction along the coastline of Surfers Paradise at a height slightly above the 12th floor level of his apartment in the Bahia Beachfront Apartments at 154 Esplanade, Surfers Paradise.[47] This observation is also consistent

[45] The passenger briefing requirements set out in CASR 132.065 and 132.070 (Exhibit F.14) require the briefing to be conducted "*before the passenger is taken to the aircraft*" which must include a statement to the effect that the design, manufacture and airworthiness of the aircraft are not required to meet any CASA recognised standard and that the aircraft is not required to be operated to the same safety standards as an aircraft used for regular public transport or charter operations, with the warning that travel is at the passenger's own risk.

[46] Exhibit B-1, p 5 Fig 2.3, p 9. ATSB estimates this height to be about 200 – 300 feet AMSL: Exhibit C1, p 8.

[47] Exhibit B1, pp 5, 9-10. ATSB estimates this height to be between 100 to 200ft AGL which was "*lower than aircraft usually flying in that area and direction*": Exhibit C-1, p 8. The required height for coastal transit in Class G airspace in the northbound direction is 500 feet AMSL and 1500 feet AMSL southbound: AIP En Route Supplement Australia (ERSA), Southport Avfax Code 4016.

with the flight path of the aircraft observed shortly before by Ms Curtis.

- **Deborah Severino and Kevin Murphy** – who gave evidence at the inquest, confirmed their observations of an aircraft matching the description of VH-PAE performing aerobatic manoeuvres when they were on board their boat anchored at Tippler's Passage, north-west of Couran Cove Resort on South Stradbroke Island. Although uncertain of the time at which they observed the aircraft, they saw it conduct a "*loop*" and a "*roll*". Ms Severino recalled seeing the aircraft do about 4 or 5 loops and "*wingtip rolls*" before it cut right on the south-east side of the island. At that point, both witnesses lost sight of the aircraft below the tree line, last seeing it flying in a low but seemingly controlled manner.[48] The wind was light at the time and weather clear on a pleasant morning. Neither witness heard any untoward engine noise or heard anything that indicated that the aircraft had experienced a mechanical fault or mid-air bird strike.[49]

54. The witness statements obtained by investigators and the evidence given at the inquest by Mr Wilson, Mr Murphy and Ms Severino, together with the evidence obtained by the ATSB as to the last CTAF radio calls that were heard being made from VH-PAE, provide a reasonably clear understanding of the path that was taken by VH-PAE on 5 June 2019. The final radio call from VH-PAE heard by another pilot, by which Mr Van-Hattem broadcast his location as "*Porpoise Point and heading seaward for aerobatics at 3,500 feet*", is likely to have been made shortly before Mr Murphy and Ms Severino saw the aircraft.

55. In analysing Airservices and Department of Defence records of primary radar returns from VH-PAE, the ATSB investigators have concluded that this data shows that "*the last detections between 1005:36 and 1005:48 were 'tightly grouped*" indicating the aircraft was either at very low speeds or in a steep dive; the speed was below 60kt, which could be attributed to the aircraft being in a vertical manoeuvre".[50]

56. Notwithstanding its analysis of the radar data and limited wreckage recovered, the ATSB concluded that the evidence of "*significant disruption*" to VH-PAE, indicated that "*the aircraft impacted the water at high speed*".[51] This accords with the evidence of Mr Arnot who, as an aircraft engineer with extensive aircraft maintenance experience

[48] This evidence does not suggest that the aircraft did not return to straight and level flight following the intentional aerobatic manoeuvres observed by Ms Severino and Mr Murphy (**cf** Exhibit B1, p 50 par [16.3]). Rather, it is likely that the witnesses lost sight of the aircraft from their vantage point on the western side of the island.
[49] Exhibit B1, pp 10 – 13; cf Exhibit B1, p 48, p 50.
[50] Exhibit C1, p 8
[51] Exhibit C1, p 20

specialising in Russian YAK's and vintage aircraft restoration, opined that the collision of the aircraft with the water "*was a high-speed impact*".[52] (Mr Arnot is currently the custodian of the wreckage on behalf of the aircraft insurer.)

57. I agree with Counsel Assisting's assessment that this evidence is sufficient to enable a finding that the aircraft, VH-PAE, with Mr Van Hattem and Ms Applebee on board, impacted the sea near South Stradbroke Island, Queensland shortly after 10:05 hours on 5 June 2019. The impact was not survivable.

Potential causal factors

58. In relation to most fatal air accidents involving flight into terrain or flight into water, a catalogue of potential or possible causes for the accident relating to the operation of the accident aircraft may be considered. Broadly speaking, these potential causes may include the following[53]:

- Meteorological conditions.
- Operating outside of weight and CG limits.
- Insufficient or tainted fuel.
- Engine failure.
- Aircraft structural failure.
- Bird strike.
- Loose articles affecting flight controls.
- Maintenance failures.
- Pilot proficiency/pilot error/radio communications.
- Pilot illness/ medical fitness.
- Pilot loss of consciousness as a result of (aerobatic) manoeuvres.
- Passenger or third-party involvement.

59. In the present inquest, having regard to the results of both the ATSB and QPS investigations and the evidence of witnesses, it is possible to immediately exclude many of these factors to limit the focus of inquiry to the specific issues identified as the subject of the Inquest.

60. Upon the available evidence, there is no indication that meteorological conditions or fuel sufficiency or fuel quality played any part in the loss of

[52] Exhibit B1, p18
[53] This list is not exhaustive but is based on matters considered or raised by investigators in relation to VH-PAE.

VH-PAE. Both the ATSB and QPS investigators concluded that there was no significant weather event apparent that could have contributed to the cause of the accident.[54] Historical data sourced from the Bureau of Meteorology confirmed the observations of Ms Severino and Mr Murphy as to the favourable weather conditions on the morning of 5 June 2019.

61. The ATSB report notes that: "*A review of the weight and balance found that the aircraft was within centre of gravity limits at the time of take-off*" on 5 June 2019.[55] Accordingly, the aircraft was being operated within its weight and CG limits. As the aircraft was within the limits specified for aerobatic flight, no weight or loading issue can be shown to have affected the performance of the aircraft on that day.

62. The evidence obtained by QPS from Mr Steven Rance, Aerodrome Manager at the Club, confirmed that careful daily fuel quality checks were undertaken, and results recorded. The test of fuel obtained from the same on-site fuel storage that was used for VH-PAE showed no visible contaminants such as foreign substances or water. The Club's records showed that 75.22 L of AVGAS passed through the bowser into VH-PAE at 9:32 hours on 5 June 2019.[56] A member of the Club, Mr Gary Klein, gave evidence that the YAK 52 had a fuel capacity of 120 litres with a fuel exhaustion time of about two hours.[57] Insufficient or tainted fuel can be excluded as factors in considering possible causes of the accident.

63. No underlying medical issues of significance affecting the pilot have been raised in any of the investigations or in the evidence collected to date. The ATSB reviewed the pilot's aviation medical records. Within those records is a record of an audiogram for Mr Van Hattem produced by Dr Douglas Tong showing that Mr Van Hattem had a mild sensory neural hearing loss (of 6000 – 8000 hz). The ATSB did not consider that the medical records of Mr Van Hattem had any significance or provided any indication that a medical event contributed to the accident.[58] No other evidence suggests that Mr Van Hattem had any mental health issue that may have affected his flying. He was fit to fly on 5 June 2019.

64. In relation to the balance of the specific factors noted above, a significant difficulty in fully considering each of those factors is the limited recovery of aircraft wreckage. The aircraft was not fitted, and not required to be

[54] Exhibit C1, p 7; Exhibit B1, pp 41-42.
[55] Exhibit C1, p4; see also Exhibit B1-58.
[56] Exhibit C1, p 7; Exhibit B1, pp 32-33; Exhibit B1.49- Exhibit B1.50.
[57] Transcript 14/12/2022, p 1-26. Mr Klein said it would be "*very difficult*" to get a Yak 52 to fly at 60 litres an hour, unless the pilot was "*fairly careful with the throttle settings*" and if performing aerobatic manoeuvres, "*you can burn 80 - 80 litres an hour*".
[58] Exhibit C1, p 3. Information informally obtained from CASA 's Avmed Branch relating to any implications of Mr Van Hattem's recorded hearing loss similarly indicates that there should have been no medically indicated effect of the mild hearing loss on the pilot's ability to operate the aircraft or hear any in-flight alarms or alerts.

fitted, with a flight data recorder (or cabin voice recorder) by which flight information (and in-cabin communications) are recorded in a device (known, colloquially, as a "*black box*").[59] The QPS report notes that minimal wreckage was recovered with the damaged tail section as the largest and most identifiable pieces of wreckage.[60]

Issue II. Airworthiness and Maintenance

65. The ATSB report provides some general information about YAK 52 aircraft as an all-metal, two-seat, tandem, single-engine, low-wing monoplane. It was designed by the Yakovlev Design Bureau in Russia as a basic aerobatic training aircraft and manufactured in Romania by Aerostar S.A. The type first flew in 1978 and about 1,900 were built. Production ceased in 2010. The aircraft type never received civil or military type certification.

66. VH-PAE was manufactured in 1982. In about 2004, the aircraft was disassembled in Russia and brought to Australia but was not registered as a VH- aircraft with CASA until 5 April 2017.[61]

67. The available evidence shows the following history of maintenance of the aircraft:

    - In 2017, the then owner of VH-PAE, Mr Matthew Coughlin, made an application to the AWAL for the issue of a Special Certificate of Airworthiness (**SCA**) for the aircraft. At that time, the aircraft had an overhauled propeller with 327 hours since new.
    - The SCA was issued on 19 September 2017 by an Appointed Person of AWAL, aircraft designer and maintenance engineer, Mr Philip Goard.[62] As part of that airworthiness procedure, Mr Goard completed a number of checklists for VH-PAE. In one of those checks the engine was inspected in accordance with an Airworthiness Directive, AD/ENG/4 Amdt 11.[63] Nil defects were recorded. [64]

[59] The function of a "*black box*" device is to record in-flight data with a specific algorithm which, in case of an accident, will enable accident investigators to access that information upon retrieval of the "*black box*".
[60] Exhibit B1, p 26.
[61] Exhibit C1, p 4.
[62] Affidavit of Pring-Shambler, pars [13]-[17], Exhibit F16.
[63] This included a cylinder leak check in accordance with applicable maintenance data, inspection of the engine oil pressure filter and oil pressure screen for evidence of metallic particles and engine oil replacement.
[64] Exhibit F10.

- A fresh Maintenance Release[65] was issued on 20 September 2017 which was due to time expire on 20 September 2018.
- The owner of the aircraft was required to maintain the aircraft in accordance with a Maintenance Schedule applicable to his YAK 52 aircraft, approved by AWAL on 8 November 2017.
- AWAL arranged for the aircraft to undergo a permit index (**PI**) assessment in accordance with procedures based on a CASA advisory circular, *Limited category aircraft – permit index*[66]. As AWAL did not consider that an "*airframe life*" applied to YAK 52 aircraft, VH-PAE was assigned a PI number of '0' which permitted the aircraft to be flown over populous areas.[67]
- After Mr Van Hattem purchased VH-PAE, he instructed Nigel Arnot, Chief Engineer of Ultimate Aero Maintenance Pty Ltd to give the engine a "*Top Overhaul*" which involved removing and restoring the nine engine cylinders. Mr Arnot gave evidence that the cylinders were sent to an approved workshop in Hungary and came back "*virtually brand new*".[68] This may be viewed as "*preventive maintenance*" which for some reason or another Mr Van Hattem thought was necessary.[69] Mr Arnot considered that the aircraft was "*a different aeroplane after the top overhaul*".
- The last maintenance release for the aircraft was issued on 1 November 2018 by Luskintyre Aircraft Restoration at Boonah with Mr Arnot signing and certifying for the completion of maintenance later undertaken, including an oil change and filter inspection on 22 March 2019 when the aircraft TTIS had reached 1153 hours.

68. The ATSB report notes: "*A significant amount of the aircraft structure and systems were* (*sic*) *not recovered*".[70] It appears that no significant part of the aircraft's Vedeneyev M14P nine-cylinder, radial engine[71] was

[65] A maintenance release is a document issued by an aircraft engineer in accordance with the aviation regulations that shows that an aircraft has had the required maintenance carried out at a particular time and provides details of any defects that may require rectification before the aircraft may be flown and any further maintenance that may become due during the life of the maintenance release: see *Civil Aviation Advisory Publication* CAAP 43-01 v 2.0 (August 2017).
[66] CASA Advisory Circular, AC 21-25 v 5.0, January 2017.
[67] Some aspects of the PI assessment system are considered in relation to Issue IV below.
[68] Exhibit B1, p 18; Transcript 15/12/2022, p 2-10 – 2-11.
[69] It would be extremely rare for all of the cylinders in an aircraft engine to simultaneously fail in such a way as to require replacement of all of them.
[70] Exhibit C1, p 12.
[71] Exhibit C1, p 4; Exhibit B1, p 18 (statement of aircraft engineer, Nigel Arnot); see also Airworthiness Approval Note as to the radial engine type fitted: Annexure "PPS-7" to the affidavit of Peter Pring-Shambler, Exhibit F16.

recovered.[72] This means that no examination has been able to be undertaken of the engine's intake system, including the carburettor, mechanical fuel pump, oil pump, magnetos and other components of the engine.

(a) Engine failure

69. Photos of the hangar floor at the Club where Mr Van Hattem kept VH-PAE were produced in evidence. These photos indicate that Mr Van Hattem kept basic tools and items in the hangar that may be used in performing pilot maintenance of an aircraft and show a quantity of oil on the hangar floor and in a container. Mr Arnot gave evidence that this was not unusual and that he did not consider that the photos indicated that the aircraft had an oil leak problem as at 5 June 2019.[73]

70. Although there is no evidence to suggest that there was any deficiency in the engine maintenance of VH-PAE or any inattentiveness in adopting appropriate maintenance procedures by Mr Van Hattem or by any maintenance organisation involved in performing engine maintenance to maintain the continued airworthiness of the aircraft, the possibility that the aircraft suffered a sudden, unexpected, full or partial, engine failure that caused or contributed to the crash, cannot be entirely dismissed.

71. The best that can be said is that the witnesses who observed the aircraft on the day did not hear or see anything about the performance of the aircraft that would indicate that the aircraft was malfunctioning in any way. The ATSB has acknowledged that, due to the limited evidence available at the time of the accident, its investigators were "*unable to consider a number of potential factors that could explain why the aircraft collided with the water*", including, amongst other things, "*an engine failure*".[74] No steps were taken to recover the engine from the sea.

(b) Structural failure

72. The ATSB was able to recover a significant part of the tail section of the aircraft consisting of the rear fuselage and inboard sections of the vertical and horizontal stabilisers.[75]

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[72] An incident report produced by Surf Lifesaving Queensland suggests that the engine, or wreckage that included the engine, was sighted or "*located*" during the SAR operation on the morning of 6 June 2019: Exhibit B1:35, p 4. There is no further reference to this in any of the investigation reports or other evidence.
[73] Transcript 15/12/2022, pp 2-09/2-10. Mr Arnot indicated that oil change intervals were set at 25 hours for the radial engine of the aircraft. Transcript 15/12/2022, p 2-35.
[74] Exhibit C1, p 20
[75] Exhibit C1, p 10. Aircraft stabilisers provide stability for the aircraft, to keep it flying straight. The vertical stabiliser keeps the nose of the plane from yawing from side to side. The

73. Mounted inside the vertical stabiliser, there is a bellcrank assembly that provides structural support for, as well as actuation of, the elevators. The ATSB found some small cracks on either side of the bellcrank. The smaller cracks on the left side of the bellcrank were determined by ATSB experts to be fatigue cracks, likely to have been present before the crash. The cracks on the right side were viewed as being caused by the load forces occasioned by the crash.

74. Although the ATSB investigators found that the tail section of the aircraft was attached to the rear cockpit by the flight control cables, there is no mention of whether the pilot's control cables were found to be intact or whether there was anything that may have impeded the pilot from properly adjusting the elevators. However, it was observed, without further detail, that *"(t)he centre hinge for the elevator was bent inboard*".[76] The investigation of the recovered tail section appears to have quickly focussed on the provenance of the two small cracks found on either side of the elevator bellcrank.

75. The ATSB noted that a UK Civil Aviation Authority (**CAA**) Mandatory Permit Directive (**MPD**) had been introduced in July 2000 for YAK 52 aircraft in the UK, requiring a specific dye penetrant inspection of the elevator actuation pulley at various intervals.[77] That MPD is included in the AWAL Maintenance Schedule for YAK 52 aircraft (including VH-PAE).[78] The relevant inspection was carried out on VH-PAE on 31 October 2018 as one of the maintenance tasks required for the issue of the 1 November 2018 Maintenance Release for VH-PAE. The aircraft was flown for about 35 hours from then to the date of the accident.[79]

76. The ATSB also noted that a YAK 52 aircraft conducting aerobatics in Russia in September 2010, had experienced a bellcrank failure that resulted in a loss of control of the aircraft and a fatal injury to the pilot.[80] The failure of the bellcrank was largely due to high operational cyclic stresses that resulted in a fatigue failure of the part.

77. The ATSB noted that the Russian designer of the YAK 52 aircraft, Yakovlev, as part of its maintenance program for YAK 52 aircraft, had made it an express requirement that the elevator bellcrank be inspected at 25 hour intervals using dye penetrant inspection methods. If cracks are detected, the bellcrank must be replaced.[81] These requirements were

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horizontal stabilisers prevent an up-and-down, or pitching, motion of the nose of the plane. The moving section at the rear of the horizontal stabilisers is an elevator that is attached to the fixed sections by hinges. When the right elevator goes up, the left elevator also goes up to control the pitching motion of the aircraft and the angle of attack of the wing.

[76] Exhibit C1, p 11.

[77] Exhibit 2.1.1.

[78] Affidavit of Pring-Shambler, Exhibit F16, Annexure "PPS-4A", p 13.

[79] Exhibit C1, p 14.

[80] Exhibit C1, p13.

[81] Exhibit C1, p 15. It is understood that the elevator control on a YAK 52 consists of a pushrod to connect the fore and aft control columns together. A bellcrank assembly transfers

reinforced by Yakovlev after the 2010 YAK 52 accident in Russia. The ATSB further noted that AWAL was not aware of changes made by Yakovlev to its maintenance program and had not incorporated them into the Australian maintenance schedule for YAK 52 aircraft.

78. The evidence of Mr Arnot is that all necessary inspections and checks of VH-PAE were conducted on 31 October 2018 and lead to the issue of the last maintenance release for the aircraft on 1 November 2018. No fatigue cracks in the bellcrank of the aircraft were detected on this occasion.

79. Mr Arnot, having read the ATSB report, does not consider that the small fatigue cracks discovered in the post-crash analysis of the tail section of VH-PAE are likely to have contributed to the accident. If the bellcrank had a pre-existing crack "*it would not cause VH-PAE a loss of control input and cause the aeroplane to crash*".[82] This is the view of the ATSB as well; although ATSB noted that had subsequent inspections of the aircraft not identified the cracks, they would eventually have "*progressed to failure and almost certainly resulted in a loss of control*" of the aircraft.[83]

80. As with the question of possible engine failure, due to the limited wreckage recovered, it is difficult to assert definitively that no structural failure of the aircraft in the last moments of flight contributed to the crash. However, on the evidence to hand – especially the expert opinions of the ATSB and Mr Arnot regarding the implications of the nascent fatigue cracks found in the bellcrank of the aircraft – I agree with Counsel Assisting's submission that it is open to conclude that a contributing structural failure is unlikely to have occurred**.**

81. Similarly, with no evidence presented by witnesses who observed VH-PAE of localized bird-movement activity posing a potential threat to air operations and no evidence from investigators that pilots undertaking air activities (including aerobatics) in the South Stradbroke area have encountered bird-strike airspace safety problems, I agree that the likelihood of a bird threat affecting Mr Van Hattem's flying activities on the day can be largely dismissed.[84]

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the means of control from pushrod to cables which run aft to a quadrant mounted inside the rear fuselage. It is not at all clear from the ATSB report that the Yakalov maintenance program requiring dye penetrant inspections of the elevator bellcrank is reflected in the "*compliance*" requirements of MPD:2000-004 concerning such inspections of the elevator actuation pulley, as picked up, in terms, in the AWAL Maintenance Schedule for YAK 52 aircraft. It is also noted that the NZ CAA issued an AD specifically concerning the Elevator Control System Pulleys of YAK 52s: Exhibit B 1.45, pp 4-5.

[82] Exhibit B1, p 24.

[83] Exhibit C1, p 21.

[84] The ATSB collects statistics on aircraft birdstrike activity across Australia. It notes that the majority of birdstrikes occur within the "*confines*" of an aerodrome, namely, on or within 5 km of an aerodrome. Its research report on *Australian Aviation Wildlife Strike Statistics 2008 – 2017* does not identify any location on or near Stradbroke Island as an area of reported bird strike activity: see *ATSB Transport Safety Report, AR-2018-035, Final – 13 March 2019* https://www.atsb.gov.au/publications/2018/ar-2018-035.

(c) Loose articles

82. In its report, the ATSB refers to the possibility of loose articles interfering with the flight controls. It is one of the many "*potential factors*" that the ATSB was "*unable to consider*".[85]

83. Various overseas aircraft accident investigations of events, not noted by the ATSB, concerning loose articles in YAK 52 aircraft show that such articles can have catastrophic consequences.

84. One event is referred to in another MPD of the UK CAA, MPD:2004-006.[86] The investigation into a fatal crash of a YAK 52 in England in 2003 found that the primary cause of the accident was a loose article, being a screwdriver, that jammed the aft elevator quadrant and prevented the elevator from being moved by the pilot.[87]

85. The UK CAA subsequently issued a MPD to require installation of barriers (known as foreign object debris – **FOD** – barriers) in the rear fuselage of YAK 52 aircraft to close off the aft elevator quadrant from the cockpit area and prevent loose articles slipping to the rear of the aircraft. This MPD is not included in the AWAL Maintenance Manual for YAK 52 aircraft in Australia. VH-PAE did not have a FOD barrier.

86. In another, almost identical, situation in New Zealand in 2012, a fatal accident occurred as a result of a screwdriver restricting elevator control after a YAK 52 aircraft performed a slow aerobatic roll. According to the NZ CAA, the "*restriction did not allow sufficient nose-up elevator authority and the pilot was unable to recover from a steep dive*".[88] The NZ CAA accident investigators determined that the screw driver had entered the tail section via the aperture in the top of the rear fuselage: "*In order for that to have occurred, the aircraft needed to have been subjected to negative G or inverted flight, coupled with an elevator down input by the pilot*". The NZ CAA's accident investigation report refers to no less than 9 similar FOD related accidents and incidents involving Yak 52 aircraft, including the UK accident in November 2003. The NZ CAA makes the point that normal servicing, refuelling and the checking of the engine oil

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[85] Exhibit C1, p 20.
[86] Contained within Exhibit E 2.1.1.
[87] On 10 November 2003, two pilots were performing aerobatic manoeuvres in a YAK 52 aircraft in country areas of Oxfordshire. The weather in the area was fine with no cloud. After flying a sequence of manoeuvres lasting approximately 10 minutes the aircraft was seen to enter a vertical climb and execute a stall turn. The aircraft completed the manoeuvre and began a vertical descent, from which there was no apparent sign of recovery. It impacted the ground directly beneath power lines killing both occupants. See *Accident to Yak 52, G-YAKW, Two Miles NE of Towcester on 5 January 2003* http://publicapps.caa.co.uk/docs/33/factor200337.pdf.
[88] Aircraft Accident Report Occurrence Number 12/218 Aerostar YAK 52TW - ZK-YTW Elevator Control Restriction Timona Park, Feilding, 23 January 2012 https://www.aviation.govt.nz/assets/publications/fatal-accident-reports/ZK-YTW_Fatal_23_Jan_12.pdf . This aircraft was a tail wheel version of the YAK 52.

during pre-flight is facilitated by opening "*quick release*" access panels on the YAK 52 aircraft: "*Pilots often use a flat bladed stubby screwdriver, a multi tool or a Swiss Army type pocket-knife to accomplish the task".*

87. The report of the NZ CAA refers to another event in 2002 in California, when a Yak 52 was destroyed when it struck terrain in a near vertical attitude following a loss of control after a loop. The NTSB discovered a screwdriver in the tail section and determined that it had jammed in the elevator bellcrank in a similar fashion to that which occurred in the 2012 NZ accident. In another, non-fatal, incident in 2004 at Essex in the UK, the pilot of a Yak 52 completed a stall turn but felt a control restriction that gave the aircraft limited nose-up capability. The pilot managed to recover the situation, land the aircraft and found that a cell phone left in the aircraft two months earlier had penetrated a defective safety barrier and lodged in the elevator quadrant.

88. Evidence before the Court includes reference to an incident, involving Mr Van Hattem, when he joined the circuit at Boonah Airfield inverted at a height estimated by a witness to be about 1300 feet.[89] On this occasion, the pilot dropped his mobile phone while inverted and it went down to the back of the aircraft. Mr Van Hattem, with a female passenger on board, landed his aircraft without incident and a maintenance engineer employed by Mr Arnot, Liam Grubb, retrieved the phone from the rear of the aircraft.[90]

89. Mr Arnot did not personally see the incident but observed that Mr Van Hattem was quite "*jovial*" about it. Apart from asking Mr Van Hattem not to do that "*here*" again he didn't "*discuss anything else really with him*" about his inappropriate flying or the need to secure loose objects.[91]

90. Mr Arnot considered that a loose object such as an unsecured phone or other item could reach the elevator quadrant of a YAK 52 in the course of aerobatic flight. However, it would take particular and repeated manoeuvres to enable that to happen. The item would have to pass over six "*ribs*" in the body of the aircraft before reaching the tailplane where it would need to "*sit up in the tailplane itself*" before becoming jammed in the push rod attached to the elevator to prevent "*the elevator bellcrank moving backwards and forwards*". Mr Arnot thought it more likely that a tool, such as a spanner, rather than a camera/phone, would be able to move back far enough into the tail plane to cause a problem. Nonetheless, his own practice in carrying a passenger with a mobile phone on aerobatic

[89] Exhibit C1, p 4. The ATSB refers to this incident as having occurred "*about a week prior to the accident*"; however, the last entry in Mr Van Hattem's pilot log book for travel to Boonah is recorded for 24 April 2019.
[90] Exhibit B1, pp 24-25.
[91] Transcript 15/12/2022, p 2-42.

flights is to have the passenger attach the phone to their wrist: "*it's got to have some form of attachment to them*". [92]

91. The NZ CAA carried out various tests to try and reproduce the accident flight situation that occurred in 2012. The following appears in their accident report (at 1.16.6-1.16.7):

> *On the majority of occasions, the screwdriver missed the aperture* (in the top of the rear fuselage) *altogether. It was also observed that the screwdriver would on many occasions, remain wedged between the rearmost stringers and not move at all. The only time the screwdriver had opportunity to pass through the aperture was when the elevator was commanded to an elevator down position. When this occurred the elevator control quadrant assembly was at a lower position which opened up the aperture and therefore allowed sufficient clearance for the screwdriver to enter the elevator control mechanism.*

92. Many aerobatic manoeuvres involve the pilot pushing the elevators down, so that lift is increased on the tail, pushing it up and bringing the aircraft's nose down. [93] It is plainly not beyond the realm of possibility that if a loose object was on board VH-PAE which, following a series of loops or other aerobatic manoeuvres, jammed in the elevator quadrant, that may have caused the aircraft to depart from controlled flight from which the pilot could not recover.

93. It is of potential relevance to observe from the videos taken by Mr Wilson that at the time of assisting Ms Applebee to take her seat in the aircraft, Mr Van Hattem removed a board or item of similar description from behind the passenger seat. He handed it to Mr Wilson to place away from the aircraft. In giving evidence, Mr Wilson could not recall what the item was. What purpose it was intended to serve by Mr Van Hattem is not known. No investigation has been able to assess whether initial placement of the object, or its removal, by Mr Van Hattem required him to use any tool or pocket-knife to accomplish the task.

94. Although the ATSB was unable to consider whether loose articles interfered with the flight controls on VH-PAE, given the history of accidents caused by loose or foreign objects restricting elevator control on YAK 52 aircraft following a slow roll or other aerobatic manoeuvres, with serious consequences for a pilot unable to then recover from a steep dive, I agree it is not an issue that can be ignored.

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[92] Transcript 15/12/2022, pp 2-39 – 2-41.

[93] From the photo of the damaged tail section of the aircraft in Fig 5 of the ATSB report, it appears that the right horizontal stabiliser is deflected down which would suggest that the elevators mounted on the trailing edges of each of the stabilisers were also down at the time VH-PAE impacted the water: Exhibit C1, p 12.

Issue III. Pilot training and proficiency

95. At the time of the accident, Mr Van Hattem held two flight crew licences; one, a private pilot licence (**PPL**) and the other a recreational pilot licence, initially a pilot certificate issued by Recreational Aviation Australia (**RA Aus**) in February 1999. In 16 years (1999-2015), he had accumulated a total of 413.3 flying hours under his RA Aus pilot certificate. In 5 years, from 4 July 2014 to the last recorded flight in his log book on 31 May 2019, he had accumulated 412.4 hours as a PPL holder. By the time of the accident, he had logged only 39.4 hours flying VH-PAE.[94] On any view, he had limited experience of flying a YAK 52 aircraft.

96. Mr Van Hattem obtained a Manual Propeller Pitch Control endorsement and a Retractable Undercarriage endorsement on 22 May 2018 at Boonah Airfield, Dugandan (**Boonah**). Mr Van Hattem's log book shows his first flight in VH-PAE on this day. He flew for 1.5 hours as pilot in command. He then purchased VH-PAE which was registered to him on 5 July 2018.[95] His pilot log book records that his next flight in VH-PAE was on 19 October 2018 from Boonah and return for 0.9 hours. The absence of recorded flights for the period from July to late October 2018 is consistent with (and largely explained by) the evidence of Mr Arnot who was attending to the top overhaul of the aircraft at about this time. On 2 November 2018, Mr Van Hattem flew VH-PAE to Southport for, according to his log book, the first time in that aircraft.

97. Mr Van Hattem flew VH-PAE another 12 times in November and December 2018. The ATSB report notes an incident in November 2018 where Mr Van Hattem was observed to be conducting low-level aerobatic manoeuvres in VH-PAE at about 500 feet over a residential area near Southport Airport.[96] Mr Van Hattem was given a verbal warning by the Club.

98. Mr Rance the Aerodrome Manager at Southport recalled this incident and gave evidence as follows:[97]

> *Okay. And so, you say that now rings a bell, that there was an issue - - -? ---I think*
>
> *- I believe it was over Helensvale, which is to the west of us, and I believe he was doing aerobatics over the - over that area, that triggered a report.*
>
> *I see? ---Yeah.*
>
> *So is that a populous area, over Helensvale? ---Yes.*

[94] Exhibit C1, p 3.
[95] Exhibit C1, p 4.
[96] Exhibit C1, p 4.
[97] Transcript, 14/12/2022, p 1-11.

Okay? ---Yes.

And he was, what, low flying when he was doing the aerobatics? ---I don't know. I just remember he was doing aerobatics and the club was involved in that.

Was he not meant to be doing aerobatics in that particular area, or - - - ? ---To - I - I don't know, as I'm not a pilot - - -

All right? --- - - - but doing aerobatics over built-up areas tends to freak the neighbours out. Yeah.

99. Mr Klein, a former Committee member of the Club, confirmed that, at that time, if a concern was raised about a pilot's flying behaviour in conducting low level aerobatics contrary to his authorisation, unless the behaviour concerned a take-off or landing or a noise issue, the Committee would "*leave it alone*". It would not be reported to CASA. The only area where the Committee would get involved was "*when there was noise, or local complaints, in the - in - within our zone, so within three miles of our airport*."[98]

100. As at November 2018, Mr Van Hattem had no aerobatic endorsement. It is clear from Mr Klein's and Mr Rance's evidence that the Club was only concerned about compliance with its "*flying neighbourly policy*" not with the fact that Mr Van Hattem had no authorisation to fly aerobatic manoeuvres lawfully.[99] In any event, the Club did not keep a record of the endorsements or other authorisations of its pilot members, beyond the PPL required to be held by a flying member of the Club.[100]

101. It was during this time, it seems, that an acquaintance of Mr Van Hattem, Doug Field, spoke with him about getting an aerobatic endorsement. Mr Field had known Mr Van Hattem for a few years before he acquired VH-PAE. Mr Field's father and Mr Van Hattem had become friends and Mr Van Hattem had visited the family property at Mt Archer many times.[101]

102. The Field family property had a private airfield known as Archer Falls, located between Woodford and Kilcoy. Mr Field said that Mr Van Hattem had flown the YAK to the Archer Falls property before and although it is not a particularly easy airfield to land at "*he was quite proficient at already operating the aeroplane*"[102]. Mr Field said that Mr Van Hattem had told him that he had done some aerobatics with another pilot. Mr Field said

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[98] Transcript, 14/12/2022, p 1-57.

[99] However, the ATSB notes that the Club's policy is also expressed to be aimed at ensuring that members do not commit "*breaches of CASA regulations*", or engage in "*poor Airmanship and recklessness*": Exhibit C1, p 4 fn 4.

[100] Transcript, 14/12/2022, p 1-58.

[101] Ibid, p 1-66; p 1-67.

[102] Ibid, p 1-67. It may be noted that there is nothing in Mr Van Hattem's pilot log book indicating that he had ever flown to Archer Falls in VH-PAE. Records produced by RA Aus show that he had flown his kit-build aircraft, Kiebitz BQ 19-5417, to Archer Falls on 5 October 2013: Exhibit D1.

that he did not know who that pilot was. As Mr Field was the Chief Flying Instructor and owner of Stick n' Rudder[103] at Caboolture, as well as a friend, he encouraged Mr Van Hattem to do aerobatic training with him.

103. On 17 January 2019, Mr Van Hattem was assessed for, and subsequently provided with, flight activity endorsements for aerobatics and spinning. His check training and endorsement was conducted by Mr Field. These endorsements qualified Mr Van Hattem to perform basic aerobatics and intentional spin manoeuvres at an altitude of greater than 3000 feet AGL.

104. Mr Field gave evidence that the in-air training and demonstrations on the day that Mr Van Hattem came to Watts Bridge were undertaken from a height sufficient to enable recovery before reaching the "*hard deck*" of 3000 feet. He acknowledged that, without recent experience of undertaking aerobatics in a YAK aircraft, he adopted a "*conservative*" approach.

105. His evidence proceeded as follows[104]:

> *Q……*
>
> *And on the day of training, and which I like to do on the majority of occasions, is to be well above that hard deck. So we would've - everything would've been recovered by 3500-feet AGL at a - at a minimum. So we would've been up - you know, if we're spinning, you know, we could've been up around 7000 feet on the entry to some of those manoeuvres, potentially.*
>
> Well, to commence the manoeuvres at 7000 feet? ---
>
> *That - that - that could've been possible, yeah. Because we're going to - if we're going to do a fully developed spin, we're probably going to lose, you know, two, 3000 feet in that manoeuvre. So, you know, what's that, three and a-half, you know, another - yeah. So seven and a-half thousand feet, potentially. Yep.*
>
> Was the fact that you hadn't had recent experience in the Yak something that you factored into the height at which you wanted to commence these manoeuvres, in other words, to give yourself a bit of a safety buffer, given the aircraft was not one that you'd been flying recently? ---
>
> *Yeah, absolutely. You know, I wouldn't have - be - because I do have a, you know - a low level - a low level rating and a low level training approval, I could, you know, carry out the training lower but, you know, I do remember being - being conservative with the aircraft, to - to definitely give myself more time, knowing that, you*

[103] Stick n' Rudder is the trading name for Aviation One Pty Ltd a flight training organisation accredited to provide training for both RA-Aus and CASA certificates and licences: Transcript, 14/12/2002, p 1-62. Mr Field said that he had not been teaching any aerobatics out of the Stick 'n Rudder flying school for the past 2 years.
[104] Transcript, 14/12/2022, pp 1-72 – 1-73.

know, I was away (aware) *that the aircraft was heavy, and it had more inertia with the bigger engine, that it - that I might need a bit more time to recover from a spin. Yep.*

106. Mr Van Hattem's pilot log book and the maintenance release for the aircraft show that 2.0 flight hours were logged for 17 January 2019. This was entered in the Route/Remarks section of his log book as YSPT – YWSG – YSPT, indicating that Mr Van Hattem had flown from Southport Airport to Watts Bridge Airport and back to Southport that day. No further entry for the endorsement training appears in Mr Van Hattem's log book.

107. In contrast, Mr Field recorded in his pilot log book three separate entries for flying as pilot in command with Mr Van Hattem on 17 January 2019 with circuits starting and finishing at Watts Bridge.[105] In the training records for the different aerobatic manoeuvres outlined, Mr Field recorded entries of 0.7 hours, 0.6 hrs and 0.7 hours alongside instructor comments referring to the activities undertaken; a total of 2 hours for the whole of the endorsement.

108. In giving oral evidence, Mr Field considered that Mr Van Hattem would have taken about 20 minutes to fly from Southport to Watts Bridge each way.[106] Accepting Mr Field's estimate of a minimum flight time of 40 minutes for Mr Van Hattem to cover the return route, that leaves around 1 hour 20 minutes of actual flight time for the aerobic and spinning endorsements to be conducted as "*dual*" instruction with Mr Field.

109. Mr Field's explanation for the discrepancy between the log book and maintenance time recorded by Mr Van Hattem and the time that he (Mr Field) had recorded in both his log book and the training records as the time for conducting the aerobatic and spin endorsement was that there is a difference between air time recorded for the purpose of a maintenance release (from wheels off to wheels on) and log book time that can include an allowance for "*taxiing component and so forth*".[107]

110. Mr Field accepted that the time recorded on the maintenance release as "*air switch*" time is "*the most accurate source*". He added: "*And then from there I've recorded the time off my watch from when we've started and stopped, and he's recorded the time off the maintenance release direct into his logbook*". In Mr Field's view, there is "*usually*" a variation between pilot logbook time and maintenance time of 20 or 30 per cent so it's "*not unusual for…. the logbook time to be more than the air switch time*".[108]

111. The implication of this is that Mr Field used a "*block*" of time method for making entries in both the training records for Mr Van Hattem and in his

[105] Exhibit E 4.
[106] Transcript 14/12/2022, p 1-82.
[107] Ibid.
[108] Transcript 14/12/2022, p 1-84.

own log book. Anyone reviewing the training records maintained by Mr Field would need to be aware that a training record entry of 0.7, may need to be interpreted as a take-off to landing flight of 30 minutes, with taxiing and/or any pre-flight, on board, briefing, taking a further 12 minutes (i.e. 0.5 + 0.2). Similarly, a training record of 0.6 would suggest a wheels off to wheels on flight of about 25 minutes, with the further period recorded, of about 10 or 11 minutes, being spent on the ground with the engine running.

112. On this basis, the time taken for the actual training and testing of Mr Van Hattem for his spin and aerobatic endorsements by Mr Field, on Mr Field's own explanation, cannot have been more than 1 hour 25 minutes in the air with some 35 minutes of taxiing and/or on-ground briefing. Mr Field did not travel with Mr Van Hattem from Southport to Watts Bridge and return, which on his own estimate would have taken some 40 minutes. If Mr Van Hattem had only taken into account an air switch time measured from wheels-off to wheels-on when he flew from Southport to Watts Bridge and return on the day of his endorsement, it is to be inferred, on the basis of Mr Field's evidence, that that total time recorded by Mr Van Hattem included three separate take-offs and landings at Watts Bridge.

113. Mr Field's explanation for the differences in the way that he and Mr Van Hattem have made entries in their respective log books may have some level of plausibility. However, Mr Field was not at all sure that his estimate of Mr Van Hattem's flight time from Southport to Watts Bridge was accurate. He also accepted that in recording the flight activity endorsements in Mr Van Hattem's pilot log book with the date of issue on "*19-01-19*", he made an "*administrative error*" with the date.[109]. Moreover, he gave the following evidence:

> *You know, as far as -as far as I can remember he came to Archer Falls and then we flew to Watts Bridge to do - to do more training because quite often I'd do my aerobatics training at Watts Bridge as there was just - there's an aerobatics box there and just - it's a safe environment to do the training in.*[110]

114. There is no entry in either Mr Field's log book or Mr Van Hattem's log book to provide any record of Mr Van Hattem flying alone or with Mr Field to Archer Falls on any day. The following evidence of Mr Field indicates that Mr Field has, at best, a poor recollection of the details:

> Does that mean that your time might be inaccurate, then, in your logbook? *---It's possible, yeah. Like I might have made an administrative error potentially.*

[109] Exhibit B-1, p 35; Transcript, 14/12/2022, p 1-106.
[110] Transcript, 14/12/2022, p 1-77.

All right. And in terms of the document that we've been looking at, the spreadsheet, is it - is it possible then that, you know - it's E3, exhibit E3. Is it possible then that the times you've got here are also not strictly accurate? *---Anything's possible. There's - yeah*.

But is there any other explanation other than either Mr Van Hattem's made a mistake or you might have made a mistake? *---Either/or is possible really, yep.*

115. Ultimately, the best that Mr Field could say was that the extensive number of aerobatic activities recorded as having been undertaken by him with Mr Van Hattem would generally be a lot for someone to do in two hours if the person wasn't already proficient at aerobatics. However, as the endorsement is "*a competency-based system*" and as Mr Van Hattem "*was already proficient at performing those aerobatic manoeuvres*", Mr Field considered he did not require more time than was taken on the day: "*he was already proficient at carrying out the manoeuvres, so he was able to handle a significant amount in a short period of time*".[111]

116. According to Mr Klein, he set out to show Mr Van Hattem some "*nuances*" of aerobatic manoeuvres. They flew together on about 6 occasions using each other's YAK 52 aircraft.[112] They did spins together "*out west*" at a starting height of "*something between five and a-half and seven and a half*" thousand feet[113].

117. It is plain that Mr Klein undertook some informal aerobatics training with Mr Van Hattem in late 2018 without making any real inquiry as to whether Mr Van Hattem was lawfully endorsed to conduct aerobatic and spinning manoeuvres.[114] It is also obvious that Mr Field took no step to ascertain the qualifications or proficiency of the person who he understood had already provided Mr Van Hattem with some aerobatic training.

118. Mr Field acknowledged that as at 17 January 2019, he had not previously instructed anyone in a YAK 52 for an aerobatic or spinning endorsement. As at that time, he had about 1 hour of piloting a YAK 52 aircraft although he had previously accompanied an aerobatic pilot in a YAK 52 on a few occasions. Mr Field gave the following evidence:

And how long did you spend on inverted spins with Mr Van Hattem? *---I couldn't tell you off the top of my head.*

Had you ever done an inverted spin in a YAK 52 before that day? *---No. Not that I'm aware of, no.*

Had - - -?*---But I performed inverted spins and many other aerobatic types before though.*

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[111] Transcript, 14/12/2022, p 1 – 95.
[112] Transcript 14/12/2022, p 1-25.
[113] Ibid, p 1-28.
[114] Ibid, p 1-28. Mr Klein said "*I didn't really discuss what he had, endorsements or training*."

> Had Mr Van Hattem done one before? ---*Not that I - not that I'm aware of.*
>
> So you would have had to show him how to do it? ---*Likely, yes.*
>
> And having done the inverted spin you would have had to climb back up again and let him do one? ---*That's correct, yep.*
>
> So that would take how long? ---*Five to ten minutes. I'm just guessing. Yep*.[115]

119. Mr Field had no clear recollection of how long each activity undertaken by or demonstrated to Mr Van Hattem had taken. He had no recollection of whether VH-PAE was refuelled at either Watts Bridge or Archer Falls during the course of the endorsement.[116] In the training record there are no less than 30 activities listed for the GA spin endorsement and some 55 activities listed for the aerobatics endorsement. All are certified in the training record for Mr Van Hattem as having being "*demonstrated/instructed*" on 17 January 2019 and Mr Field has noted in the Instructor Comments column: "*It is evident that student has previous experience conducting aerobatic manoeuvres as he is able to demonstrate all manoeuvres safely (loop, aileron roll, stall turn) within aircraft limits. He is able to recover from an upright stable spinning both Beggs-Mueller (sic) and also PARE methods*".[117]

120. In responding to questions as to the extent to which each activity was demonstrated and/or carried out by Mr Van Hattem, Mr Field said this[118]:

> And is it also the case, then, that if you didn't demonstrate, you also didn't instruct Mr Van Hattem how to do it? Or would you still have instructed him how to do every single element? ---*I would have - would've gone through every element, for sure, from - from - from what I can remember, and I would've instructed and critiqued each of the elements, multiple times. And I remember when we did it, we did - we did the manoeuvres on multiple occasions, and we went back and refined the manoeuvres. So there was definitely, you know, instruction there. It wasn't just him demonstrating and me going yes, this guy's proficient. It was the manoeuvres carried out multiple times.*
>
> All right. It just may be the case that you didn't, in fact, (do) some of them yourself, personally, but you instructed him to do so, and then he did so, and he was competent? ---*Yeah. So just may not be on the - on the very first instance that I didn't demonstrate. I - I may very well have likely demonstrated afterwards, but I would've likely used that as*

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[115] Ibid, pp 1-92, 1-93.
[116] Ibid, p 1-113. The records produced by Mr Field do not indicate whether Mr Van Hattem paid for the instruction given by Mr Field or paid for any fuel obtained at Watts Bridge or Archer Falls.
[117] For reasons set out below, the instructor comment in the training record, Exhibit E 3: "*Stall turn – right wing low, pull symmetrically on exit to prevent rolling g*", may be of particular significance.
[118] Transcript, 14/12/2022, p 1-107.

a tool to get him to demonstrate the manoeuvre first, to get an understanding of how proficient he was.

121. Mr Field acknowledged that he had accessed the training record of Mr Van Hattem on 8 June 2019. He wanted to "*check*" that he had "*covered everything off*". He could not recall whether he had amended, added or changed anything in the training record. [119]

122. It is difficult to accept that although able to recall specifically accessing the training record of Mr Van Hattem three days after the accident on 5 June 2019, Mr Field has no recollection of what he needed to "*check*" or whether he had altered the record or added anything to it.

123. On one issue, Mr Field's recollection was reasonably clear: the pilot operating handbook (**POH**) provides the only "*approved method of recovery*" for use by an aerobatic pilot. [120] However, Mr Field could not recall if he had seen the POH for Mr Van Hattem's aircraft but thought that he had access to "*some information on the aeroplane … Marcel actually, at the time, had that with him for - as far as I can remember. And we did consult it for spin recovery and also entry manoeuvres and aircraft limitations*".

124. In contrast it was Mr Klein's evidence that the YAK 52 POH or Flight Manual does not contain anything relating to aerobatic manoeuvres and the performance of them. [121] Mr Klein could not recall hearing of, or being taught, the PARE or Mueller-Beggs spin recovery methods.

125. Mr Field said that he practised these two methods of spin recovery in the course of Mr Van Hattem's endorsement on 17 January 2019. In the training records, Mr Field noted that Mr Van Hattem "*is able to recover from an upright stable spin using both Beggs/Mueller (sic) and also PARE methods*". [122] Mr Field could not recall if the Mueller/Beggs recovery method had been executed by Mr Van Hattem during an incipient phase of spin or a fully developed phase of spin. [123]

126. Mr Field suggested that before undertaking Mr Van Hattem's flight activity endorsements he did some "*research*" into the YAK 52. He said there was some "*evidence out there that Mueller-Beggs wasn't particularly*

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[119] Ibid, p 1-113.
[120] Ibid, p 1-71.
[121] Transcript 14/12/2022, p 1-21. In contrast, Mr Arnot thought that although there was just one flight manual or POH for the YAK 52 aircraft there were "*one or two*" paragraphs in the manual dealing with recovery from spins. The ATSB report notes some specific operational limitations such as the maximum aerobatics speed (360kmph) and G limits (+7/-5) for YAK 52 aircraft, and some general warnings about aerobatic manoeuvres and that "*some aircraft*" will not recover with "*conventiona*l" spin recovery: Exhibit C1 p 17.
[122] Exhibit E3, p 3.
[123] The spin is commonly categorised in four phases; entry, incipient, developed, and recovery. No two aircraft spin the same way: see CASA Advisory Circular AC 61-16v1.0, *Spin avoidance and stall recovery training*, p 11.

successful for this aircraft type" and that use of a recovery method with elevator input was "*important*". Nonetheless, he considered that the Mueller-Beggs method of spin recovery was "*a good useful training aid to show pilots that the recovery method didn't always work, and you're in a position there where you've got the correct rudder input, generally all you need to do is move the elevator forward and the aircraft recovers, which then is essentially setting up the same conditions as the PARE recovery method.*"[124] Mr Field was of the view that if the Mueller-Beggs method is used correctly but doesn't work after a normal period of time, "*you can simply move the elevator forward and you've essentially got the PARE recovery*".

127. Counsel Assisting submitted that the evidence of the way in which Mr Field had Mr Van Hattem demonstrate a problematic spin recovery technique amounted to experimentation rather than a considered and professional instruction or training of an appropriate spin recovery technique for a YAK 52 aircraft. If Mr Field truly believed that the only "*approved method of recovery*" for use by an aerobatic pilot is that which is set out in the POH or Flight Manual of the aircraft being used for aerobatics, I agree that it is difficult to accept his view that instruction should be given in another method of spin recovery, as "*a good useful training aid to show pilots that the recovery method didn't always work…".*

128. It is also clear from the evidence of many qualified witnesses who gave evidence of their own aerobatic experience that a flight activity endorsement for aerobatics and spinning manoeuvres should involve far more flying training and instruction than two hours.

129. Mr Klein gave evidence that he had obtained his aerobatic flight activity endorsement some ten years before meeting Mr Van Hattem in 2018. His training and instruction from a qualified flight instructor extended over three days with 1 hour flying each day. He said that the endorsement training should be spread over several days, albeit that he had only taken about 3 hours all up to obtain the endorsement.

130. Mr Arnot was asked whether he thought it possible to get through the activities referred to in Mr Van Hattem's training record in two hours. His response was "*not a chance*".[125] Mr Arnot considered that the "*recognised standard*" for a basic aerobatic endorsement is between eight and 10 hours of training, although he accepted that "*it's a little bit dependant on pilot ability*".

[124] Transcript 14/12/2022, p 1-74.
[125] Transcript 15/12/2022, p 2-48.

131. The evidence given by both Mr Awad and CASA's Dr Stanton endorsed 8 to 10 hours as the minimum benchmark for such a flight activity endorsement.

132. Mr Awad, the former CEO of AWAL (from 2013 – 2021) gave evidence that his aerobatic endorsement in the USA took in the order of 10 hours. He undertook a series of training flights with a check pilot who was a very experienced aerobatic pilot with each flight being "*roughly between one and 1.5 hours in duration*".[126] He considered eight to ten hours to be "*the basic*".

133. CASA's Branch Manager of Sport and Recreation Aviation, Dr Anthony Stanton, gave evidence that he would expect a flight activity endorsement to take eight hours, and "*on average 10 to 15 hours*". In his experience, the instruction should take place with a series of lessons. He gave the following evidence:

> *So for example, you'd go - you'd start off with spinning, you'd have a 45(min) to an hour long brief on the aerodynamics of spinning, the risks of spinning, what we were about to go and do in the aircraft. You would then go and do about an hour's flight time of just spinning. You'd come back, you'd let the student digest that. Normally you'd come back another day and you'd move on to the next lesson, but each lesson, each manoeuvre normally would be about an hour. The MOS today reflects what the CAR used to reflect in the past, which is four manoeuvres plus the unusual attitudes. So there's five hours' worth of focusing on each manoeuvre, plus the ground briefing time. The MOS today talks about the underpinning knowledge. And then, as evidence has been given before me, you put those things together, which would be another couple of hours, two or three hours. That's all going well. And then you've got the average student who doesn't do it perfectly within the hour.* [127]

134. Dr Stanton said that if a student seemed to have had some prior aerobatics training that would not justify a truncation or shortening of the instruction time. He added:

> *If he came to me, I would actually take longer. Because it would - it would show me that this person has a particular apprehension (sic)*[128] *to risk-taking, and I would be very methodical, not only about the course of training that I'm doing, because I know where risk may lead to, but I would want to not only teach the manoeuvres and - and those things, but I would want to spend time with that person to try and change their way of thinking about their approach to risk. So…. If they came to me and said, "I've done all of these things and I can do all of these manoeuvres," if they wanted me to do the training, not only would we*

[126] Transcript 15/12/2022, p 2-74.
[127] Transcript 15/12/2022, p 2-99.
[128] The transcript records the word "*apprehension*", but it is likely that, in context, Dr Stanton used or intended a word such as "*predisposition*" or "*inclination*".

do it absolutely as per the prescribed syllabus and take the time that I would expect it to take, I'd probably even want to take a little bit longer, because I want to spend time with that person and try and change their mindset away from this non-compliance, "I can take risks, I'm confident", to a more appropriate place.[129]

135. Dr Stanton explained that CASA's Manual of Standards (**MOS**) promulgated under Part 61 of the CASR sets out, for flying training including aerobatic training, the competency standards that somebody has to reach to obtain a flight crew licence or other endorsement. These are "*the things they have to be able to do in terms of performance criteria*".[130] It is then "*up to the instructor to take that and turn it into a syllabus of training*".

136. The relevant standards for an aerobatics endorsement for performing aerobatic manoeuvres not below 3,000 feet AGL are set out in FAE-1 to Section 6 of Schedule 2 to the Part 61 MOS. The standards for a spinning endorsement (to execute and recover from an upright spin manoeuvre) are in FAE-8 to Section 6 of Schedule 2. The skills and knowledge required under FAE-8 include "*Mueller-Beggs spin recovery action and limitations on its application"*. There is nothing in the MOS to indicate any period or duration of training required or the sequence of manoeuvres to be performed in the course of instruction and training for a flight activity endorsement. It appears from the primary and subordinate legislation that these are matters left for a flight instructor to determine although CASA has published some advisory material that may assist an instructor to develop an appropriate syllabus and training program.[131]

137. Mr Field emphasised that his understanding of "*competency-based*" training and assessment meant that he could consider the level of proficiency immediately displayed by a trainee or person seeking a particular flight activity endorsement. In Mr Van Hattem's case, Mr Field took into consideration Mr Van Hattem's assertion of prior learning and experience and, at best, sought to address any disparities in his foundational aerobatic knowledge. However, Mr Field took no step to seek to independently verify that which he says Mr Van Hattem told him about his prior learning and aerobatics experience.[132]

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[129] Transcript 15/12/2022, p 2-99.
[130] Ibid, p 2-100.
[131] For example, Advisory Circulars AC 61-16 v 1.0, April 2020 *Spin avoidance and stall recovery training;* and AC 61-09 v 1.0, April 2022 *Competency-based training and assessment for flight crew.*
[132] It may be noted that although CASA's advisory circular AC61-09, v 1.0 refers to the recognition of prior learning it provides for "*verification*" by an instructor "*assessing the evidence against the requirement of each unit of competency*". However, the "*evidence*" referred to is "*prior learning self-assessment evidence*" provided by the trainee: see p 19 of AC 61-09, v 1.0.

138. Counsel Assisting submits and I agree, that Mr Field's assertion that he ensured that *each* of the elements set out in the training record that he compiled for Mr Van Hattem and which he demonstrated and/or had Mr Van Hattem perform "*multiple times*", within a period, at best, of 1 hour 25 minutes, is not plausible. The ATSB investigators "*established that during the accident flight and previous flights, the pilot conducted low-level aerobatics without completing the required training and having the appropriate endorsement*".[133]

139. Consequently, Counsel Assisting submits, and I agree, that the available evidence supports findings that:

    - Mr Van Hattem did not have a flight activity endorsement to conduct aerobatics below 3000 feet;
    - Mr Field did not have an appropriate level of experience or recency with conducting aerobatic manoeuvres in YAK 52 aircraft to adequately assess the training required by Mr Van Hattem to meet all the competency standards set out in Pt 61 MOS for relevant flight activity endorsements[134]; and
    - The training and instruction Mr Van Hattem received from Mr Field for the purpose of obtaining flight activity endorsements to conduct basic aerobatic and spinning manoeuvres from not below 3000 ft, was deficient.[135]

140. That Mr Van Hattem persisted in performing aerobatic manoeuvres well below 3000 feet after he obtained his flight activity endorsements further indicates the limited value of his prior learning or endorsement training. Of some significance in this regard is the evidence given by Ms Irina Bursill, a registered nurse who, in 2019, was living at Helensvale[136]. In early 2019, Ms Bursill met Mr Van Hattem. A friendship developed. Ms Bursill undertook a flight with Mr Van Hattem in VH-PAE. She allowed her son to take a flight with Mr Van Hattem on a later occasion. She thought that her flight had taken place in April 2019 but was not sure of the date.[137]

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[133] Exhibit C1, p iii. In its Safety summary, the ATSB also notes that the lack of "*required training*" would have "*potentially limited the pilot's appreciation of the risks associated with low-level aerobatics*".

[134] Mr Field was given an opportunity to respond to these criticisms on 31 January 2023 but has elected not to do so.

[135] Mr Field was given an opportunity to respond to these criticisms on 31 January 2023, but has elected not to do so.

[136] Exhibit E1.

[137] Mr Van Hattem's log book only records short return flights from Southport Airfield in 2019 on 4 January, 16 February and 9 March. It is possible that Ms Bursill flew with Mr Van Hattem on 16 February and her son's flight took place on 9 March 2019. Alternatively, Mr Van Hattem failed to correctly or fully make log book entries for these flights. However, as maintenance release flight times coincide with the entries recorded in Mr Van Hattem's log book, it is unlikely that the routes flown by Mr Van Hattem were incorrectly recorded by him.

141. Ms Bursill said that Mr Van Hattem gave her a short pre-flight briefing, essentially telling her not to touch the flight controls from the passenger seat. He did not say anything about securing her mobile phone which she held in her hand.[138] Ms Bursill placed in evidence a video taken with her phone camera during the flight with Mr Van Hattem.[139] The video clearly shows the performance of an aerobatic manoeuvre along the beach in approximately the same area of the Gold Coast depicted by Ms Angela Curtis[140].

142. The ATSB investigators analysed Ms Bursill's video footage and concluded that "*the aerobatics were conducted below 1,000 feet and that elements of the flight were conducted as low as 260 feet based on the buildings in the area*".[141] The ATSB does not suggest that the manoeuvres were performed in a manner that was technically deficient.

143. The flying history of Mr Van Hattem is succinctly outlined in the ATSB Report.[142] ATSB investigators noted that Mr Van Hattem had received two official or formal warnings about performing aerobatics and low flying. The first warning came from RA Aus in October 2013. A report was received by RA Aus that Mr Van Hattem had been seen performing "*acrobatic manoeuvres and a parachute drop at low level*" at Archer Falls on 5 October 2013. This was contrary to both RA Aus rules and *Civil Aviation Orders* that expressly prohibited flying an RA Aus registered aircraft of the type flown by Mr Van Hattem "*in acrobatic flight*".[143]

144. Mr Van Hattem admitted that he had allowed a parachutist to jump from his kit-built aircraft (from 3000 feet) but didn't know that he needed a CASA approval to do so. He acknowledged that he had performed "*a few Chandelles*" which he did not consider to be an "*aerobatic*" manoeuvre, indicating no understanding of the difference between "*acrobatic*" manoeuvres and aerobatic manoeuvres[144]. The RA Aus Assistant Operations Manager explained the difference and informed Mr Van Hattem of the relevant regulations. Mr Van Hattem disputed the views of

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[138] Exhibit E1, par [10].
[139] Exhibit E1.1.
[140] At figure 2.3 of Exhibit B1, p 5.
[141] Exhibit C1, p 4 dot point 2. Ms Bursill confirmed that this part of the ATSB report refers to what she told ATSB.
[142] Exhibit C1, pp 3-4.
[143] CAO 95.5, Schedule 1, cl 7: "*acrobatic flight*" under CAR 2 in force at that time was defined as "*manoeuvres intentionally performed by an aircraft* (sic) *involving an abrupt change in its attitude, an abnormal attitude, or an abnormal variation in speed*"; Under CAR 152, in force at the time, parachute descents (other than emergency descents) were prohibited unless authorised by CASA.
[144] A "*chandelle*" is "*a maximum performance, 180° climbing turn that begins from approximately straight-and-level flight and concludes with the airplane in a wings-level, nose-high attitude just above stall speed*" (FAA *Airplane Flying Handbook*, Chapter 9-5). It is not considered by the FAA to be an aerobatic manoeuvre but under the CASA definition is clearly an "*acrobatic*" manoeuvre.

the Manager but accepted that he could not drop parachutists from his aircraft.[145]

145. The next warning was that, referred to above, issued to Mr Van Hattem following a complaint to the Club, in November 2018. Mr Van Hattem had been conducting low-level aerobatic manoeuvres in VH-PAE over a residential area near Southport Airport.[146] Mr Van Hattem was given a verbal warning by the Club. There is no record of any further complaints made in relation to Mr Van Hattem's flying. The ATSB notes that a review of relevant databases kept by the ATSB and CASA respectively found "*no safety reports relating to the pilot*".[147]

146. In the QPS report, Senior Constable Hutchinson proffers the opinion that the observations of the eyewitnesses on the day of the fatal flight indicate that Mr Van Hattem executed the aerobatic manoeuvres on the day "*faultlessly*" even though they were "*conducted at an elevation contrary to the pilot's endorsements*".[148]

147. Overall, Counsel Assisting submits that the available evidence does not point to a lack of technical proficiency by Mr Van Hattem in conducting various aerobatic manoeuvres as observed by other people. It may, however, be noted that one of Mr Field's Instructor comments at the time of conducting Mr Van Hattem's endorsement was that on conducting a "*stall turn*" he allowed the right wing to drop low and needed to "*pull symmetrically on exit to prevent rolling g*". The suggestion here is that Mr Van Hattem was changing bank angle while simultaneously changing G-load creating a differential in the loading of one wing (or one stabiliser) relative to the other.[149] Mr Field's comment suggests that he was concerned to ensure that the stall turn was undertaken in a way that enabled the G-load to be applied symmetrically on the airframe to prevent "*rolling g*".

148. In both the QPS report and the ATSB report, investigators have considered that the damage to the recovered aircraft structure was "*consistent with the aircraft impacting the water in an inverted right wing down orientation*".[150] One explanation for this - having regard to Mr Field's instructor's comment in January 2019 - is that if Mr Van Hattem made a large, simultaneous change in pitch and bank in the course of a low level aerobatic manoeuvre after passing over South Stradbroke Island he may have allowed the right wing to drop and then sought aggressively to pull

[145] See Exhibit D1 and the exchange of emails at Exhibit D2.
[146] Exhibit C1, p 4.
[147] Ibid.
[148] Exhibit B1, p 50, par [16.9].
[149] As to the phenomenon of "*rolling* Gs" see, for example, the explanation at: https://takeflightsandiego.com/assets/documents/Rolling%20Gs.pdf.
[150] Exhibit B1, p 31, par [7.6]; Exhibit C 1, p 20.

up while still rolling out of a near vertical bank at low speed. As a result, the aircraft may have suffered the effects of "*rolling G*" that Mr Field had earlier instructed him to avoid, with Mr Van Hattem not being able to recover the aircraft before impacting the water, right wing down.

Other factors

149. The ATSB has noted in its report that among the potential factors that could explain the accident, such as inadvertent passenger interference with the flight controls, partial or full pilot incapacitation (possibly due to the physiological effects of conducting aerobatics), an aerodynamic stall or other mishandled manoeuvre by the pilot, there was insufficient evidence to enable its investigators to consider those factors.[151] The further evidence obtained for the inquest does not enable closer examination of those factors.

150. The ATSB investigators also concluded that it could not be determined "*with certainty*" that Mr Van Hattem was "*conducting an aerobatic manoeuvre immediately prior to impact, but it was considered possible*".[152] As such, the ATSB was not able, meaningfully, to investigate whether, in the course of conducting an aerobatic manoeuvre, Mr Van Hattem made a skill error that caused the aircraft to impact the water or whether some other factor was involved which precluded the pilot from effecting a recovery from an aerobatic manouevre engaged in at a low height.

151. The investigation by the QPS has led Senior Constable Hutchinson to proffer the opinion that an event may have occurred in the last phase of flight "*that has caused the pilot disorientation, distraction, unconsciousness or combination of these factors*".[153] The QPS report refers to some of the theory concerning the effects of high positive and negative G loads on pilots during the performance of aerobatic manoeuvres.[154] There is no evidence that Mr Van Hattem was peculiarly susceptible to a loss of consciousness or disorientation while conducting aerobatics at low altitude or that he had ever experienced a G-induced vestibular dysfunction. The observations of those who flew with Mr Van Hattem (including Ms Bursill, Messrs Field, Klein and others) do not indicate a susceptibility of that kind.

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[151] Exhibit C1, p 20. ATSB also include engine failure and loose articles interfering with the flight controls in this list.
[152] Exhibit C1, p 20.
[153] Exhibit B1, p 50 par [16.12].
[154] Exhibit B1, pp 43-44; Similarly, the ATSB report, Exhibit C1, p 17; See also FAA Advisory Circular AC 91-61 *A Hazard in Aerobatics: Effects of G-Forces on Pilots*, 2/28/84.

152. Notwithstanding the possibility of pilot error in the conduct of an aerobatic manoeuvre, Counsel Assisting submits that the available evidence does not enable a positive contention to be made that the apparent deficiency in Mr Van Hattem's training and instruction for the flight activity endorsements that he obtained in January 2019 was, necessarily, a factor that contributed to, or otherwise explains, the fatal accident on 5 June 2019. I concur.

153. That said, I agree that the available evidence does suggest that Mr Van Hattem had a cavalier attitude to observing applicable air rules concerning the performance of aerobatic flying and deliberately and repeatedly ignored the limitations of his flight activity endorsements. Mr Arnot opined that Mr Van Hattem was "*pushing the limits too fast and too soon*".[155] On the basis of the evidence concerning Mr Van Hattem's flying history it may more accurately be said that he was prepared to ignore the "*limits*" that applied to his aerobatic flying and engage in risky behaviour without sufficient thought or concern for the potential for harm.

Issue IV: Regulatory Oversight

154. The ATSB report together with the evidence provided by Mr Pring-Shambler, AWAL's Director of Self-Administration, and CASA's Dr Stanton, outline the regulatory context in which ex-military and historic aircraft, known as Warbirds, may be operated.

155. CASA has devolved a high level of direct administrative and legal responsibility for the oversight of recreational and sport aviation to approved self-administering organisations. By and large, recreational and sport aviation enthusiasts, must be members of an appropriate self-administering organisation and operate in accordance with that organisation's rule set. Self-administering organisations are required to oversee their member's activities and provide CASA with regular reports relating to compliance and safety assurance as to their members' flying activities.

156. AWAL is a self-administering aviation organisation for Warbirds, as "*limited category*" (**LC**) aircraft. It operates under a CASA-approved Exposition & Self-Administration Manual (**ESAM**).[156]. CASA has a role to set the regulatory framework in place leaving it largely to self-administering organisations to apply the rules and enforce them. However, CASA still maintains some level of oversight e.g., CASA must approve most amendments of the ESAM before a change is made by the

[155] Exhibit B1, p 20.
[156] Exhibit B1-44.

self-administering organisation.[157] Moreover, a self-administering organisation such as AWAL has no authority to suspend or cancel anyone's flight crew licence. Regulatory action of that kind must only be taken by CASA.

157. A private pilot wanting to fly an LC aircraft for personal or recreational purposes is required to be a member of AWAL.[158] At the time of the accident, Mr Van Hattem's application for membership of AWAL was still in the process of being approved. Mr Van Hattem had failed to seek membership of AWAL upon acquiring VH-PAE and was reminded to do so after AWAL made a report to CASA. [159]

158. All AWAL members must comply with applicable provisions of the ESAM and observe AWAL's Code of Conduct and Ethics. A breach of the Code by a member may result in disciplinary action being taken by the AWAL Board against the member. Such disciplinary action may include a formal warning, censure/reprimand, or termination of AWAL membership, with resulting removal of permission to operate LC aircraft in Australia.

159. AWAL does not provide flying training for its members but has a large role in overseeing maintenance systems for Warbirds. It is also responsible for ensuring that Permit Index (**PI**) assessments for its member's aircraft are undertaken.

160. Every LC certificate must be issued with a PI number (from 0 to 3) entered on or annexed to the certificate in accordance with the PI procedures set out in AWAL's manual.[160] These procedures accord with the risk assessment process identified in CASA's Advisory Circular relating to PI requirements for LC aircraft.[161]

161. Under CASR reg 132.195, a PI number assigned to a limited category aircraft must (a) meet the requirements of the Part 132 MOS for the assignment of the number; and (b) *"not be likely to have an adverse effect on the safety of other airspace users or persons on the ground or water".* The PI assessment process takes into account a range of risk categories or elements against which each aircraft must be assessed. The risk factors can be broadly grouped under two main categories: (a) factors affecting the level of risk of a particular aircraft being involved in an accident and (b) other factors relating to the potential seriousness of the

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[157] CASR 149.115.
[158] Affidavit of Peter Pring-Shambler: Exhibit F 16, par [11].
[159] Ibid, pars [32] – [33].
[160] Before the administration of Warbirds was assigned to AWAL in May 2007, PI assessments were carried out by CASA. AWAL largely '*inherited'* the PI assessment methodology and procedures from CASA.
[161] AC 21-25 v 5.1, December 2022 - *Limited category aircraft - permit index* (**the PI AC**). The previous version of the PI AC as in force in June 2019 (v 5.0, January 2017) was not materially different from the 2022 version.

consequences of an aircraft accident.[162] The factors covered in either of these categories include aircraft take-off weight, aircraft stall speed, maintenance history and aircraft airframe history and "*airframe life*". Overall, the risk factors are given a numerical "*weighting*" based on "*the perceived level of risk and hazard*".[163] The weightings range from minus 130 (for the highest level of risk) to plus 130 (for the lowest level of risk). A risk points score is applied to each risk element which, when added up, enables a PI number (from zero to 3) to be assigned to the aircraft. If a PI number of 0 is assigned – as it was to VH-PAE – the aircraft may be flown over built-up areas subject to normal airspace and ATC requirements.

162. In the PI AC, CASA "*acknowledges*" that operators of Warbird, Historic and Replica aircraft are "*willing to accept any risks that may be associated with these types of aircraft in order to be allowed to continue flying them*". The theory behind this assertion has led CASA to base its approach to the regulation of LC aircraft "*around a structure in which pilots and occupants are informed of the risks associated with the operation*" with CASA incorporating "*safeguards to ensure that the risk is confined to the occupants of the aircraft, while protecting the general public from risk of harm or property damage*".[164]

163. The risk "*confinement*" (or mitigation) process centres on two steps:

    - First, is the assessment of a "*risk profile*" of each LC aircraft involving physical inspection and airworthiness certification of the aircraft, with "*appropriate*" conditions that may be applied by the administering authority (in this case, AWAL). As noted earlier, VH-PAE underwent this certification process in 2017.

    - Second, is the PI assessment process to ensure compliance with CASR 132.075 which provides that flight over populous areas by LC aircraft is not permitted unless an aircraft has been approved to do so by the administering authority or has been assigned a PI number that permits the flight.

164. The PI assessment does not take into account factors such as weather, terrain and pilot skill levels. The risk factors taken into account, as drawn from the relevant MOS, are all aircraft-related factors. If the levels of risk are "*clear cut*", no further consideration is necessary in the PI assessment with the "*resulting permit index number*" being "*applied*" to the aircraft.

165. However, under the PI AC, if an aircraft is found to be "*marginally within a risk band*", it may still be given the lower permit index number relating to that risk band, if "*a satisfactory safety case is provided to the assessor*".

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[162] Ibid, p 8.
[163] Ibid, par [3.3.8].
[164] PI AC, p 7, par [3.1.2].

For the purposes of such a "*safety case*", other or additional factors, including "*pilot qualification/experience requirements*" can be taken into account so that the safety case addresses the way in which identified risks will be additionally mitigated "*to ensure a level of public safety that is commensurate to the lower permit index number being sought*".[165]

166. CASA has a duty, under CASR 132.205, to direct a limited category organisation (such as AWAL) to assign a new PI number to an aircraft where "*CASA is satisfied that the aircraft's existing permit index number does not comply with regulation 132.195*".

167. Counsel Assisting submits that it appears that CASA has, hitherto, been satisfied that the process by which a PI number of "0" is assigned to YAK 52 aircraft is sufficient to allow YAK 52 aircraft performing aerobatic manoeuvres to do so over populous areas (subject to airspace or ATC constraints).

168. However, an issue, raised in the ATSB report, concerns the way in which AWAL has applied the criterion for aircraft airframe history in order to assess the risk of fatigue failure[166]. The ATSB was informed (and Mr Pring-Shambler gave evidence to confirm) that AWAL does not consider YAK 52 aircraft to have an airframe life limit. Accordingly, in making the PI assessment for all YAK 52 aircraft (including VH-PAE) no points are deducted for this risk category. However, the ATSB pointed out that the Russian designer, Yakovlev, had determined an airframe life limit for YAK 52 aircraft with allowable extensions to that limit being based on an operator's compliance with the designer's approved maintenance and inspection program. Moreover, the UK Civil Aviation Authority had issued a MPD in 1998 to provide for airframe life limits and an "*overhaul life*" for YAK 52 aircraft in the UK.[167] Neither CASA nor AWAL adopted the elements of that MPD.

169. In 2005, CASA was advised by the Chief Designer of Yakovlev that an "*aircraft life*" had been determined for YAK 52 aircraft and that "*the assigned operating time* (service life*) of YAK 52 aircraft registered in Great Britain may be extended to 2000 flight hours and 30 calendar years*". It

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[165] PI AC, p 17.

[166] In various accident reports, the ATSB has referred to the phenomenon of fatigue failure where the fracturing of the brittle surface of any given material due to cyclic or fluctuating stress can lead to the loss of structural integrity of the material. For example, in its report into the In-flight break-up of a Cessna, VH-SUX, at Mount Isa on 26 May 2019 (AO-2019-026 Final – 23 November 2021) ATSB says (at p 27): *Aircraft should be designed so that the stresses in their structures from the expected flight loads do not exceed the strength of the materials. The damage from each stress fluctuation is small, but the accumulation of many stresses over time can result in significant damage. The accumulated damage from these fluctuating stresses is referred to as 'fatigue damage'. Fatigue damage leads to the formation of cracks in the aircraft's structure. Cracks reduce the load-carrying capability of the structure, which if not managed, can ultimately lead to in-flight structural failure.*

[167] Exhibit C1, p 7.

appears that CASA, at that time, did not decide to adopt the UK MPD (as an airworthiness directive or otherwise) relating to airframe life limitations for YAK 52 aircraft, although an airworthiness officer recommended that the MPD "*should be the basis of any System of Maintenance that CASA approves*". In correspondence with the Yakovlev Chief Designer in 2005, the officer noted that "*it has been identified that the aeroplane type is subject to both airframe life limitations and to a defined overhaul life*".[168] Currently, the UK MPD is not included within the AWAL approved maintenance schedule for YAK 52 aircraft of its members.

170. The ATSB makes the following points concerning this issue:

- AWAL by its approved (or appointed) person undertaking the LC certification of YAK 52 aircraft, could issue a certificate stating a new approved airframe life for the aircraft if satisfied that it would maintain an acceptable level of safety of flight.[169]
- Although YAK 52 aircraft are not required to comply with the airworthiness requirements of foreign authorities, the existence of an airframe life limit could be established from the UK MPD to guide the AWAL PI assessment process.

171. The response from AWAL's Director of Self- Administration (supported by Mr Arnot) is that there is no need to establish an airframe life limit for YAK 52 aircraft. The approach of AWAL is to rely on the maintenance schedule prepared in accordance with the ESAM for each YAK 52 aircraft to ensure continuing airworthiness of the aircraft. This includes scheduled 50 and 100 hourly inspections together with an "*integrity*" inspection every 3 years.

172. Counsel Assisting submits that the PI AC appears to place responsibility on the relevant self-administration organisation to establish whether a subject aircraft has an approved airframe life specified by the manufacturer. CASA accepts that some "*basic training aircraft*", typically those with "*simplicity of design, low mass and low speeds*", are not regarded as posing a fatigue risk if "*normal standards of maintenance*" are observed. If such aircraft don't have a manufacturer's airframe life, they "*therefore do not have any points deducted from the score*". However, CASA adds that if an "*approved*" airframe life has been exceeded, an administering authority may issue a certificate stating an airframe life for an LC aircraft that is different from "*the existing approved airframe life*" (pursuant to CASR 132.180(4)(d)).[170] AWAL has not issued any certificate stating an airframe life for the airframe of YAK 52 aircraft

[168] Exhibit 2.1.1, (unpaginated) pp 19-29.
[169] Exhibit C1, p 6.
[170] PI AC, op cit, p 11.

because it has no "*relevant data*" from the aircraft manufacturer upon which to do so.[171]

173. It is submitted by Counsel Assisting that the issue that this evidence highlights is this: on the one hand, the ATSB considers that YAK 52 aircraft do have an approved airframe life specified by the manufacturer. This is confirmed by the correspondence that CASA received from Yakovlev in 2005. The UK accepts that the aircraft have an airframe life; the UK CAA has issued an MPD confirming what the approved airframe life for YAK 52 aircraft in the UK is.

174. On the other hand, AWAL does not consider that a relevant airframe life exists or is applicable to YAK 52 aircraft in Australia. CASA's present position is less than pellucidly clear.[172] In giving evidence on behalf of CASA, Dr Stanton accepted that a review of how the PI assessment system is being interpreted and applied by AWAL and appointed persons who are asked to issue special certificates of airworthiness should be undertaken and that CASA has "*already started work on that review …. that work's certainly underway*".[173]. However, Dr Stanton did not accept that the issue also posed a potential problem for the content of passenger briefings required to be given in accordance with the provisions of CASR 132.065 and CASR 132.070. Dr Stanton considered that if a briefing was required to include a statement concerning an aircraft that had exceeded its airframe life, that requirement would be satisfied by the pilot saying something to the effect that "*the aircraft's being managed by its maintenance program"*.[174]

175. It is submitted by Counsel Assisting that on any view, it is apparent from the available evidence that Mr Van Hattem did not provide a safety briefing to Ms Applebee that covered all the requirements of the applicable aviation regulations. Having closely examined Mr Wilson's iPad footage at the Inquest, I agree. Having particular regard to the evidence of Ms Bursill, I agree it is unlikely that he did so on any occasion when he carried a passenger on board VH-PAE. However, given that there is no consensus by the relevant aviation authorities and AWAL as to what the precise content of each such briefing by a YAK 52 pilot should be, no criticism of Mr Van Hattem in this regard is warranted. I agree with that submission. Counsel Assisting submits that what is of more immediate concern is that under the PI system currently administered by AWAL, an

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[171] Affidavit of Pring-Shambler, Ex F16, par [29].
[172] It appears that CASA has recently written to a number of people to try to understand whether YAK 52 aircraft have an airframe limit, if so, what it is and, importantly, why there is an airframe limit, before seeking to "*move forward from here*": evidence of Dr Stanton at T/s 15/12/2022, p 2-95.
[173] Transcript 15/12/2022, p 2-95.
[174] Ibid.

aircraft that has in fact exceeded its manufacturer's approved airframe life may be treated as if it has no airframe life and, thereby, accorded a lower risk assessment than may be warranted, permitting the aircraft to be used for low level aerobatic manoeuvres over populous areas.

176. For the purposes of the inquest, CASA located and produced copies of certain CASA files (that had been held in digitised form) relating to its pre-2007 regulation of YAK 52 aircraft. That material includes copies of a number of UK MPDs some of which have been incorporated into the AWAL Maintenance Schedule for YAK 52 aircraft and some of which have not. In addition to MPD: 1998-017 R5 relating to airframe life limitations and overhaul life for YAK 52 aircraft, the series of MPDs (and whether each is included in AWAL's maintenance schedule for VH-PAE) is as follows:

    - MPD: 1997-008 R1 – Aircraft life extension: YAK 52 aeroplanes - *superseded by MPD 1998-017 R5 – not included in AWAL Maintenance Schedule.*
    - MPD: 1997-020 R1 – Harnesses: YAK 50 and 52 aeroplanes – *included in AWAL Maintenance Schedule as a special instruction.*
    - MPD: 1998-016 R2 – Vedenyev/Ivchenko M-14P engine life limit: YAK 50 and 52 aeroplanes – *not included in AWAL Maintenance Schedule.*
    - MPD: 1998-020 – Fabric covered control services: YAK 50 and 52 aeroplanes – *included in AWAL Maintenance Schedule (not as a special instruction but as part of the periodic inspection schedule).*
    - MPD: 2000-004 – Crack in elevator control system pulley: YAK 52 aeroplanes – *included in AWAL Maintenance Schedule*.
    - MPD: 2004-004 – Pneumatic system reservoirs: various aeroplanes including YAK 52 aeroplanes – *not included in AWAL Maintenance Schedule.*
    - MPD: 2004-006 – Installation of barriers across the rear fuselage: YAK 52 aeroplanes – *not included in AWAL Maintenance Schedule.*

177. It is submitted by Counsel Assisting that the available evidence does not disclose upon what basis, historically, CASA decided to include some but not all of the UK MPDs in the initial versions of the maintenance schedules for YAK 52 aircraft. Dr Stanton said although he "*can't talk to what was in the mind of my colleagues in 2005*", all of the MPDs on the CASA files produced are part of a "*comprehensive review that we're undertaking*".[175]

[175] Transcript 15/12/2022, p 2-97.

I concur that it is both prudent and timely that such a review is long overdue.

Autopsy results

178. Over four days commencing 7 June 2019, a senior forensic pathologist carried out examinations on the remains removed from the wreckage and as later found on the wave edge of the beach on North Stradbroke Island.

179. Details of these examinations are as follows:

Van Hattem

180. An autopsy was ordered and performed[176]. It comprised an external and internal examination (to the extent an internal examination was required to determine the cause of death), imaging, document review and toxicology studies.

181. The opinion of the forensic pathologist as to the cause of death is based on consideration of the circumstances of death and an autopsy including associated imaging and testing.

182. The forensic pathologist summarised the findings at autopsy as follows:

- The post-mortem finding reveals an extensively disrupted body with major injuries involving the head and lower limbs. The injuries were compatible with being due to the aircraft accident.
- There was no evidence of any natural disease that could contribute to the accident (within the limits of examination due to disrupted body and decomposition).
- Toxicology analysis of liver tissue did not detect any drugs. Alcohol cannot be analyzed from liver tissue.

183. In conclusion, the forensic pathologist opined that the severity of the injuries was consistent with being inflicted with great force as in an aircraft crash.

184. In the opinion of the forensic pathologist, the cause of death was:

1(a) Multiple injuries, *due to, or as a consequence of*

1(b) Aircraft crash (pilot).

Applebee

185. An external examination, imaging, document review and toxicology studies were undertaken[177].

[176] Autopsy report of Senior Forensic Pathologist Dr Ben Ong dated 26 August 2019: Exhibit A1.3.
[177] Autopsy report of Senior Forensic Pathologist Dr Ben Ong dated 26 August 2019: Exhibit A2.3.

186. The opinion of the forensic pathologist as to the cause of death is based on consideration of the circumstances of death and a post-mortem examination including associated imaging and testing.

187. The forensic pathologist opined that the findings on examination showed an adult female in a stage of early decomposition. There was disruption of the head with the brain missing from the cranial cavity. The lower limbs were deformed with numerus fractures. A CT scan further showed extensive rib fractures with pneumothorax, collapse of lungs and avulsion of heart from its attachment.

188. The forensic pathologist opined that the findings indicate severe traumatic forces applied to the head and legs and to a smaller extent, the chest. Features are in keeping with injuries sustained in an aircraft crash. The injuries would not be compatible with life and death would have been instantaneous. There was no evidence of drowning.

189. In the opinion of the forensic pathologist, the cause of death was:

    1(a) Multiple injuries, *due to, or as a consequence of*

    1(b) Aircraft crash (passenger).

190. Although the body of Ms Applebee was not discovered until 7 June 2019, the autopsy findings indicate severe traumatic forces that can only have been occasioned by the impact of the aircraft into the water. The injuries *"would not be compatible with life and death would have been instantaneous".*[178] The inescapable conclusion from this evidence is that Ms Applebee died on 5 June 2019.

Findings required by s 45

Martinus Van Hattem

Identity of the deceased:	Martinus Van Hattem (DOB 26 March 1967)
How he died:	VH-PAE impacting the sea at high speed
Place of death:	Coral Sea - Near Jumpinpin SOUTH STRADBROKE QLD 4216 AUSTRALIA
Date of death:	5 June 2019
Cause of death:	1(a) Multiple injuries, *due to, or as a consequence of* 1(b) Aircraft crash (pilot).

[178] Exhibit A2.3, p 5.

Trista-Lea Applebee

Identity of the deceased:	Trista-Lea Applebee (DOB 6 June 1988)
How she died:	VH-PAE impacting the sea at high speed
Place of death:	Coral Sea - Near Jumpinpin SOUTH STRADBROKE QLD 4216 AUSTRALIA
Date of death:	5 June 2019
Cause of death:	1(a) Multiple injuries, *due to, or as a consequence of* 1(b) Aircraft crash (passenger).

Comments and recommendations

Concluding comments and recommendations

191. Upon the matters that the ATSB investigators were able to take into account in the course of their investigation, the ATSB concluded that while conducting an aerobatic flight, which included low level manoeuvres below 500 feet, for reasons undetermined, VH-PAE collided with the water at high speed. Both occupants died when the YAK 52 aircraft Mr Van Hattem was piloting, in the course of a private aerobatic flight, crashed. The ATSB was not able to determine "*with certainty*" that the pilot was conducting an aerobatic manoeuvre "*immediately prior to the impact, but it was considered a possibility*". [179]

192. Notwithstanding the detailed investigation undertaken by the QPS (led by Senior Constable Kyle Hutchinson) and the further evidence obtained during the inquest, there is insufficient factual evidence to determine the reason why Mr Van Hattem was unable to control VH-PAE to avoid impacting the water in the manner that it did. Some factors may readily be dismissed or marginalised. Other possible factors, including pilot error, loss of situational awareness at a critical moment in performing an aerobatic manoeuvre or loose articles affecting flight controls are likely to have greater potential significance in explaining how the accident occurred.

193. The precise cause of the crash has not been ascertained. There is no evidence of any mechanical failure. Mr Van Hattem's lack of experience in this type of flying and his performance of aerobatic manoeuvres at heights well below 3000 feet above ground or sea level, may have contributed. The possibility that a loose or uncontained tool or other article

[179] Exhibit C1, pp iii, 23.

on board the aircraft may have interfered with the flight controls and prevented Mr Van Hattem from recovering from an aerobatic manoeuvre is a feasible but not ascertainable explanation for why the aircraft impacted the water.

194. The investigations have nevertheless highlighted a number of concerns about aerobatic flying both in relation to the flight activity endorsement training and instruction received by Mr Van Hattem and as to the regulatory system within which Warbirds, used for private aerobatic flying, operate.

195. In its submissions, the ATSB highlighted the key safety measures arising from its investigation into the accident of VH-PAE, namely:

- recognising the inherent risks of low-level aerobatic flight and the importance of being suitably trained and qualified;
- encouraging witnesses, particularly in the aviation industry, to report any concerns about unsafe behaviours; and
- conducting more frequent dye penetrant inspections for YAK-52 aluminium elevator bellcranks.

196. In its submissions, CASA has rejected many of the recommendations advanced by Counsel Assisting, primarily on the following grounds:

- Procedural fairness, because they were not specifically foreshadowed and consequentially not raised in the evidence of Dr Stanton; and/or
- The factual findings able to be made do not provide a sufficient connection with the deaths investigated at Inquest to sustain broad recommendations as to tasks that CASA should undertake to prevent deaths from happening in similar circumstances in the future.[180]

197. Broadly[181], I do not accept those submissions on the following basis:

- As the High Court held in *Ainsworth v Criminal Justice Commission* (1992) 175 CLR 564 it is "*not in doubt that, where a decision-making process involves different steps or stages before a final decision is made, the requirements of natural justice are satisfied if 'the decision-making process, viewed in its entirety, entails procedural fairness'*: *South Australia v. O'Shea* [1987] HCA 39; (1987) 163 CLR 378, per Mason C.J. at p 389". It is plain that none of the suggested recommendations has potential reputational consequences for CASA or any officer of CASA.

[180] Section 46(1) of the CA.
[181] I will deal with the specifics below.

- At its highest, the test may be whether, in all the circumstances, a lack of perceived notice, during the examination of a witness, of a possible preventative recommendation has deprived CASA of a reasonable opportunity to make representations to the Court concerning a relevant issue: *Cox v Corruption and Crime Commission* [2008] WASCA 199 at [52]. It cannot seriously be contended by CASA that the witness, who CASA chose to give evidence at the inquest, Dr Stanton, should have been given an opportunity to be heard in opposition to any potential recommendation or coronial comment of a preventative nature that may be made pursuant to section 46 of the CA and directed to CASA. Neither the rules of procedural fairness nor the State Coroner's Guidelines (**Guidelines**) require that a lay witness – including an officer of an agency like CASA - be given an opportunity, in the course of giving evidence, to comment on a specific possible preventative recommendation to a government agency that has no adverse impact on personal or agency reputation.

198. CASA's submissions omit the following (which appears at page 18 of the Guidelines):

> *Counsel Assisting's submissions should foreshadow any adverse findings or comments, preventative recommendations or s48 referrals open to the coroner.*

199. The recommendation has been raised in submissions by Counsel Assisting and CASA has provided its response.

200. Further, when placed in full context (page 21 of the Guidelines), the practical intent (or objective) of the Guidelines is clear, as follows:

> *Once the coroner decides to hold an inquest, early consideration should be given to possible recommendations, with a view to inviting input from relevant agencies for examination during the inquest. This will ensure that agencies to whom possible recommendations may be directed are identified and given an opportunity to participate in the inquest, either by seeking leave to appear or providing information or written submissions about the practicality of any proposals under consideration.*
>
> *Depending on the circumstances of the death, consideration should be given to seeking input from relevant government agencies, statutory authorities, regulatory authorities, professional or industry representative bodies or public interest groups. ……*
>
> *It is preferable that this response gathering process is commenced prior to the inquest to allow sufficient time for all parties to consider the responses, and for arrangements to be made for relevant witnesses to give evidence. Parties should be actively encouraged to suggest areas where the coroner may consider making recommendations. …..*

Counsel Assisting's submissions should address possible comments open to the coroner, so the family and other parties have an opportunity to respond to those proposals.

201. Finally, and although not tendered in evidence, I am aware that Counsel Assisting did engage in extensive consultation with CASA before the Inquest.[182] That consultation involved informing CASA of issues upon which CASA's assistance could be requested, and Counsel Assisting attending in conference with CASA officers (Mr Rule and Dr Stanton) to discuss those issues.

202. Consequently, I am satisfied and find that the requirements of procedural fairness have been met.

203. For the reasons that appear below, I also find that there is a "*sufficient connection*" to the deaths investigated at Inquest to sustain broad recommendations as to tasks that CASA (and others) should undertake to prevent deaths from happening in similar circumstances in the future, with some adjustment to some of the recommendations initially advanced by Counsel Assisting.

Flight activity endorsements

204. The evidence of experienced pilots with aerobatics endorsement (Messrs Arnot, Klein, Awad and Dr Stanton) clearly confirms the need for flight activity endorsements for aerobatics and spinning manoeuvres to be carried out with rigorous and conscientious instruction and training of the pilot seeking those qualifications. A minimum period of training and instruction is required, and manoeuvres demonstrated and performed in an appropriate sequence that, in many if not most cases, may require several days to undertake.

205. Although CASA has issued various Advisory Circulars and other material providing some guidelines as to the standards required to be attained in the course of flight activity endorsement training, a present concern is whether the relevant Pt 61 MOS and the guidance material provided by CASA leaves too much discretion to a flight instructor as to how a candidate for endorsement is assessed.

206. Furthermore, the recent Safety Advisory Notice (**SAN**) [183] published by the ATSB in conjunction with its investigation report into the fatal crash of a light aircraft while performing aerobatics near Peachester on 23 June 2021 (resulting in the deaths of two people), highlights a real concern about the suitability of using the Mueller/Beggs method of spin recovery

[182] For example, email and attachment from Mr Harvey to Mr Joe Rule (CASA's Manager Litigation, Investigations and Enforcement) dated 15 August 2022.
[183] Exhibit C2.

set out in CASA's Pt 61 MOS for spinning endorsements (and low level aerobatic endorsements) in aircraft used for aerobatic flying, including YAK 52 aircraft.

207. Against that background, Counsel Assisting submitted that it is open for me to make the following recommendation, that CASA should:

- Review flight instructor standards of performance to ensure that every flight instructor conducting flight training for a flight activity endorsement:
    - is fully qualified, experienced and current in undertaking and instructing all required aerobatic, spinning and spin recovery manoeuvres in the model of aircraft being used for the endorsement;
    - is responsible for training the pilot undertaking the endorsement and ensuring that the pilot meets established competency standards in all subject matter areas in the manner clearly set out in an appropriate syllabus of training for the endorsement.
- Consider whether all flight training organizations accredited to provide training and instruction for flight activity endorsements should be required to provide a minimum period or duration of training and instruction with relevant aerobatic manoeuvres and tasks demonstrated and performed in an appropriate sequence under an approved syllabus of flight activity endorsement training.
- Review *the Pt 61 Manual of Standards* to determine whether the Mueller/Beggs method of spin recovery should continue to be included as a competency standard required to be attained by pilots undertaking flight activity endorsements.
- Take appropriate steps to determine whether the Mueller/Beggs method of spin recovery is capable of enabling recovery of YAK 52 aircraft types from a spin and, if so, whether specific limitations of that spin recovery method affect the way in which that method should be instructed/demonstrated, if at all, in the course of flight activity endorsement training; and
- Review the Pilot Operating Handbook for YAK 52 aircraft to ensure that:
    - it provides sufficient information relating to aerobatic manoeuvres and spin recovery; and
    - it is consistent with the Pt 61 Manual of Standards (and any relevant Flight Instructor Manual) relating to the skills and knowledge required to perform aerobatic manoeuvres and

enable full recovery from spin manoeuvres by appropriate spin recovery action.

208. CASA has provided comprehensive submissions about this recommendation which I have considered carefully. Rather than set out CASA's lengthy submissions in full, it is perhaps more effective if I deal with the disparities relevant to the recommendation.

209. The following concerns the first recommendation set out at paragraph 207 above (para 182 (i) of submissions of Counsel Assisting) above:

- CASA agrees that the training received by Mr Van Hattem by Mr Field was inadequate. However, the criticism of Mr Field is more extensive than as either voiced by Dr Stanton in evidence or in Counsel Assisting's submissions. CASA submits that it will now "*investigate further the training and assessment that Mr Field's* (sic) *has provided*", which I consider as entirely appropriate in the circumstances.
- I do not consider that the deficiency of Mr Van Hattem's training by Mr Field was dismissed or marginalized by Counsel Assisting[184].
- It is plain that Mr Field considered it a requirement of the applicable standards to demonstrate and have Mr Van Hattem perform (whether by way of experimentation or otherwise) a spin recovery manoeuvre that the ATSB has now identified (with a Safety Advisory Notice[185]) as being highly problematic. CASA's submission that the Mueller/Beggs method of spin recovery "*was and is a required knowledge competency standard*" required as "*underpinning knowledge*" as a "*theory component of flight training and assessment*", and that there is "*no general requirement for any applicant to demonstrate performance*" of that spin recovery method, is at odds with Mr Field's use of that method as an in-flight manoeuvre that he apparently considered to be consistent with the requirements of the Part 61 MOS.
- CASA views these issues as being unique to the training that Mr Van Hattem received from Mr Field, which does not "*suggest the existence of any systemic issues with flight instructor standards and the regulatory framework governing the training and granting of flight activity endorsements*".[186]
- CASA submits that the issue is one of compliance by, and competency of, Mr Field[187]. Mr Field was a "*single actor*"[188].
- In setting out in detail the provisions of the Part 61 MOS, CASA submits that a flight instructor has "*no discretion*" as to "*what forms the training and assessment required*". In his evidence to the Court, Dr Stanton said that the MOS sets out the "*standard of competency*

[184] CASA's submissions at paragraph 16(b).
[185] Exhibit C2.
[186] CASA's submissions at paragraphs 27 and 34.
[187] CASA's submissions at paragraphs 35 and 46.
[188] CASA's submissions at paragraph 59(c).

that somebody has to reach" and "*the things they have to be able to do in terms of performance criteria*" but it is "*then up to the instructor to take that and turn it into a syllabus of training*".[189]

- Dr Stanton was specifically asked the following[190]: (p 2-102 – 2-103):

  Is it something that CASA can look into as to whether flying schools - have an adequate knowledge - if I can put it that way - of what they are meant to be doing in terms of (a) developing their syllabus and (b) ensuring that if the spin recovery methods are to be the methods prescribed in a pilot operating handbook or flight manual, that those are the methods only to be used? ---CASA recently did publish a spinning AC. I'm reasonably confident that that content is contained in that AC, but I certainly have a review of it to make sure it is, but I'd be surprised if that's not in there….

  How many approved flying schools are there in Australia? --- An estimated number would be 300, but I'd have to research to find the exact number.

  All right. So is it feasible for CASA to review the syllabus or training that - the more significant ones, or even a sample, perhaps, of those flying schools are conducting…?---Certainly, we could take that on board…

- CASA notes that each unit of competency prescribed in the Part 61 MOS as a training requirement "*must form part of a training program*"[191]. However, it is not clear as to how CASA determines the adequacy of such a training program or syllabus.

210. The following relates to CASA's submissions about the recommendation set out at paragraph 207 above (para 182 (i) of submissions of Counsel Assisting):

    - CASA takes issue as to the terminology used ("*flight training operators or organizations*" and "*flight instructors*"), submitting that it is neither necessary nor appropriate to review flight instructor standards of performance and consequentially, the recommendation should not be accepted. I appreciate the helpful summation of part 6 of the MOS and accept the corrections to relevant terminology.
    - However, whilst CASA's stated intention is to further investigate the training and assessment that Mr Field provided to Mr Van Hattem, it should be viewed in the context of Mr Field no longer providing training in aerobatic endorsements.
    - The submission that as Mr Field was a "*single actor*", there is no basis for a preventative recommendation that would seek to ensure that every flight instructor authorised to conduct flight training for

[189] Transcript- Dr Stanton on 15 December 2022 at p 2-100.
[190] Transcript- Dr Stanton on 15 December 2022 at pp 2-102 – 2-103.
[191] CASA submissions at paragraph 50.

such endorsements is competent to do so, is not based on a concern as to a lack of resources or other indication of onerousness. Instead, it is largely based on a narrow reading of what may be considered "*connected with a death investigated at an inquest*" within the meaning of section 46 of the CA.

- Moreover, CASA's submission of Mr Field's lack of competence and his misunderstanding of the requirements of the Part 61 MOS cannot exclude the possibility (or even the likelihood) that other flight instructors may find implementation of the standards and development of an appropriate syllabus similarly open to different interpretations.
- CASA's submissions are only consistent with a conclusion that, for whatever reason, it is only the present inquest that has identified a concern as to the competence of, and understanding of the Part 61 MOS by, Mr Field in relation to his conduct of a particular, safety-critical, flight endorsement. CASA has not independently or on any prior occasion identified this concern in respect of Mr Field. CASA rejects any need for review of flight instructor standards generally but has itself raised the issue of compliance and enforcement.

211. Consequently, I make the following recommendation:

> *CASA should review the extent to which its surveillance of flight instructors who conduct flight training for a flight activity endorsement of a pilot of a Warbird aircraft is sufficient and effective to ensure that those flight instructors are appropriately managing their safety risks, are complying with all relevant regulations and understand the requirements of applicable flight instructor standards of performance when conducting such endorsement training.*

212. The following relates to CASA's submissions about the recommendation set out at paragraph 207 above (para 182 (ii) of submissions of Counsel Assisting):

- CASA rejects this on the basis of four points; the first two of which refer to the terminology and expression used, which I accept and is simple to correct.
- The third point is a general objection of a lack of forewarning that the "*system of regulation*" relating to aerobatic flight activity endorsements was an issue. Essentially, it submits that "*governance*" of flight training as an integral aspect of that issue that may lead to coronial recommendations in accordance with section 46 of the CA, was not specifically identified.
- The fourth point is that although the "*prescriptive requirements of the Part 61 MOS*" do not provide for a "*minimum period*" or "*duration*" for endorsement training, as a matter of "*necessity and practicality*" the requirements of the MOS do "*provide for a minimum*

period of time if they are complied with"[192]. However, CASA then (correctly) refers to the "*unchallenged evidence*" of Dr Stanton as to a minimum period of time an endorsement should take. The evidence of other witnesses (Messrs Awad and Arnott) supports this "*minimum*".

- CASA submits that the issue revealed by the evidence does not relate to the absence of a prescribed time an instructor must take to properly train and endorse an aerobatic pilot but "*an issue with the application of the regulatory requirements by one flight instructor*"[193].
- One difficulty with CASA's submissions on this issue[194] is that it overlooks its recent Advisory Circular AC61-09, v 1.0 on competency-based training and assessment for flight crew, when it refers to the recognition of prior learning, it provides for instructor "*verification*" of asserted prior learning by "*assessing the evidence against the requirement of each unit of competency*". However, the "*evidence*" referred to is "*prior learning self-assessment evidence*" provided by the trainee: see p 19 of AC 61-09, v 1.0. Accordingly, CASA's own advisory material creates an issue as to what the "*regulatory requirements*" required to be "*applied*" by a flight instructor, in fact are. As such, CASA's submission that Mr Field's understanding of "*competency-based*" training and how to manage recognition of prior learning is "*wrong and unsafe*", begs the question: how should a flight instructor assess a pilot's assertion of "*prior learning*"? Dr Stanton's evidence was, effectively, that such an assertion should be ignored or otherwise give rise to a need for some closer level of "*re-education*", that would add more time to the training needed.
- Again, I note the evidence of Dr Stanton that CASA could "*take on board*" the feasibility of reviewing the training syllabus or a sample syllabus of the training of flying instructors who conduct aerobatic flight activity endorsements. Respectfully, this does not align with the basis of CASA's rejection of the second recommendation.

[192] CASA submissions at paragraph 75.
[193] CASA submissions at 79.
[194] Referred to in footnote numbered 127 in Counsel Assisting's submissions on page 27.

213. I find that the overall evidence supports a recommendation of this kind. Accepting adjustments to terminology and expression, I therefore make the following recommendation:

> *CASA should consider whether all flight instructors accredited to provide training and instruction for flight activity endorsements should be required to provide a minimum period or duration of training and instruction with relevant aerobatic manoeuvres and tasks demonstrated and performed in an appropriate sequence under an approved syllabus of flight activity endorsement training.*

214. The following relates to CASA's submissions about the recommendation set out at paragraph 207 above (para 182 (iii and iv) of submissions of Counsel Assisting):

- CASA's submissions on these recommendations arise out of two pieces of evidence
    - Mr Field's training of Mr Van Hattem during which he had Mr Van Hattem demonstrate or perform the Mueller/Beggs method of spin recovery.
    - The advent of the SAN issued by the ATSB in the aftermath of the crash of a Cessna A150 Aerobat in which Mr Field's colleague, flight instructor Rory Blanning and his passenger Adam Heath, were killed on 23 June 2021.
- CASA submits that the use of an inappropriate spin recovery method by Mr Van Hattem was not a "*possible factor*" that may have contributed to the crash because "*it takes thousands of feet to recover from a spin*". Whilst that this submission is at best speculative opinion, I accept there is some force to the view that specific recommendations of the kind proposed are probably more directly appropriate to consider in any inquest that may arise into the deaths of Messrs Blanning and Heath.
- Noting that CASA cross-examined Mr Field as to his use of the Mueller/Beggs spin recovery method and noting the concern voiced by the ATSB (and by witnesses such as Mr Arnott) as to the suitability of this manoeuvre in the context of CASA's declared intent to further investigate the training and assessment that Mr Field provided Mr Van Hattem, I make the following comment that I consider is supported by the evidence that was adduced at the Inquest:

CASA is urged to include within the foreshadowed investigation a consideration of whether the Mueller/Beggs method of spin recovery should continue to be included as a component of the syllabus of flight activity endorsement training conducted by a flight instructor in a YAK 52 aircraft.

215. The following relates to CASA's submissions about the recommendation set out at paragraph 207 above (paragraph 182 (v) of submissions of Counsel Assisting):

- CASA objects to this recommendation primarily on three bases:
  - Relevance.
  - CASA has insufficient specialist knowledge and resources to review a POH.
  - There is no "*link*" between the POH of a YAK 52 aircraft and the Part 61 MOS standards.
- As to the first, the evidence of witnesses (including Dr Stanton, Mr Arnott and Mr Field) is that the POH of a Yak 52 provides the only source that identifies an appropriate spin recovery method. Various witnesses, including Dr Stanton, gave evidence as to their understanding of the content of the YAK 52 POH in relation to aerobatic and spin recovery manoeuvres. That evidence plainly related to the level and adequacy of Mr Van Hattem's pilot training for aerobatic flight activity endorsements and his aviation proficiency. I do not accept this objection on that basis.
- As to the second, CASA's submission is at odds with its own published material concerning Aircraft Flight Manuals. In its Advisory Circular AC 21-34 v1.1 of October 2022, CASA refers expressly to the circumstances in which a person may apply to CASA or a relevant approved design organization (or other person) for approval of a change to a flight manual for an aircraft. (An AFM or POH is a manual provided for an aircraft which states the approved limitations within which the aircraft is considered airworthy, as defined by the appropriate airworthiness requirements, for the safe operation of the aircraft). Accepting that CASA is not the relevant "*design authority*" for a YAK 52 aircraft, the suggestion that CASA is unable to review the POH for such an aircraft to consider whether it provides the information that CASA assumes is contained in the manual as to appropriate aerobatic manoeuvres is difficult to accept. Dr Stanton made the point in his evidence that "*What should take place in the air is whatever the flight manual says for that aircraft. That's the technique that the instructor should be using with that student, with that aircraft during flying training and at all times you fly the aircraft*". It is not plausible that experienced flying operations personnel of CASA are simply unable to consider:

- Whether a Flight Manual or POH for a YAK 52 aircraft in fact contains a relevant "*technique*"; and
- If so, whether that "*technique*" is considered to be satisfactory from an aviation safety viewpoint.

Whether the consequence of such a review is that further action by CASA, such as a new or further Advisory Circular, is needed, is a matter that CASA should be able to consider.

- As to the third ground, given CASA's insistence that the spin recovery methods referred to in the Part 61 MOS are an aspect of the theoretical knowledge that the law requires a pilot to have, it is plainly CASA's position that any review of the operational limitations or requirements of the YAK 52 POH should be addressed independently of the Part 61 MOS.

216. I therefore make the following recommendation in a simplified version of the original proposed by Counsel Assisting:

> *CASA should review the English version of the Aircraft Flight Manual or Pilot Operating Handbook for YAK 52 aircraft to ensure that it provides sufficient information for pilots relating to aerobatic manoeuvres and spin recovery techniques that enable the pilot in command to comply safely with the requirements, instructions, procedures or limitations concerning the operation of the aircraft that are set out in the AFM or POH.*

Regulatory system

217. Given the existing self-administration framework within which Warbird aircraft are operated, for both commercial and private purposes, a number of questions arise in the context of the investigation of the crash of VH-PAE concerning the way in which airworthiness and maintenance data for YAK 52 aircraft is accessed, considered and/or made available to owners, operators and maintainers of these aircraft in Australia.

218. The existence of numerous MPD's issued over the last 25 years by the UK CAA in relation to YAK 52 aircraft provide evidence of close regulatory attention to air safety issues affecting YAK 52 aircraft in the UK which appear to have received little attention to date in Australia.

219. One significant issue concerns the need for YAK 52 aircraft to be fitted with a FOD barrier to eliminate or reduce the risk of loose objects falling to the back of an aircraft during an aerobatic manouevre and causing interference with flight controls.

220. It is plain that this issue has been considered by CASA in relation to various aircraft types other than YAK 52s. For example, in 1996 an Airworthiness Directive, AD/SWSA226/75, was issued. That action

followed incidents involving various Fairchild-Swearingen SA226 / SA227 (Metro / Metroliner) aeroplanes where "*objects fell through openings in the cockpit floor and jammed the elevator and the yoke*".

221. I note the evidence of Mr Arnot at the Inquest about the modest cost of installation of FOD barriers. In recommending it to YAK 52 owners, Mr Arnot said:

> "*It takes about three hours of labour to do it properly, and a very small amount of material, so $300 ---Not a lot money*". [195]

222. Further, the ATSB has raised serious questions as to how the CASA risk mitigation process enabling AWAL to assign a PI number to a LC aircraft when granting a special certificate of airworthiness has been interpreted and applied in relation to the airframe life for YAK 52 aircraft. Although CASA has recently embarked on a review of this aspect of the PI index system, the scope of that review, CASA's objectives in undertaking that review and the extent of involvement of both CASA and AWAL in conducting that review were not comprehensively dealt with in the evidence given by Dr Stanton.

223. Against that background, Counsel Assisting submitted that it is open for me to make the following recommendations in relation to these issues; that CASA and AWAL should:

- Take action to direct the installation of foreign object damage barriers in the rear fuselage of YAK 52 whether by way of an appropriate Airworthiness Directive by CASA (subject to satisfaction of the relevant statutory criteria for issue of an AD) or, upon consultation with AWAL, by way of effecting a change to the AWAL Maintenance Schedule for YAK 52 aircraft;
- Review all UK CAA Mandatory Permit Directives and any other information available to CASA and AWAL from overseas airworthiness authorities relating to YAK 52 aircraft with a view to considering whether any or all of those directives or other information should:
    - be incorporated into the AWAL Maintenance Schedule for YAK 52 aircraft or otherwise included in an approved System of Maintenance for YAK 52 aircraft; and
    - be taken into account in assessing the airframe life limits of YAK 52 aircraft.
- Review the existing Permit Index Assessment system for limited category aircraft including its use, interpretation and application

[195] Transcript 15/12/2022, p 2-14.

by AWAL, in relation to YAK 52 aircraft, to ensure that any risks to public safety posed by such aircraft, especially if flown over populous areas, are fully, adequately and consistently assessed with, if necessary, appropriate changes or amendments being made to the provisions of *the Part 132 Manual of Standards*.

224. The following relates to CASA's submissions about these proposed recommendations:

- CASA helpfully provided a summation of the Part 132 regulatory regime, which is accepted[196]. However, little turns on CASA's submission that AWAL "*is not a self-administering aviation organisation*" but "(r)*ather, it is a 'limited category' organisation*". AWAL refers to itself as "*the administering body for LIMITED category aircraft operations in Australia*". It has a CASA approved ESAM[197]. AWAL expressly says that its ESAM "*is the document approved by CASA for the purpose of approving AWAL as a Self-administering Aviation Organisation for Limited category aircraft*".[198]
- CASA's submission that it had no knowledge that the PI number assigned to VH-PAE (in 2017) did not comply with relevant requirements (including the Part 132 MOS) because, amongst other things, it was "*not aware whether the manufacturer of the aircraft, Aerostar SA, had prescribed an airframe life for YAK 52 aircraft*…" is difficult to accept in light of the letter (dated May 12, 2005) that CASA received from Yakovlev's Chief Engineer stating, unequivocally, that "*YAK-52 life times were established subject to the type of aircraft modification*".[199]
- The evidence of the ATSB is that at the time of its registration in Australia "*VH-PAE was 15 years over its 20-year airframe life* ". It found that 40% of YAK aircraft registered in Australia were over their airframe life limit at the time of registration[200]. Plainly, the ATSB considers that YAK 52 aircraft do have an airframe life limit, and this should be taken into account when the PI system is being implemented in relation to YAK 52 aircraft.
- The submissions of Counsel Assisting on this issue are criticized by CASA as lacking appropriate "*nuance*", but are however consistent with the ATSB's evidence. Plainly, whether a pilot may perform aerobatic manoeuvres over a populous areas depends both on

[196] CASA submissions, paragraphs [96]-[110].
[197] Exhibit B1.44.
[198] Exhibit B1.44, front page.
[199] Exhibit E2.1.1 contained within the CASA file attached to Dr Stanton's statement.
[200] Exhibit C1, pp7,22.

whether the aircraft has the appropriate PI number and whether the pilot in command has the appropriate flight activity endorsements to conduct aerobatic manoeuvres, pursuant to CASR 61.380 and table 61.1145.[201]

- Although Dr Stanton did not state in his evidence that there was no approved airframe life for YAK 52 aircraft in Australia, CASA's submissions now positively assert that YAK 52 aircraft "*did and do not have*", for the purposes of the current Australian regulatory system, an "*approved airframe life*". [202] However, CASA concedes that the issue now is whether that should remain so. Positively, CASA has formulated appropriate steps it submits that it should take on this issue. [203] .
- I observe that but for the advent of this Inquest it is highly unlikely that CASA would have searched for and "*rediscovered*" the electronic file (produced by Dr Stanton) or undertaken any review of the airframe life and application of the PI assessment system in respect of YAK 52 aircraft. The ATSB had not recommended such a review and CASA's submissions[204] indicate that its pre-inquest state of "*knowledge*" did not give rise to a concern about these issues. Accordingly, I take the view that a recommendation in appropriate terms should be welcomed rather than rejected by CASA.

225. In its submissions on these three aspects, the ATSB:

- Is supportive of any safety action that may reduce the risks of FOD interfering with flight controls.[205]
- Says in light of the fact it did establish safety factor findings with respect to the identification of an airframe life for YAK 52 aircraft, it is supportive of any further safety action which reviews how information about the aircraft's airframe life is taken into account in the system of maintenance and the PI for flight over populous areas.[206]

226. AWAL's submissions on these issues are largely reflective of the evidence of Mr Pring- Shambler. In particular, AWAL:

- Is in agreement with CASA that YAK 52 aircraft do not have an approved airframe life. Although AWAL does not urge the need for a review of this issue, it does state clearly that it is "*not resistant*

[201] Not pursuant to CASR 91.185: paragraph 135 of CASA's submissions.
[202] CASA submissions at paragraph [129], [147(b)(i)].
[203] ibid at paragraphs [112],[130], [131], [146], [147(b)(ii) -(iii)] and [151].
[204] ibid at paragraph [111].
[205] Paragraph [7].
[206] Paragraph [8].

to improvements, if they are justifiable".[207] The object of the revised recommendation set out below should lead to a professional assessment of whether the determination of an aircraft life limit for YAK 52 aircraft in Australia is or is not "*justified*".

- Agrees with the recommendation proposed concerning action to mandate a FOD barrier but sees the mechanism for this as an AD rather than amendment of its Maintenance Schedules for the aircraft. I am of the view that this is an appropriate matter for AWAL and CASA to discuss as part of the suggested review.

227. Taking into account the submissions, I make the following recommendations which vary the original proposed by Counsel Assisting in this respect:

- CASA and AWAL should take appropriate steps to:
    - ensure that a risk-based assessment of the available evidence concerning incidents in which objects or loose articles have moved to the rear of YAK 52 aircraft in the course of aerobatic manoeuvres, adversely affecting elevator control of the aircraft, is undertaken; and
    - determine whether mandating the installation of foreign object damage barriers in the rear fuselage of YAK 52 is a necessary or desirable safety measure to be taken in an appropriate manner.
- CASA should undertake and complete a comprehensive review and assessment of the need to establish an approved airframe life limit for YAK 52 type aircraft in Australia having regard to:
    - the ATSB report of its investigation into the air accident involving VH-PAE;
    - relevant United Kingdom Mandatory Permit Directives;
    - airworthiness information obtained from the designer of the aircraft (A.S. Yakovlev);
    - airworthiness information obtained from the manufacturer of the aircraft (Aerospace SA); and
    - any other relevant airworthiness information and foreign state or foreign authority material that may be obtainable by CASA dealing with the issue of an appropriate airframe life for the YAK 52 aircraft type.
- CASA and AWAL should review the way in which the existing Permit Index Assessment system for limited category aircraft is

[207] AWAL's submissions at paragraph [7].

used, interpreted and applied by AWAL, in relation to YAK 52 aircraft, to ensure that any risks to public safety posed by such aircraft, especially if flown over populous areas in the course of aerobatic flights, are fully, adequately and consistently assessed in accordance with the stated objectives of the Permit Index Assessment System.

Reporting safety concerns

228. A further issue raised both in the report of the ATSB and in the course of the inquest concerned the avenues available for the reporting of air safety concerns to the appropriate authorities.

229. The ATSB administers a voluntary reporting scheme under the *Transport Safety Investigation (Voluntary and Confidential Reporting Scheme) Regulation 2012* known as REPCON. If a member of the public reports an aviation safety concern to the ATSB under this scheme, the ATSB passes it on to CASA or to the "*responsible person*" (e.g., air operator, maintenance workshop etc). It does not have a role of collating and monitoring REPCON received safety concerns over a period of time.

230. A mandatory aviation occurrence reporting framework has recently been established through legislative amendment to the *Transport Safety Investigation Regulations* administered by the ATSB. Under section 18 of the TSI Act where a "*responsible person*" has knowledge of an "*immediately reportable matter*", then the person must report it to a nominated official as soon as is reasonably practicable, by the means prescribed. This reporting framework has been expanded to set out various kinds of reportable matters in relation to an aircraft. These "*matters*", by and large, relate to ATSB "*investigable*" matters such as an aircraft accident, loss of separation standards between aircraft, a declaration of emergency and reportable aircraft incidents. A person who has knowledge of a reportable matter and who is responsible for reporting include a pilot, the owner or operator of the aircraft, maintenance personnel, the operator of an aerodrome and a sport aviation body that administers aviation activities in relation to the identified aircraft.

231. However, it does not appear that the ATSB mandatory reporting system includes disciplinary measures that a sports aviation body may administer in relation to its members. In its report, the ATSB also expressed concern about the perception of risk by an over-confident pilot and the need for "*intervention*" where there are repeated instances of "*unsafe behaviour*".[208] The issue raised here fundamentally concerns the

[208] Exhibit C1, p 18.

adequacy and effectiveness of aviation incident reporting systems, a factor that I highlighted at the hearing.

232. As the ATSB has noted, CASA has an informal voluntary aviation incident reporting scheme which is largely directed to encouraging members of the public to report aviation safety matters to CASA such as low flying complaints, health concerns about a pilot or ATC, or general aviation safety concerns. [209]

233. Dr Stanton gave evidence that self-administering sport and recreation organisations will be required to inform CASA of disciplinary measures taken when they "*transition*" as self-administering organisations under new Part 149 of the CASRs. At present AWAL has not completed that transition. [210]

234. Dr Stanton accepted that one possible interim measure to ensure that CASA can collate and monitor disciplinary action taken by self-administration organisations is to include a reporting requirement in the ESAM or exposition of the CASA approved organisation.

235. Accordingly, Counsel Assisting submits that I should make the following recommendation about this issue:

> *CASA should review the ESAM that is currently in place for AWAL and consider whether that constituent document should be amended to include a requirement or obligation that AWAL must inform CASA (within a specified period of time) of any disciplinary measure that AWAL has taken, in accordance with its rules or Code of Conduct, against a member and the circumstances in which the need for that action arose.*

236. In relation to the proposed recommendation about reporting systems I have taken into account the various submissions of the represented parties:

    - In its submissions, CASA seems to accept the utility of the objective to be achieved by the suggested recommendation in this respect [211]. However, it asserts that its current review of the AWAL ESAM will "*give effect*" to that proposed recommendation, obviating the need for it to be made. It notes that the use of the term "*transition*" in relation to the existing regulatory regime concerning aviation reporting systems is "*not correct*". This was unfortunately the term used by Dr Stanton in giving his oral evidence at the Inquest.

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[209] CASA has a statutory voluntary reporting scheme under the *Civil Aviation Act 1998*, Div 3C in relation to self-reporting by pilots and other civil aviation authorization holders who may be exposed to regulatory action by CASA and who wish to gain some level of protection from adverse regulatory action through self-reporting.
[210] Transcript 15/12/2022, pp 2-117. RA-AUS is an organisation that is required to now report to CASA disciplinary action taken by it against a member.
[211] Submissions of Counsel Assisting at paragraph [195].

- On that basis, CASA suggests a formal recommendation is now unnecessary.
- It is not clear from CASA's submissions that its current review – that it intends to complete "*in the near future*" – will cover all elements raised in the suggested recommendation.
- AWAL submits that the principal sanctions available to AWAL are a suspension or cancellation of membership and that, being a self-administering body, what disciplinary measures it takes should be at the discretion of that body for the breaches of the code of conduct and ethics (rules). It queries at what point does one draw the line in sharing information with CASA and what are the ramifications for not disciplining a member? Its submission is that internal disciplining of members and then reporting to CASA, should remain a matter between CASA and AWAL as clarified in the ESAM.
- ATSB submits that the mandatory and voluntary occurrence reporting schemes administered by the ATSB are not appropriate mechanisms by which self-administering organisations should provide details of disciplinary measures taken. This is because these schemes provide operational information to the ATSB for the purpose of conducting an independent investigation after the occurrence of an unsafe action has eventuated. It acknowledges however, there are other avenues that exist in conjunction with regulatory levers that might be exercised by those organisations, relying on information that might be reported to them, in respect of future behaviour.

237. Having carefully considered the respective submissions, the issues this Inquest has highlighted for the first time in this unique area and the awareness this brings to the interested parties as a result, I am persuaded that a recommendation about reporting is not necessary. I am comforted by Dr Stanton's forthright evidence that it is intended that the current review of AWAL's ESAM will address this issue.

> *I therefore formally make a comment to acknowledge the submissions CASA advances about this issue*[212] *and endorse the action that CASA says it is taking as a consequence.*

Pre-existing fatigue crack

238. I have noted the ATSB's concern that, upon a chemical analysis of parts recovered from wreckage, a pre-existing fatigue crack was found in the elevator bellcrank of VH-PAE which could, in time, have propagated and caused structural failure. In November 2020, the ATSB issued a safety advisory notice (SAN) to Yak-52 maintainers and owners emphasising the

[212] CASA submissions at paragraphs [227]-[231].

importance of dye penetrant inspections to remove defective elevator bellcranks from service.

239. As it appears that the AWAL maintenance schedule sufficiently responds to the SAN issued by ATSB, Counsel assisting has submitted that no further recommendation is needed in relation to the fatigue issue examined by the ATSB. I concur. In this respect, I note that AWAL has published a copy of AO-2019-027-SAN-024 on its website in relation to dye penetrant inspections of YAK-52 elevator bellcranks, for the attention of its members.

AWAL proposed recommendation

240. Finally, AWAL proposes a further recommendation could be made to require CASA to give AWAL notice of a change of registration or ownership of a Warbird.

241. The difficulty with this suggested recommendation is that AWAL was in fact aware of the change of ownership of VH-PAE in 2017 but had been informed that the new owner would not yet be flying the aircraft. It plainly had sufficient information to contact Mr Van Hattem to notify him of the membership requirements if and when he commenced flying activities in the aircraft.

242. I am of the view that this should be a matter for discussions between the organisations rather than a formal coronial recommendation.

Family statements

243. The loss of Mr Van Hattem and Ms Applebee has had a devastating impact on those left behind. At the conclusion of the evidence at the Inquest, the families of both were invited to provide statements. Statements were provided to me and I believe it suffices for me to say that those statements were heartfelt and sincere.

244. I express my sincere condolences for the losses that each of the families' have suffered and hope that the investigation and this Inquest has provided some answers. Having made the above recommendations and comments, it is hoped that improvements will be made to this aspect of the aviation industry to prevent deaths occurring in similar circumstances in the future.

245. I close the inquest.

Carol Lee

Coroner

SOUTHPORT