QUEENSLAND COURTS

OFFICE OF THE STATE CORONER

FINDING OF INQUEST

CITATION:	**Inquest into the Aircraft Crash at Lockhart River**
TITLE OF COURT:	**Coroner's Court**
JURISDICTION:	Brisbane
FILE NO(s):	Various
DELIVERED ON:	17 August 2007
DELIVERED AT:	Brisbane
HEARING DATE(s):	5 April 2007, 08 May 2007, 4-7 June 2007, 18 June – 05 July 2007
FINDINGS OF:	Mr Michael Barnes, State Coroner
CATCHWORDS:	**CORONERS: Inquest, aircraft accident, pilot training, Civil Aviation Safety Authorities oversight of aviation, crew resource management training, interaction between Civil Aviation Safety Authority & Australian Transport Safety Bureau**

REPRESENTATION:

Counsel Assisting:	Mr Ian Harvey
Family of Sally Urquhart:	Mr Terry Martin SC (instructed by Gilshenan & Luton Lawyers)
Families of Helena Woosup, Gordon Kris, Frank Billy, Fred Bowie & Mardie Bowie:	Mr Gerry Mullins (instructed by Cleary & Lee Solicitors)
Civil Aviation Safety Authority:	Mr Peter Dunning SC with Mr Andrew Luchich (instructed by Blake Dawson Waldron Lawyers)
Air Services Australia:	Mr Kevin Holyoak (instructed by Ebsworth & Ebsworth Lawyers)
Australian Transport Safety Bureau:	Mr Peter Rose SC (instructed by Australian Government Solicitor)
Jepperson Sanderson Inc.:	Mr Ron Ashton (instructed by Minter Ellison Lawyers)

Findings of the Inquest into the Lockhart River air crash

The *Coroners Act 2003* provides in sections 45 and 46 that when an inquest is held into a death, the coroner's written findings must be given to the family of the person who died and to each of the persons and organisations granted leave to appear at the inquest and to the government entities which deal with the matters referred to in any comments made by the corer and the Minster who administers such entities. These are my findings in relation to the deaths caused by the aeroplane crash near Lockhart River on 7 May 2005. They will be distributed in accordance with the requirements of the Act and placed on the website of the Office of the State Coroner.

Introduction

On 7 May 2005, a Fairchild Metro 23 aircraft was travelling from Bamaga to Cairns via Lockhart River. The aircraft had a two man flight crew and was carrying thirteen passengers. At about 11.43am, the aircraft slammed into a hillside approximately eleven kilometres north-west of the Lockhart River aerodrome. All fifteen occupants died.

These findings seek to explain the causes of the crash and make recommendations aimed at reducing the likelihood of similar incidents occurring in future.

The Coroner's jurisdiction

Before turning to the evidence, I will say something about the nature of the coronial jurisdiction.

The basis of the jurisdiction

As the police to whom the incident was reported recognised the deaths to be *"violent or unnatural"* within the terms of s 8(3) of the Act, they reported the deaths to a coroner. Section 28(1) authorises the holding of an inquest into a reportable death if the coroner considers it desirable to do so. Section 33 allows a single inquest to be held into multiple deaths[1].

The scope of the Coroner's inquiry and findings

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

- whether a death in fact happened;
- the identity of the deceased;
- when, where and how the death occurred; and
- what caused the person to die.

There has been considerable litigation concerning the extent of a coroner's jurisdiction to inquire into the circumstances of a death. The authorities clearly establish that the scope of an inquest goes beyond merely establishing the medical cause of death.

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[1] Section 33 of the Act provides that the State Coroner may investigate, or direct a coroner to investigate, at an inquest—
(a) a number of deaths that happened at different times and places, but which appear to have happened in similar circumstances; or
(b) a number of deaths that happened at the same time and place.

An inquest is not a trial between opposing parties but an inquiry into the death. In a leading English case it was described in this way:-

> *It is an inquisitorial process, a process of investigation quite unlike a criminal trial where the prosecutor accuses and the accused defends… The function of an inquest is to seek out and record as many of the facts concerning the death as the public interest requires.* [2]

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. As a result, the Act authorises a coroner to make preventive recommendations concerning public health or safety, the administration of justice or ways to prevent deaths from happening in similar circumstances in future.[3] However, a coroner must not include in the findings or any comments or recommendations statements that a person is or maybe guilty of an offence or is or may be civilly liable for something.[4]

The admissibility of evidence and the standard of proof

Proceedings in a coroner's court are not bound by the rules of evidence because section 37 of the Act provides that the court "*may inform itself in any way it considers appropriate."* 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 other proceedings and to have regard to its provenance when determining what weight should be given to the information.

This flexibility has been explained as a consequence of an inquest being a fact-finding exercise rather than a means of apportioning guilt: an inquiry rather than a trial.[5]

A coroner should apply the civil standard of proof, namely the balance of probabilities, but the approach referred to as the *Briginshaw* sliding scale is applicable.[6] This means that the more significant the issue to be determined, the more serious an allegation or the more inherently unlikely an occurrence, the clearer and more persuasive the evidence needed for the trier of fact to be sufficiently satisfied that it has been proven to the civil standard.[7]

It is also clear that a Coroner is obliged to comply with the rules of natural justice and to act judicially.[8] This means that no findings adverse to the interest of any party may be made without that party first being given a right to be heard in opposition to that finding. As *Annetts v McCann*[9] makes clear that includes being given an opportunity to make submissions against findings that might be damaging to the reputation of any individual or organisation.

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[2] *R v South London Coroner; ex parte Thompson* (1982) 126 S.J. 625
[3] s46
[4] s45(5) and 46(3)
[5] *R v South London Coroner; ex parte Thompson* per Lord Lane CJ, (1982) 126 S.J. 625
[6] *Anderson v Blashki* [1993] 2 VR 89 at 96 per Gobbo J
[7] Briginshaw v Briginshaw (1938) 60 CLR 336 at 361 per Sir Owen Dixon J
[8] *Harmsworth v State Coroner* [1989] VR 989 at 994 and see a useful discussion of the issue in Freckelton I., "Inquest Law" in *The inquest handbook*, Selby H., Federation Press, 1998 at 13
[9] (1990) 65 ALJR 167 at 168

The investigation

At approximately 12.05pm on 7 May 2005, the Lockhart River aerodrome manager, Mr Friel, became aware that the expected flight from Bamaga had not landed as scheduled. This information was brought to the attention of the Australian Search and Rescue Co-ordinator in Canberra and the local police.

At approximately 4.30pm, the accident site was located in the Iron Range National Park on the north-western slope of a ridge known as South Pap. People on board the rescue helicopter, operated by the Department of Emergency Services observed flames and smoke coming from the wreckage. There were no signs of life.

Police investigation

Following the discovery of the wreckage a major incident room was established in Cairns to allow all information to be collated and disseminated. A command post was established at the Lockhart River aerodrome which was led by Inspector Russell Rhodes. Detective Sergeant Erin Eyears of the Weipa Criminal Investigation Branch was assigned to be the principal investigator of the incident.

The police officers did not set out to determine the cause of the accident, as it was not primarily their role to do so. The police took over security of the scene, caused the relatives of the deceased to be notified and arranged for the transportation of the bodies of the victims to Brisbane for identification and autopsy. Police officers also assisted the Australian Transport Safety Bureau (the ATSB) investigators when they arrived at the scene. I would like to commend the efforts of the police and others involved in the recovery efforts for the work undertaken dangerous and treacherous conditions.

Australian Transport Safety Bureau investigation

The investigation into the cause of the accident was undertaken by the ATSB in accordance with the provisions of the *Transport Safety Investigation Act 2003 (Cwlth).* The Transport Safety Investigation Director must, as soon as practicable after completion of an investigation, publish a report in relation to the investigation.

In this instance, a multi-disciplinary team utilized the expertise of appropriately qualified and experienced aviation engineers, human factors experts and other technicians and relevant professionals. The lead investigator gave evidence that there were between five and seven officers working on the investigation most of the time and that on occasions this increased to ten. He said that the investigation was estimated to have cost approximately $2.5 million.

The final report of the investigation was published on 4 April 2007 following a comprehensive consultation process. It was of great assistance to me. It is divided into four parts. The first part contains a large amount of factual information that is considered by the ATSB to be "*pertinent to the understanding of the circumstances surrounding the occurrence*". Part two of the ATSB report – headed "*Analysis*" – contains an evaluation of much of the factual information presented in part one (although part one also contains evaluative material as well). Part three presents the findings of the authors of the ATSB report and part four records safety-related action taken by

interested parties consulted by the ATSB in the course of the TSI Director's accident investigation and includes a number of recommendations as to safety action that may be taken to "eliminate or mitigate safety deficiencies".

I consider their investigation was thorough and competently carried out. I am satisfied that it adequately engaged with the issues raised by the incident. However, there are aspects of its methodology that warrant some comment.

In 2004, the ATSB took advantage of a redesign of its occurrence database to examine other aspects of its activities with a view to utilising advances in information technology to enhance the quality of its investigation processes by modernising its record keeping, documents and exhibit management, analysis of the evidence, project management and report workflow. The Bureau is to be commended for attempting to adopt a scientific approach to what has been, in many instances treated as an art form. However, there is, I would suggest, some basis for concern about aspects of the project's outcome. In view of its recency and importance to future investigations I consider it worthwhile to record some concerns about how it will be applied.

The analysis framework that was developed as part of that project is said to *"improve the rigor, consistency, and defendability of investigation analysis activities and to improve the ability of investigators to detect safety issues in the transportations system."*[10]

A key component of the new system, including the analysis framework, is the use of standardised terminology. A significant term, a *"contributing safety factor,"* is defined as an event or condition that increases safety risk and which, if it had not occurred or existed, the occurrence under investigation or another contributing safety factor would "*probably*" not have occurred or would "*probably*" not have had such serious consequences. The Bureau settled on a 66% probability as a sufficient causal connection.

CASA, in its submissions to this inquest suggested that this was too low a threshold; that it raises serious doubts as to whether the findings in the ATSB report regarding contributing safety factors can be relied upon. In my view, the validity of such a benchmark can be challenged from at least two other perspectives. Firstly, to suggest that the accuracy of deductive reasoning or even speculative assessments to which the approach will be applied can be gauged with such precision is, in my view, misconceived. A calibration that may be ideally suited to measuring tangible items or the outcomes of chemical or physical processes may have no application to the vagaries of human behaviour.

Further, there seems no good basis for requiring the same level of certainty in relation to all possible contributing causes in all cases and seeking it solely from within the evidence gathered during an investigation. Lawyers apply what is referred to as the Briginshaw principle whereby the level of persuasion or conviction required and the evidence necessary to establish it may vary, having regard to the seriousness of the issue under consideration; the gravity of its consequences and inherent likelihood of it occurring. The ATSB should perhaps heed the warning of Justice Dixon (as he then was) who, when discussing the level of persuasion necessary to find a fact proven said *"It can*

[10] Ex D8 p11

not be found as a result of a mere mechanical comparison of probabilities independently of any belief in its reality."[11]

A number of other aspects of the ATSB's methodology also concerned CASA. The first was that the report did not disclose that this was the first investigation that had been managed under the new model which was untested. This seems of little substance: the investigation processes and the reports findings are open for scrutiny and CASA has actively participated in that in various fora. If the methodology is flawed, whether on its first application or its fiftieth, that should be exposed and this inquest should be part of that scrutiny.

Of more concern is CASA's suggestion that in its efforts to look beyond the immediate physical cause of an incident, the ATSB has created a framework that is biased towards a conclusion that organisational factors contributed to the crash. The ATSB claims to have built on seminal work by Professor James Reason whose root cause analysis model has been applied in numerous multi-factorial incident investigation contexts. The Bureau says it extended the range of factors to be considered when analysing the various possible contributions to an incident that go beyond the actions of the individuals directly involved. The lead investigator, Mr Madden, acknowledged that the model assumed that there will never be an incident that can adequately be explained by either the occurrence event and some individual actions but he did not say, as the CASA submission asserts, that there will always be organisational influences which could, if in place, have prevented the problems that resulted in the incident.

In fact, he said when cross examined by CASA's counsel that the model requires investigators at the outset to always consider the possibility of such indirect contributions "*to ensure that we don't missing(sic) anything*" but that if "*during the course of the investigation we find that , in the organisational influences area that it is indeed not the case, well, there won't be any prominence given that in the accident report* ***and it may indeed cease at around the risk control area."***

This misconstruing of the investigation model is in my view significant. It leads CASA to assert that the systemic bias creates an unwitting focus on organisations such as CASA and encourage speculative attempts to link it to the cause of the accident. This tendency can is said to be counter-productive in terms of aviation safety because:-

- it leads to a loss of focus on the *"real*" cause of the accident;
- false safety issues are created and are unlikely to be respected;
- the force of "*legitimate" findings against CASA* "in any other such report is at least diminished"...

In my view, this attack on the methodology used by the ATSB is without substance. I do not accept that by requiring its investigators to always consider whether organisational influences may have contributed to an incident, the professional judgement of those investigators is likely to be overborne.

[11] Briginshaw v Briginshaw (1938)60 CLR 336, 362

CASA contends that the ATSB had a conflict of interest that should have led to its actions being identified as one of the organisational influences that may have contributed to the crash. Further, CASA asserted that the ATSB should have refrained from investigating the incident on account of it having such a conflict.

This submission relates to the evidence of a Mr Grant, a pilot who flew for a Papua New Guinea company closely related to Transair from 1999 to 2002. He said in evidence at the inquest, that in August 2002 shortly before he left the company, he called the ATSB to relay his concerns about the way in which co-pilots who had been trained or endorsed by Transair performed when they were sent to fly for the PNG company. Mr Grant also raised concerns about the way Mr Wright, a director of both companies and the chief pilot of Transair discharged his management responsibilities.

Mr Grant says that after outlining his concerns, the person who he spoke to at the ATSB told him to put his concerns in writing. Mr Grant indicated that he did not do this as he considered that he had given enough information to cause a properly focussed and motivated investigator to look into the issues he had raised. Mr Grant was referred to CASA by the ATSB. He says that in October 2004 he repeated much of his earlier complaint after he was prompted to again call the ATSB as a result of another Transair PNG pilot whom he had previously criticised being involved in an incident when working for another operator. I am satisfied that issues raised by Mr Grant were not relevant to this accident.

After the Lockhart River crash Mr Grant again contacted the ATSB and he was interviewed by investigators.

CASA submits that the ATSB had a conflict of interest as a result of the earlier contacts and that the agency failed to adequately manage it. I do not accept that to be the case. The ATSB report discloses these earlier contacts and describes how they were handled. I do not consider that a reasonable person would be led to conclude that the ATSB was unlikely to fairly handle information given to it by Mr Grant after the Lockhart River crash just because he had contacted them about a related company before the crash. I do not therefore need to consider whether the ATSB has in place policies to adequately resolve conflicts of interest should they arise.

And finally, CASA submits that the ATSB's report assessments of the actions and procedures of CASA are presented in a distorted, unbalanced and unfair manner. The submission also asserts that Mr Madden accepted this to be the case but as the transcript excerpt quoted in support of this contention makes clear, Mr Madden was responding to compound questions. It is by no means certain whether he was agreeing to the suggestion that certain information was not included in the report or that the omissions were the result of a lack of balance or impartiality.

In any event, the extent to which reliance can be placed on the report is, in these proceedings, a matter for me to determine. While I might not necessarily agree with each and every conclusion drawn by the ATSB, I see no reason to conclude that there has been any deliberate skewing of the evidence: of necessity, not all information gathered in such an investigation can be included in the final report and reasonable minds may differ on what

should be excluded without either being biased. Nor do I consider that the investigation model or framework led to any unconscious bias.

In prosecuting these allegations over ten pages of its submissions, CASA reminds one of the oft quoted observations made by Hamlet's mother, Queen Gertrude, when viewing the travelling players. CASA's submission seeks to down-play the allegation of bias by concluding with what seems to me a disingenuous assurance that they are not alleging that it was intentional but rather the result of structural problems with the ATSB's new investigation system. That disclaimer is not consistent with the earlier attacks on the impartiality of the report which I have only briefly summarised here.

CASA had senior, expert legal representation who I'm sure would not have made such a sustained attack on the integrity of the ATSB investigation report without explicit instructions. In my view, these protestations are symptomatic of serious, ongoing animosity between the two organisations that needs redressing. I shall return to the issue in the recommendation section of these findings.

The inquest

Because of the extent of the ATSB investigation and the detailed nature of its report, a decision was taken to avoid re-investigating all of the issues connected with the crash. For that reason a number of directions hearings were held with a view to identifying the issues in relation to which oral evidence should be called.

At the first such hearing held in Brisbane on 5 April 2007, Mr Harvey was appointed counsel assisting me. Leave to appear was granted to the families of Sally Urquhart, Frank Billy, Fred Bowie, Robert Brady, Gordon Kris, and Helena Woosup all of whom were passengers on the plane. Other parties granted leave to appear included the ATSB, the Civil Aviation Safety Authority, Jeppesen Sanderson Pty Ltd, and Air Services Australia. All were invited to make submissions on what issues should be explored at the public hearings and which, if any, of the ATSB's conclusions should not be accepted. A further directions hearing was held on 8 May 2007 and the issues to be explored at the inquest and the witnesses to be called to give oral evidence were outlined.

The hearing proper commenced on Thursday Island on Monday, 4 June 2007 and proceeded over four days. This was done to afford members of the northern peninsular area (NPA) community, so dreadfully impacted by the crash, an opportunity to attend and hear the expert evidence in relation to the aspects of the investigation which they were particularly interested. It also provided family members with an opportunity to meet with in private with the Detective Inspector Aspinall, the officer in charge of the coronial support unit, to learn what they wished concerning the recovery of the bodies of their relatives.

The hearing was then adjourned to Brisbane and resumed on Monday, 18 June 2007. The remainder of the hearing continued over fourteen days. Twenty witnesses gave evidence and one hundred and seventy exhibits were

admitted into evidence. While some families of the deceased did not seek leave to appear at the inquest, they continuously consulted with those assisting me prior to the commencement and throughout the hearing of the inquest on Thursday Island and in Brisbane.

I was greatly assisted by the very experienced lawyers who participated in the hearing and made detailed written submissions after the close of evidence.

The evidence

I turn now to the evidence. I cannot, of course, summarise all of the information contained in the exhibits and transcript but I consider it appropriate to record in these reasons the evidence I believe is necessary to understand the findings I have made.

History of the Airline

The operator of the incident flight was Lessbrook Pty Ltd trading as Transair Australia (Transair). The Civil Aviation Authority (CAA) issued an initial Air Operators Certificate (AOC) to Transair on 17 May 1989 that authorised the company to conduct charter operations in Cessna Conquest, Mitsubishi MU2 and Rockwell 690 turbo-prop aircraft. The CAA subsequently varied Transair's AOC to authorise the operation of other types of aircraft and in July 1994, the AOC was varied so that it could operate the Fairchild SA226-TC Metro II and SA227-AC Metro III series turbo-prop aircraft.

Until 1999, Transair was engaged in charter operations within Australia and on an international route between Australia and Papua New Guinea. On 29 October 1999, CASA authorised Transair to conduct regular public transport cargo-only operations between Australia and Papua New Guinea. CASA subsequently withdrew that authorisation on 15 December 1999 due to Transair using the Metro II aircraft, VH-TFQ, on the Papua New Guinea route. That aircraft was not approved for regular public transport operations. In September 2001, Transair was authorised to conduct regular public transport passenger operations between Christmas Island and Jakarta, Indonesia. The following month, CASA approved Transair to conduct regular public transport passenger operations within Australia on the Cairns – Bamaga route.

During 2002, Transair also operated a helicopter operation based near the Gold Coast. In 2004, Transair's regular public transport operations increased significantly when the company expanded its services to link Sydney with Inverell, Gunnedah, Coonabarabran, Cooma, Grafton and Taree in New South Wales. This expansion was under the name Big Sky Express Pty Ltd. Further in 2004, CASA also approved the expansion of services by Transair to include a service from Inverell to Brisbane.

The incident aircraft

VH-TFU was a Fairchild Aircraft Inc. Metro 23 aircraft. It was a twin engine turbo-propeller, plane with a pressurised cabin that was certified to carry up to 19 passengers and two crew members. It was previously owned and operated by a regional airline in Mexico. The aircraft was sold by that airline in February 2003 to a leasing company before being purchased by Transair and imported into Australia in June 2003. The aircraft was issued with an Australian certificate of airworthiness on 4 July 2003. At that time, the aircraft had a total time in service of 24,704.7 hours and 27.078 cycles.

All parties at the inquest accepted that no evidence exists that would suggest any the failure of the engines, airframe or navigational instruments on VH-TFU contributed to the accident.

The crew

Captain Brett Hotchin was born on 13 December 1964. He was a much loved son, brother, cousin, uncle and friend to many. He was passionate about flying from a young age. Captain Hotchin was forty years of age at the time of his death.

Timothy Down was born on 25 July 1983. He was a prefect at his high school before commencing university studies. Prior to graduating he began studying to become a pilot. He was a gifted athlete competing in a variety of sports including triathlons. He was twenty-one years of age at the time of his death.

The passengers

There were thirteen passengers on board the incident flight all of whom boarded the aircraft at Bamaga.

David Banks was a devoted husband to his wife Anne of almost forty years and a loving father to their three children. Dr Banks was best known in his career as a veterinary scientist for his work on the control and eradication of livestock diseases. He played a pivotal role in protecting Australia from exotic pests, particularly in the development of bio-security and quarantine policy. He was fifty-five years of age at the time of his death.

Frank Billy was born on 23 March 1984 on Thursday Island. After finishing high school, he commenced an apprenticeship in carpentry and was employed with the Injinoo Shire Council. He was a dedicated family man and beloved partner to Emily Kepa, and father to their three children. He was twenty-one years of age at the time of his death.

Fred Bowie was a talented track and field athlete who was given the opportunity to travel to Canada when he was fifteen to compete with the Australian Schools Athletics Team. After school, he undertook an apprenticeship in carpentry and joinery with the Injinoo Shire Council and was due complete his trade in November 2005. He was beloved partner to Florence Kepa, and father to their four children, the youngest of whom was born after the accident. He was also actively involved in his local community. He was twenty-five years of age at the time of his death.

Mardie Bowie was born at Thursday Island on 23 November 1974 and at the time of her death, was employed as a sports and recreation officer with the Bamaga Shire Council. She was a loving wife to her husband Francis of six years and a beloved mother to their two children. She was also took an active role with her extended family. She was thirty years of age at the time of her death.

Robert Brady was a much loved son, grandson, husband and brother. He was a qualified diesel mechanic and travelled internationally with his trade. At the time of his death, he was employed with Heritage Four Wheel Driver Tours as a tour guide. He was thirty-five years of age at the time of his death.

Edward Green was working at Turtle Island at a remote pearl seeding business prior to his death. He was also gaining valuable experience to

advance his intended career as a ship's master. He is survived by his wife and close family. He was thirty-five years of age at the time of his death.

Kenneth Hurst was the managing director of a drilling supply company. He enjoyed recreational fishing and travelled to Bamaga a few times for this purpose. He was a much loved son, brother, husband, father and friend. He was fifty-five years of age.

Gordon Kris was devoted to his partner of seventeen years Elizabeth Stephen, and father to their seven children. At the time of his death, he was in his final stages of his apprenticeship in cabinet making. He was thirty-seven years of age.

Noel Lewis was a much loved brother, husband and father. He was actively involved in the Australian Drilling Association and served as Queensland Branch President as well as being a representative on the Queensland Drillers Licensing Advisory Committee. He was forty-eight years of age.

Paul Norris was born on 9 December 1970. Prior to his death, Captain Norris was employed as a pilot with Aero-tropics based on Horn Island. On the day of the accident, he was travelling to Cairns to meet his wife Fiona Curren so they could celebrate their fourth wedding anniversary. He was thirty-four years of age at the time of this death.

Arden Sonter was a much loved husband, father, brother and son. At the time of his death, he was residing with his family in Bamaga and was employed as the Chief Executive Officer of Bamaga Enterprises Limited. He was forty-four years of age.

Sally Urquhart was born on 30 March 1977 in Wondai. She graduated from Griffith University with a Bachelor of Laws (Honours) and commenced employment with the Queensland Police Service. At the time of her death, she was a serving member of the Queensland Police Service stationed at Bamaga with her fiancé, Trad Thornton, a fellow police officer. On the day of the accident, she was travelling to Townsville to participate in a Constable Development Program. She was not only gifted academically but athletically, representing the State in touch football. She was twenty-eight years of age at the time of her death.

Helen Woosup was born on 6 September 1979 in Cairns. She was a devoted partner to Mimia Whap and mother to their five children. She was employed as a trainee sports and recreation officer for the Injinoo Shire Council. She was also an active member of her local community. She was twenty-five years of age.

The effect on the NPA communities

Obviously all of the families' of the deceased have suffered a terrible loss as a result of this incident. However, the loss goes beyond the purely personal for the Northern Peninsular Area communities who lost four Indigenous members, a well respected police officer and a senior administrator.

Mr Robert Bagie, the step-father of Mardie Bowie and a senior member of the Injinoo Aboriginal Shire Council gave evidence at the inquest about the affect that this accident has had on the local community. Mr Bagie said that the impact had been significant, not only on the families involved but on the northern peninsular area communities as a whole. Everyone was related to or had close personal ties with one or more of the people who died. Many people in the community are now afraid to fly and would choose to drive to Weipa and Cairns in order to avoid flying, even though these journeys take up to five and sixteen hours respectively. This places a great strain on community members as few have vehicles of the necessary standard to travel such distances. Further, during the wet season the roads are closed for long periods.

Mr Bagie told the court that some members of the community chose to travel from Bamaga to Cairns by sea. This is a two day trip and as one can imagine, very expensive. Mr Bagie told of a loss of confidence throughout the community in both the authorities and the airlines and that a fear of flying had the affect of further isolating an already remote community.

A young man in Injinoo told me that as well as losing his sister in the crash, two of his team mates from the local football team also died. As a result, there is now not much enthusiasm for football in the community, whereas previously games were a major social event.

I extend the families and friends of all those killed in this crash my sincere sympathy and condolences.

Relationship between Trans Air and Aero-tropics

In September 2001, Transair entered into a commercial arrangement with Aero-tropics to provide a regular public transport service between Bamaga and Cairns. This was a result of a regional airline affiliated with the Ansett Australia group ceasing its services in this area. An agreement was reached between Mr Lippman and Mr Wright that Aero-tropics would be responsible for advertising the service, ticketing passengers and ground handling, while Transair supplied the aircraft, fuel and pilots from its Cairns base. This arrangement was extended in 2004 to include regular public transport services into Lockhart River twice a week. The aircraft was the subject of an undocumented “wet” lease (or “operated” lease) arrangement between Transair and Lip-Air Pty Ltd trading as Aero-Tropics such that the flight from Bamaga was conducted as Aero-Tropics flight HC675.

Approval to operate RPT flights

CASA authorised Transair to conduct regular public transport operations in the Metro aircraft between Cairns and Bamaga on 5 October 2001. Prior to this date, Transair’s AOC only authorised regular public transport operations between Christmas Island and Jakarta, Indonesia. Similarly, Aerotropic’s AOC was limited to regular public transport operations on piston engine aircraft and did not extend to the use of Metro aircraft.

Despite at the time, neither Aerotropic’s AOC or Transair’s AOC, authorised an RPT service using turbine aircraft on the Cairns Bamaga route, an article appeared in the Cairns Post newspaper on 22 September 2001 informing

readers that Aero-tropics had restored flights between Cairns and Bamaga as at 17 September 2001. Further, a fixed schedule for Aero-tropics flights from Cairns to Bamaga was published in the Cairns Post on 22 September 2001 and continued to be published on subsequent days prior to 5 October 2001, when CASA's approval for the route was obtained.

In evidence at the inquest, Mr Lippman claimed to have obtained legal advice at the time and relied on the fact that Aero-tropics classified the service as a "charter service" rather than a "regular public transport service". Mr Lippman told the court that passengers were made aware that the service was a charter service but conceded that passengers were most likely informed of this only after they had purchased their tickets. Further, Mr Lippman conceded that although Aero-tropics classified the service as a charter operation, it did have a fixed schedule, operated from a fixed terminal and a single seat ticket could be purchased by any member of the public.

A similar artifice was engaged in when, in 2004, Aerotropic decided to add Lockhart River to the ports it serviced. An article was published in the Cairns Post newspaper on 20 August 2004 informing readers that the additional service to Lockhart River would commence operating on 28 August 2004. CASA only granted approval to conduct regular public transport services into Lockhart River on 5 October 2004. Initially in evidence, Mr Lippman claimed that while "marketing flights" were operated at this time, no commercial flights operated prior to 5 October 2004.

The evidence, however suggests that between 28 August 2004 and 5 October 2004, TH-TFU was operated into Lockhart River on fourteen separate days including twenty-two landings. Mr Lippman was not able to offer any reasonable explanation of the basis on which this service lawfully operated into Lockhart River prior to 5 October 2004.

Pilot training

Captain Brett Hotchin Mr Hotchin was an experienced commercial pilot with more than 6000 flying hours including some 3,248.5 hours flying Metro aircraft in a multi-crew operational environment. He completed his endorsement on the Metro in 2001 and his training on the use of GNSS for en-route navigation in 1997. He obtained his endorsement to conduct RNAV (GNSS) approaches in 2001.

First officer Timothy Down obtained his commercial pilots licence and instrument rating in early 2004 and obtained a co-pilot Metro 3 endorsement in December 2004. He had a total of 655 flying hours. First officer Down did not have any training in the use of GPS nor in the conduct of RNAV (GNSS) approaches. More details and a critique of the training provide to the air crew are set out later in these findings.

It is convenient at this point to provide a brief explanation of some of the flight rules, instrument ratings and approach procedures that pilots must observe or use in circumstances that prevailed during the incident flight.

Flight rules and pilot ratings

Where a pilot wishes to conduct a flight he/she may do so in visual meteorological conditions (VMC) complying with the visual flight rules (VFR) prescribed under the Civil Aviation Regulations (CARs). Generally speaking, this means that the pilot in command (PIC) must navigate by visual reference to the ground (or water) and clear of cloud.

If the weather conditions do not permit the conduct of a flight in VMC, the flight can only be conducted:

(a) if the PIC holds a current instrument rating; and
(b) if the aircraft is flown under the prescribed instrument flight rules (IFR).

When conducting an IFR flight, the pilot in command must follow the instrument approach procedures approved by CASA in respect of the aerodromes used. The pilot in command's instrument rating must be endorsed with the relevant instrument approach procedure that the pilot wishes to use. In relation to the last flight of VH-TFU, the flight crew announced over the aircraft's radio that they were undertaking an RNAV (GNSS) instrument approach to land at the Lockhart River aerodrome.

RNAV (GNSS) approaches

RNAV (GNSS) stands for Area Navigation (Global Navigation Satellite System) approach. The GNSS is a satellite navigation system used by a pilot on board an aircraft to determine the position of the aircraft from satellite data. Thus, specific navigational equipment must be installed in the aircraft to enable the approach procedure to be used. This approach is used as an alternative to an approach using visual flight rules or other IFR navigational aides such as a non directional beacon (NDB), or an instrument landing system (ILS).

Instructions issued by CASA (under CAR 179A (1)) detail how a pilot in command of an aircraft operating under the instrument flight rules may use the Global Positioning System (***GPS***). Among other things, the instructions detail the procedures for using GPS for carrying out RNAV (GNSS), approaches.

The RNAV (GNSS) approach is a non-precision instrument approach procedure that provides pilots with lateral and/or longitudinal guidance to a runway. (In contrast, a "precision" approach procedure in Australia involves an instrument landing system that provides the pilot with both lateral and vertical guidance.) The RNAV (GNSS) type of procedure was designed in the late 1990s and procedures for particular aerodromes throughout Australia are published in the Aeronautical Information Publications produced by Air Services Australia.

An RNAV (GNSS) approach procedure is said to provide enhanced safety benefits by allowing a runway-aligned straight-in approach to a destination aerodrome via a series of "waypoints" – locations in space with specific latitude and longitude positions that are pre-programmed into a GPS receiver on board the aircraft.

To conduct an RNAV (GNSS) approach, the pilot must select a pre-programmed approach in the GPS receiver and select one of several available initial approach fixes (IAFs). By setting the GPS approach switch to the "arm" position at a specified distance from the destination aerodrome and entering the correct altimeter setting of that aerodrome, the GPS then provides navigational guidance to the selected IAF. A course deviation indicator (CDI) on the GPS unit displays any lateral navigation error. (In VH-TFU the pilot in command, but not the co-pilot, could also obtain the CDI information on the Horizontal Situation Indicator located on the instrument panel directly in front of the pilot in command.)

However, a pilot must also read the applicable RNAV(GNSS) approach chart virtually as an orientation aid to cross-check the information obtained from the GPS and to ensure that he/she has the correct descent profile for the approach. Most importantly the charts provide the vertical navigation clues that the pilot needs, with the chart diagrams showing minimum segment altitudes for the steps in the approach and the distance/altitude tables contained in the charts enabling the pilot to determine the correct height profile of the aircraft.

The altimeter in an aircraft is the most important instrument for vertical navigation. The reference point for the altimeter and for the charts used by the pilot is mean sea level (MSL). The atmospheric pressure at mean sea level at any one place changes or varies from time to time as various pressure systems (depicted in synoptic charts) move across the country. For aviation purposes the actual MSL pressure at any one place is called the QNH. A pilot may set the QNH in the sub-scale of the altimeter so that the altimeter will indicate the altitude of the aircraft above mean sea level at that place. By using the charts to know the height of terrain (or height of obstructions on the ground) the pilot uses the altimeter reading to determine the vertical clearance of the aircraft above the ground.

Design of RNAV (GNSS) approaches

Australian RNAV (GNSS) approaches are designed with five waypoints, each with a five-letter name. Within an approach, the first four letters of the waypoint are the same, representing the three-letter airport identifier – thus LHR for Lockhart River – followed by a letter indicating the direction from which the aircraft travels during the final approach (eg W for west). The fifth letter identifies which waypoint the aircraft is approaching. The fifth letters of the initial waypoint are, for example, E, D or G. The final four waypoints have standard fifth letters – "I" for intermediate fix, "F" for final approach fix, "M" for missed approach point and "H" for the holding point beyond the runway when a missed approach is conducted.

The design of RNAV (GNSS) approaches in Australia seeks to accord with standards established by the International Civil Aviation Organisation with runway aligned descent paths having an optimum slope of three degrees (and not more than 3.5 degrees for approaches used by larger aircraft) and with waypoint distances of five nautical miles (9km) whenever possible. However, the design of the Lockhart River approach produced a compromise of some of these parameters.

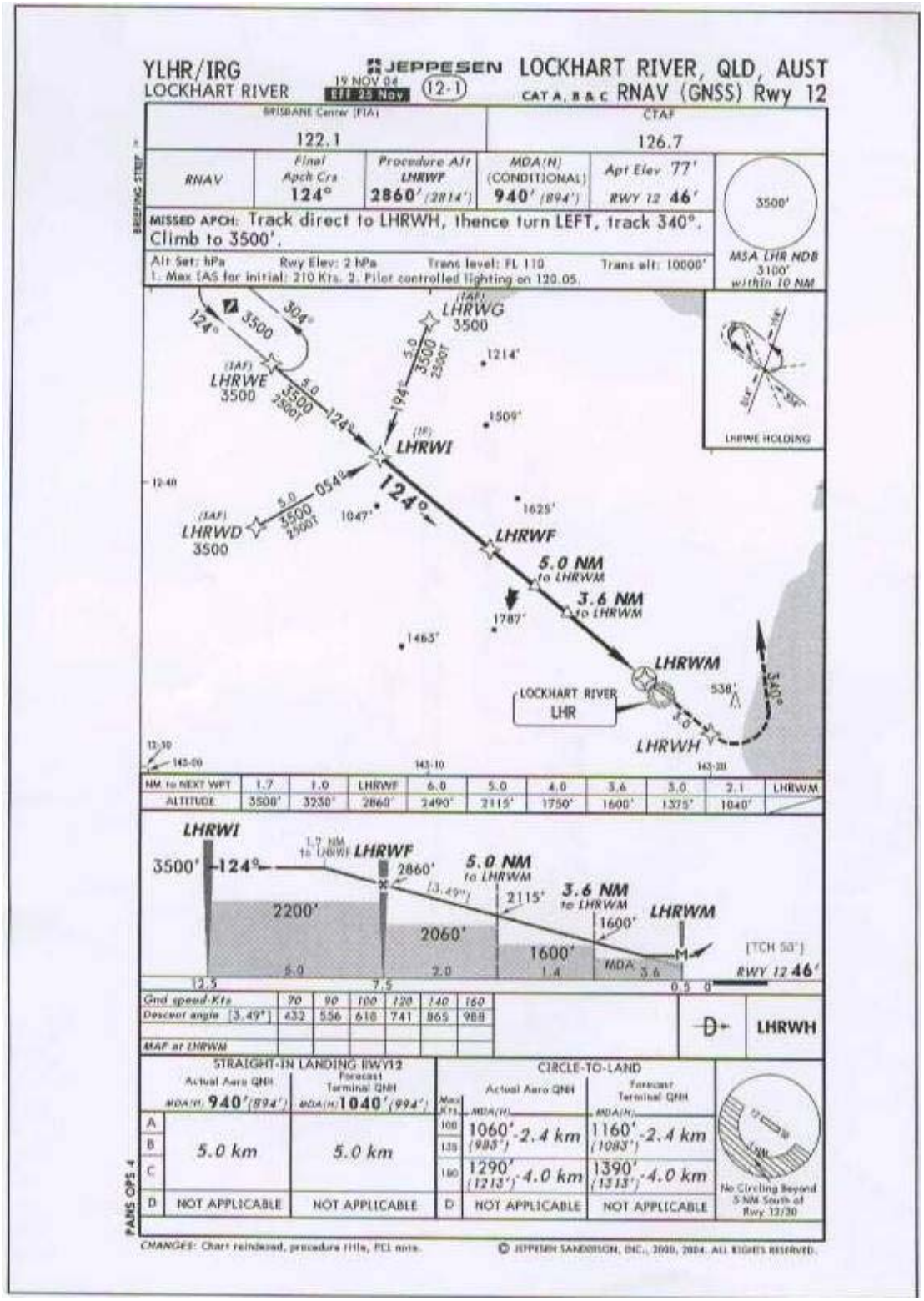
Due to the surrounding topography, the final approach path was offset five degrees to the north of the extended runway centreline. The descent path was 3.49 degrees and the final leg of the approach was seven nautical miles, two nautical miles longer than optimum. Each segment of the approach had a minimum safe altitude. Unusually, due to terrain constraints, the final segment of the approach had three altitude limiting steps rather than just one. Overall the RNAV (GNSS) approach into Lockhart River aerodrome may be described as sub-optimal.

In a research report published by the ATSB in December 2006 entitled "Perceived Pilot Workload and Perceived Safety of RNAV (GNSS) Approaches" the responses of nearly seven hundred and fifty pilots to a questionnaire on RNAV (GNSS) approaches were analysed. A number of the pilots responding to the questionnaire expressed concern about aspects of the design of the approaches, especially the display of a distance to the next waypoint rather than a reference to the missed approach point. The report notes that 21.5 % of RNAV (GNSS) approaches in Australia had "short and irregular segment distances, and/or multiple minimum segment altitude steps" – characteristics that were viewed by the pilots as a major concern.

Flight instructors surveyed said that the most frequent problem affecting their trainees was difficulty in maintaining situational awareness, which was "*often related to becoming confused about which segment they were in and how far away they were from the runway threshold".* Misinterpreting the aircraft's position by misreading the step-down profile of the aircraft or descending below the constant angle approach path were among some of the concerns raised by the pilots surveyed. However, a consensus view was that the utility of a runway aligned straight in approach was of benefit with thirty percent of the pilots surveyed saying that they believed that RNAV (GNSS) approaches increased safety.

The diagram below depicts the Lockhart River Runway 12 RNAV (GNSS) approach chart[12].

[12] Ex D5



The incident flight - northbound

On the morning of 7 May 2005, Captain Hotchin and First Officer Down were rostered to fly the regular scheduled Cairns – Lockhart River – Bamaga – Lockhart River – Cairns route.

The aircraft departed Cairns at 8.31am. The evidence indicates that Co-pilot Downs, was the handling pilot for the northbound flight, i.e. he was manipulating the controls to fly the plane while the pilot in command (PIC), Captain Brett Hotchin, was making the radio transmissions. The non handling

pilot is also responsible for checking everything the other pilot does; particularly in IFR landings, it is essential that the non handling pilot guide and confirm the handlings pilot's actions through the various stages of the final approach.

The aircraft landed on schedule at Lockhart River shortly before 9.50am and departed, ahead of schedule, at 9.58am arriving at Bamaga at 10.39am.

Mr Riley, a baggage handler at the Bamaga airport gave evidence that he was responsible for ticketing passengers as well as loading luggage and freight onto the flight for the journey back to Cairns. He explained that the normal practice was for Aero-tropics to send him a passenger manifest by facsimile transmission. The passengers would then be marked off and the manifest would be sent back to Aero-tropics in Cairns.

Mr Riley recalls undertaking the usual duties associated with his job on the morning of the incident flight. He recalls seeing both Mr Hotchin and Mr Down board the aircraft for the southbound leg. Whilst at Bamaga, he had a lengthy conversation with the Mr Hotchin who commented about the "*terrible*" weather at Lockhart River on the way up and said that "*if the weather was the same on the way back down he wasn't going to land in Lockhart*".

The incident flight - southbound

The incident flight departed Bamaga bound for Cairns via Lockhart River at 11.12am. Due to a malfunction of the cockpit voice recorder (CVR) in the aircraft, no recordings of conversations between the pilots during the last flight were available to accident investigators.

Who was the handling pilot?

There were no radio transmissions made by Mr Hotchin on this sector. There were however a number of radio communications between Mr Down and Air Services' air traffic control centre and broadcasts by him on the Lockhart River common traffic advisory frequency (CTAF). This evidence strongly suggests that Captain Hotchin was the handling pilot for this sector. This would be consistent with company policy of the Captain and the First Officer flying sector about. Examination of the track flown into Lockhart River on the journey north provides some corroboration for this conclusion. ATSB operations experts say the plane was not flown with the same degree of accuracy or precision one would expect of a pilot with Captain Hotchin's experience and as was demonstrated on the corresponding approach on the return trip. I am satisfied that Captain Hotchin was the handling pilot on this sector.

The weather

At the time of the accident, the weather conditions around Lockhart River would not permit aircraft to be operated under visual flight rules but only under instrument flight rules in instrument meteorological conditions (IMC). Consistent with the Bureau of Meteorology forecast, low cloud was present with a cloud base between 500 ft to 1000ft above mean sea level and the cloud tops at about 3000 feet. There was intermittent drizzle or occasional rain showers. The wind was predicted to be from the south-east gusting at about fifteen knots with the possibility of stronger winds up to twenty-five

knots over the South Pap ridge (and possible wind shear over the ranges north west of the airport).

The descent towards LHR

At 11.39am Mr Down broadcast via the CTAF that they were conducting a runway 12 RNAV (GNSS) approach, that the aircraft was at the “Whisky Golf” (LHRWG) waypoint and tracking for the “Whisky India” (LHRWI) waypoint.

The plane had descended to the correct altitude of 3500 feet by the time it reached LHRWG but its airspeed was 229 knots (nautical miles per hour) when the correct speed for this point on the approach was 140 knots.

At about this time Mr Down advised the pilot of another plane operating in the area that the weather conditions in the Lockhart River area were “*Ah, fairly dismal really, [a]bout nine hundred foot clear…..[indistinct: clearance or clearing]*. This must have been based on his observation on the way north earlier in the day.

The approach profile of the aircraft indicates that as VH-TFU turned at the intermediate fix waypoint (LHRWI) at 11.41:07am, the aircraft was at an altitude of 3,596 feet and travelling at an indicated air speed of 176 knots, some 46 knots above the appropriate speed. The aircraft then descended to approximately 3000 feet - this may well have been the cloud top - before levelling at that altitude for approximately two miles and commencing a further descent some 1.4 nautical miles before the next waypoint which was the final approach fix (LHRWF).

From when the plane descended to 3000 feet just past Whiskey India, it was flying below the proper profile and far faster than approach charts indicated was appropriate. It never came back within those bounds.

The manoeuvring of the aircraft from this point on resulted in the aircraft departing from the descent path and not adhering to the descent points identified on the Jeppesen approach chart for the 3.49-degree constant angle approach. However, it was not until the aircraft passed LHRWF that it descended below the minimum safe altitude of 2,060 feet at 11.43 hours, some twenty-eight seconds before impact with terrain.

During this last part of the flight the plane, at one stage was descending at over 2400 feet per minute and averaged 1700 feet per minute when the appropriate rate was 630 feet per minute. During this time, its air speed was between 177 and 158 knots when it should have been only 130 knots.

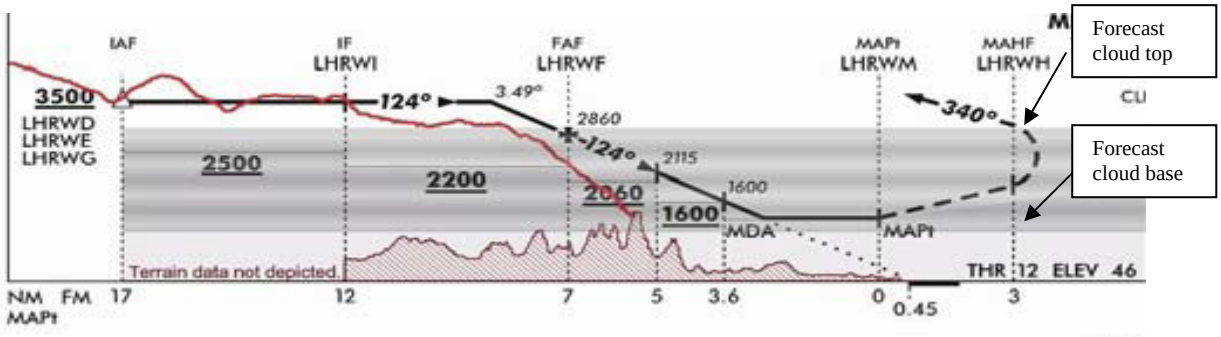
At 11.43am, the aircraft flew into the northwest side of South Pap at an altitude of 1292 feet when it should have been 2320 feet above sea level. It was approximately eleven kilometres north-west of the Lockhart River aerodrome. It is likely that the crew only became aware of the inevitable impact seconds before the collision as no steps were taken to divert or “pull up” the aircraft.

It seems likely the aircraft entered cloud at about 3,000 feet above mean sea level and was probably in IMC for most of the final ninety seconds of flight. With a cloud base predicted to be between 500 and 1000 feet and Mr Down’s estimation of the cloud being down to 900 feet, it is likely that from soon after

the plane passed the intermediate waypoint, LHRWI, the ground was, for all or much of the time, obscured by clouds.

The data from the flight data recorder indicates that the aircraft experienced increasing turbulence during the final twenty-five seconds of flight with increasing mechanical turbulence from the South Pap ridge line in the last five seconds of flight, with a loss of airspeed at that time consistent with wind shear. The evidence does not, however, suggest that the flight crew lost control of the aircraft by reason of the weather conditions. I consider the available information indicates that the crash was the result of controlled flight into terrain.

The diagram below depicts the approach profile of TH-TFU compared to the Air services Australia Runway 12 RNAV (GNSS) approach chart. The profile was created by the ATSB as a result of its analysis of the flight data. It was accepted by all parties as accurate.



The post accident response

Mr Peter Friel is employed by the Lockhart River Aerodrome Company as the Chief Executive Officer. At about 11.40am, he recalls hearing a radio transmission announcing that VH-TFU was in the area. Further, he recalls hearing a conversation concerning the weather, between one of the pilots on board the incident flight and a pilot with a call sign of Papa Alpha Romeo (PAR). Following the announcement from a pilot on the incident flight that the aircraft was in the area, Mr Friel pre-empted their landing by recording the flight details on the landing sheet.

Approximately twenty-five minutes later, Mr Friel cancelled the entry he had made in the landing sheet assuming that the crew had decided not to land at Lockhart River due to the weather conditions. After a further fifteen minutes, given that the pilots had not advised him of their intention to continue on to Cairns, Mr Friel contacted Aero-tropics. Enquiries were then made by Aero-tropics and a short time later, Mr Friel was contacted by Mr Richard Blackwell of Search and Rescue in Canberra. When it was established that the aircraft was not in radio contact, Mr Friel contacted the local police.

After becoming aware that an aircraft was missing and had not landed as scheduled at Lockhart River, Sergeant Musumeci, the officer in charge of the police division, began driving from the Archer River Roadhouse to the Lockhart River aerodrome. He was aware that an emergency helicopter was in transit to the aerodrome and that a major incident room had been established in Cairns. Initially, Sergeant Musumeci was in contact with

Constable Beattie in Lockhart River and instructed him to make arrangements to get from the local council supplies and equipment that might be needed to reach a crash site.

These were readily forthcoming and by the time Sgt Musumeci arrived back at LHR, news of the crash had spread throughout the community and a small crowd had gathered at the airport hoping to be able to assist in any rescue operation.

Sergeant Musumeci arrived at the aerodrome at approximately the same time the emergency helicopter landed at about 4.30pm. A short time later, he was informed that the crash site had been located and so he then boarded the helicopter to make an immediate inspection. While hovering over the wreckage, Sgt Musumeci and the pilot, Mr Kempton, concluded that the terrain, topography and thick vegetation made it too dangerous for the helicopter to land. Low cloud was present; there was strong wind and rain which even made it difficult for the helicopter to remain in a stable position.

Sergeant Musumeci and Mr Kempton discussed their observations. They could see that a large amount of the area which had been affected by fire, some of wreckage was still burning and had smoke coming from it. No signs of life were apparent and in view of the devastation they could see, it was concluded that there was no reasonable prosect of any of the plane's occupants having survived the crash.

Due to the weather conditions and the diminishing daylight, it was decided to commence the search the next day at first light.

On the afternoon of 7 May 2005, Inspector Rhodes was responsible for co-ordination of the major incident room in Cairns. He organised for the police air wing to be put on stand-by and arranged for a number of other police to accompany him to Lockhart River using the police air wing. They departed Cairns at approximately 4.00pm.

Upon arriving at Lockhart River, a command post was established at the aerodrome in order to co-ordinate the recovery efforts. Inspector Rhodes discussed with Sergeant Musumeci his observations of the crash sight and he was made aware that it was highly unlikely that anyone had survived. Planning continued throughout the evening for the tasks to be undertaken the following day.

Soon after first light on 8 May 2005, Inspector Rhodes and Senior Constable Crawley boarded the emergency helicopter to inspect the crash sight. Senior Constable Crawley was lowered down to the crash sight. He quickly established that there were no survivors.

The retrieval of human remains and DVI

The Queensland Police Service Disaster Victim Identification Squad were deployed to the crash site to recover the human remains and arrange to transport them to the John Tonge Centre, Brisbane, for positive identification.

The six DVIS officers who formed the Recovery Team were accompanied by four officers from the Special Emergency Response Team (SERT), six Australian Transport Safety Bureau (ATSB) officers, and two Queensland Ambulance Service (QAS) paramedics. A Scenes of Crime Officer was also on site on the first day of the recovery operation to record the scene photographically.

The recovery operation was conducted over a three day period. The process was hindered by steep slippery conditions and very thick rainforest. The weather conditions varied from thick fog which prohibited access to the crash site on a number of occasions to heavy rain which further increased the hazardous task.

The SERT officers established a landing zone for the rescue helicopter. They also constructed a pathway to the crash site as well as a clearing which was used to enable the recovered human remains to be winched out by helicopter.

Using internationally recognised procedures designed to ensure continuity of evidence and accuracy of identification of human remains, they extracted the human remains from the aircraft wreckage and transported them to a holding area at the Lockhart River airport, where the government undertaker prepared them for transfer to the John Tonge Centre. At the John Tonge Centre, autopsies were undertaken and other identification procedures were completed.

Ante-mortem information was collected from the families and friends of the victims at Cairns, Bamaga and Brisbane by a number of DVI Ante-Mortem teams. Medical and dental records along with other relevant items were also collected. A DVI Reconciliation Centre was established in Brisbane to facilitate the comparison of ante-mortem and post-mortem information to establish the positive identification of the victims.

The positive identification of all fifteen victims of the crash was finalised by 26 May 2005. This was a remarkable achievement considering the magnitude of the task and its complexities. It was only made possible by the collaborative approach of the police of the Coronial Support Unit and the forensic biologists and pathologists at the John Tonge Centre and the DVI officers. I accept the accuracy of the opinions arrived at as a result of this process.

I commend all of those involved in the post accident recovery phase for their dedication and professionalism.

The autopsies

Over three days commencing 11 May 2005, a number of experienced forensic pathologists carried out autopsies on the bodies removed from the wreckage. In each case, severe head and internal injuries consistent with the trauma generated by an aircraft crash were evident. In all but one case, there was no soot or other foreign material in the airways. This indicates that the person died almost instantly in that they drew no breath after the fire started. In the one case where soot was found, the extent of the head injuries almost certainly means that the person was unconscious and would not have been

aware of the fire or suffered any pain. Those injuries would have resulted in very rapid death.

Toxicological analysis conducted on a sample from Mr Hotchin showed no signs of alcohol or drugs. Due to the amount of decomposition, no tests should be performed with respect to Mr Down's body. The pathologists who undertook the autopsy on the body of the pilot, Mr Hotchin and the co-pilot Mr Down, found no evidence of any natural disease that may have caused or contributed to the crash.

Findings required by s45

I am required to find, so far as has been proved, who the deceased are, when and where they died, what caused their death and how they came by their death. I have described above the circumstances of the deaths. As a result of considering all of the material contained in the exhibits and the evidence given by the witnesses I am able to make the following findings in relation to the other particulars of the deaths.

Identity of the deceased

The deceased persons were:

David Banks
Frank Billy
Fred Bowie
Mardie Bowie
Robert Brady
Timothy Down
Edward Green
Brett Hotchin
Kenneth Hurst
Gordon Kris
Noel Lewis
Paul Norris
Arden Sonter
Sally Urquhart
Helena Woosup

Place of death

All of the persons died approximately 11 kilometres north-west of the Lockhart River aerodrome in far north Queensland

Date of death

They all died on 7 May 2005

Cause of death

In each case, the cause of death was multiple injuries sustained in an aircraft accident.

Concerns, comments and recommendations

One of the principle objects of the Coroners Act is the prevention of unnatural deaths. This is facilitated by authorising coroners to comment on things that relate to public safety.

So far, in these findings have described how the crash occurred and its consequences. It is now appropriate to seek to explain what caused the crash to assist consideration of whether any changes to the way aviation safety is pursued could reduce the likelihood of similar incidents in future.

As indicated earlier, I accept that no mechanical failure in the aircraft or malfunction of navigational aides contributed to the crash. It is also clear that the flight crew did not lose control of the aircraft as a result of any lack of skill or external forces such as adverse weather. Equally, there is no evidence that they intended to fly into the mountainside, nor that they became aware of the impending diaster until so soon before it occurred and that they had no time to take any evasive action. I accept that this incident was an example of what is referred to in aviation parlance as a controlled flight into terrain. I also accept that had the pilots adhered to the accepted aviation procedures and well published guidelines, the crash would not have occurred.

However, for reasons which will become clear, I do not accept that the crash was the result of an isolated incident of deviant or aberrant behaviour that should be categorised solely as pilot error. Nor is there evidence that either of the pilots were routinely cavalier about their safety or that of their passengers.

Therefore, in my view, understanding the paradox of why experienced, competent pilots would engage is objectively dangerous flying requires consideration of whether:-

- their initial and ongoing training and checking was sufficient to alert them to these dangers;
- the safety systems of their employer provided adequate guidance and oversight of their activities; and
- the aviation safety regulator responded adequately to the information accessible to it that may have indicated shortcomings in either of the above.

A starting point to an analysis of why neither the training of the pilots, the safety systems of the operator, nor the surveillance of the regulator failed to prevent the accident is consideration of why the pilots commenced an RNAV (GNNS) approach and then so dangerously departed from it.

Because the cockpit voice recorder malfunctioned, any explanations that the pilots may have articulated were lost. We are therefore left with trying to understand their actions by inferring their intentions from the movement of the aircraft and their manipulation of its controls.

Why did the flight crew attempt a RNAV (GNSS) approach?

It is clear that the flight crew intended to undertake an RNAV (GNSS) approach even though it was contrary to Transair's operations manual and CAO 40.2.1 for them to do so when only Mr Hotchin was endorsed on that

procedure. There is ample evidence that both of the pilots were aware that they could not lawfully conduct such an approach in those circumstances.

There is no evidence that the operator pressured its pilots to undertake unapproved procedures or to attempt to land when it was unsafe to do so. Further, there was available at Lockhart River, a non directional beacon navigational aid that the flight crew could have lawfully used on the day in question.

Mr Hotchin had already articulated the possibility of the weather preventing the flight landing at Lockhart River and if the cloud was as low as was predicted. Given the conversation between Mr Down and the pilot with the call sign PAR, the prosects of a landing that complied with IMC rules was extremely unlikely.

It remains unclear why the crew commenced an RNAV (GNSS) approach. I can only speculate as to whether the decision was jointly taken by the flight crew or whether the much more experienced captain overrode any concerns the very junior first officer may have voiced. I do not accept CASA's submission that the tone of Mr Down's voice when he broadcast their intention to undertake the approach proves his equanimity with that course. There is considerable evidence that I shall detail later that indicates that Captain Hotchin believed his seniority gave him greater authority to make such decisions and that Transair could, or should have been aware of this. I shall deal further with issue when considering whether the operator should have taken more action to discourage such conduct.

Why did the aircraft depart from the standard published approach procedures?

In its report, the ATSB suggested five scenarios that may explain why VH-TFU descended through the minimum safe altitude of 2,060 feet after the aircraft had passed waypoint LHRWF. By the conclusion of evidence at the inquest only three warranted consideration.

(a) The crew were attempting to conduct an approach using a constant angle descent in accordance with the RNAV (GNSS) procedure but became confused as to their position along the approach. They may have thought that they were closer to the missed approach point than they actually were, and therefore concluded that they were higher than they should have been by that point, thus descended at a faster than normal rate to get back on course.

(b) The crew abandoned the RNAV (GNSS) approach and attempted to fly through a hole in the cloud to acquire and/or maintain sight of the ground. However, after losing visual contact as a result of clouds closing in, they failed to climb back to a safe height due to confusion about their position in relation to the missed approach point, or a failure to continue to monitor the aircraft's position on the GPS receiver display.

(c) The crew were seeking to expedite descent to the minimum descent altitude (MDA) to increase their chances of making visual contact with

the ground in the mistaken belief that they had passed the only terrain features that were higher than the MDA.

In its report and initially when Mr Madden gave evidence when the inquest opened on Thursday Island, the Bureau favoured scenario (a) as the most likely explanation. However, Mr Madden qualified this to an extent by saying that even if scenarios (b) or (c) should be preferred, a common factor is a loss of situational awareness along the approach path, i.e. the flight crew at some point became confused as to how far they were from the missed approach point.

During the inquest, evidence relevant to this issue was uncovered in the transcript of an inquest into another aviation fatality that occurred near Thursday Island in 2002. Mr Hotchin was flying into nearby Bamaga at the time of the crash and heard some of the radio transitions made by the pilot who died, a Mr Short. He gave evidence at that inquest in June 2004 and revealed his knowledge of, and habits concerning, a number of matters relevant in this inquiry.

In the course of giving evidence, Mr Hotchin stated that on the day in question, he was conducting a GPS approach into Bamaga and due to isolated storms in the area thought it "*best to commence an approach into the airfield which would give us the best chance of getting in that day and remaining visual".*

Mr Hotchin acknowledged that on that flight the crew couldn't undertake an RNAV (GNSS) approach because both pilots weren't endorsed on that system. Therefore, after going down to the minimum descent altitude as they neared the missed approach point and not being able to see the landing strip, they were forced to make another attempt after climbing back up to the minimum safe altitude.

The inference is compelling that, as the Cairns base manager, Mr Hotchin must have been aware that Mr Down was not endorsed to conduct RNAV (GNSS) approaches and was not trained to undertake the duties of a non-handling pilot on such an approach. Mr Hotchin's method of dealing with the situation when he flew with the similarly unqualified co-pilot on the day Mr Short crashed, was to commence an RNAV (GNSS) approach but after reaching the relevant MSA within the prescribed 10 nautical miles radius of the airfield. He then sought to conduct a visual approach even in inclement (IMC) weather conditions.

In the course of providing his opinion as to why Mr Short may have flown his aircraft into the sea Mr Hotchin said "*what most pilots tend to do is they try to fly under the cloud and keep going down so they end up ditching in those sort of circumstances - - - into the water….. Colliding with the water, flying into the water"*.

Mr Hotchin also spoke of a flight he had undertaken only a week before the inquest when he'd encountered thunderstorms off the Papua New Guinea coast whilst conducting an approach into Port Moresby. Mr Hotchin's evidence was this:

"and so you look for a break in between the – the clouds so you can see a very white light coming through the darkness of the clouds, so you aim for that point and you go aiming for that point and then all of a sudden you notice that you're enclosed by two cells on either side, but the only thing you can do once you've made that decision is keep going straight ahead because you know that at some stage before hand you saw light beyond there".

Mr Telling, an experienced pilot who gave evidence at this inquest, said Mr Hotchin's evidence suggested that he was trying to "*eyeball*" his way through the cloud rather than relying on his weather radar; he was endeavouring to use visual clues to navigate in instrument meteorological conditions rather than relying on his instruments. This was, according to Mr Telling, "*crazy*".

According to another witness – former Transair pilot Leon Covey – it sounded "*pretty reckless*". Mr Wright expressed his lack of understanding of why Mr Hotchin would have given evidence in these terms and, as with Mr Telling, he was at a loss to understand why Mr Hotchin would not have relied upon the weather radar in the aircraft in the situation described by him. However, as to whether he observed anything in the training or checking of Mr Hotchin to suggest that Mr Hotchin held the views expressed in his evidence at the Short inquest, Mr Wright said: "*I really – I don't have an answer for that."*

Mr Hotchin's evidence evinces a determination on his part to "*get in*" to the destination airstrip without resort to an "*alternate*" if possible. His evidence is open to the interpretation that once he had formed a perception that a visual reference could be achieved, he would persevere with the approach even if he risked experiencing a sudden loss of required "*horizontal visibility*". He viewed this more as a matter of "*judgment*" rather than as a matter of adhering to prescribed or published approach procedures.

On 7 May 2005, after reaching the intermediate fix waypoint, VH-TFU levelled at marginally below the MSA, during which a second stage of flap was selected before the aircraft commenced a descent 1.4 nautical miles before the LHRWF waypoint.

Although the aircraft was laterally positioned correctly on the RNAV (GNSS) approach, it is clear that the flight path from that point was not consistent with an attempt to fly the standard approach. I consider that the evidence indicates that midway between the intermediate and final approach points Mr Hotchin abandoned the RNAV (GNSS) approach and as a result of sighting the ground determined to get beneath the cloud cover to conduct a visual approach to Runway 12.

It seems likely that when descending below the minimum safe altitude of 2,060 feet, Mr Hotchin was relying upon a perception of terrain visibility that he hoped would continue and improve as he got lower. Further, it seems he formed the equally false perception that he was closer to Lockhart River in the approach that he was attempting than he actually was. It is impossible for me to accept that Captain Hotchin would have flown at the vertical speed he did with the nose pitched down as steeply as it was had he not seen the ground at some point. The force with which the plane crashed into the mountain indicates he lost visual contact before impact. The most likely explanation for his continuing with this flight path after losing sight of the ground is the attitude

he'd articulated in the Short inquest of having made a decision, pressing on regardless.

I do not accept CASA's submission that a loss of situational awareness played no part in the crash. Mr Hotchin knew there was high terrain on the northern approach to the landing strip and had commented to colleagues on the risk it posed. I consider that he must have assumed that the plane had already passed over that high ground when he continued to descend at such a rapid rate to so low an altitude.

There is no basis to suspect that the plane's course was not controlled by deliberate and considered inputs from the flight crew. There were four sources of aircraft information that potentially could have alerted the crew to the developing problem: altimeters, vertical speed indicators (VSIs), radio altimeter and the GPWS. In respect of all of these instruments, the ATSB investigators were unable to detect any technical problem that would have resulted in false information being provided to the crew as to the rate of descent or altitude of the aircraft.

When one considers the speed at which the aircraft was flying, the turbulence which it encountered and the limited experience of the co-pilot, it is easy to accept that a misreading of instruments and/or charts could have led to the flight crew being unsure of their location. It is equally conceivable that the non handling first officer did become aware of the increasing danger but was unable to persuade a head strong captain that he should try and return to the appropriate approach profile when sight of the ground was lost.

It is also possible that an erroneous altitude/profile 'call' by Mr Down to Mr Hotchin may have contributed to a loss of situational awareness in the approach. However, with no formal training or experience with the approach charts or GPS receiver approach mode, I find that the co-pilot was not in a position to adequately or correctly interpret the approach chart or GPS display.

The evidence concerning the ground proximity warning system (GPWS) alert is inconclusive. A simulation undertaken by the manufacturer posits that it would have sounded at least twice; twenty-five seconds and five seconds before impact, raising the question of why the crew did not take any evasive action. However, there is evidence that Captain Hotchin had on other occasions de-activated it. There was conflicting evidence as to whether the alert had ever sounded when the correct profile was being flown raising the possibility that it could have misled the flight crew into believing they had passed the high ground.

However, Captain Hotchin at least would have been aware that at the vertical speed he was travelling an alert would be triggered by the rate of closure and this could explain why he ignored it. If a GPWS alert occurred twenty-five seconds before impact it was either not perceived (whether due to "inattentional blindness" or for some other reason) or was ignored (as a nuisance warning). However, on the available evidence it is not clear whether visual or aural signals from the aircraft's altitude alerter may also have provided some assistance to the crew if the pre-selected altitude had been correctly set. If the flight crew perceived such signals they presumably ignored them. Aviation records are replete with examples of pilots coming to grief as

result of preferring their sensual perceptions to the information provided by their instruments.

When he returned to the witness box as the last witness to give evidence at this inquest, Mr Madden agreed, that in view of the evidence given by Mr Hotchin at the Short inquest, scenario (b) had become the most likely explanation for the course taken on the incident flight. I am also of that view.

Did Transair pilots have a history of operating Metro aircraft inappropriately?

I have found that the incident flight involved a dangerous departure from appropriate approach procedures. This raises the question of whether it was an isolated incident or a more ongoing or widespread problem. Did Captain Hotchin habitually fly too fast and low on approaches? Did any other pilots act in a similar manner?

The inquest received evidence from pilots who had operated as co-pilots with Mr Hotchin concerning his operating practices and command style. Specific matters raised included the following:

(i) Mr Hotchin operated the Metro aircraft faster than other pilots on approach;
(ii) If a co-pilot challenged excess speed, Mr Hotchin would slow down if he respected the co-pilot; a co-pilot who was not assertive enough to ask Mr Hotchin to slow down may never catch up with Mr Hotchin;
(iii) He would sometimes also perform the duties of the other pilot;
(iv) He would not follow standard operating procedures (a point also made by the managing director of another low capacity regular public transport operator with whom Mr Hotchin worked prior to joining Transair) or would rush through procedures;
(v) He was generally a confident pilot;
(vi) It was reported that Mr Hotchin's cockpit communication style was reported to be "direct"; he could be "frank or curt" with co-pilots.

An analysis of the data on the flight data recorder for a sample of thirty flights undertaken by VH-TFU in April and May 2005 disclosed that when Mr Hotchin was on board higher average speeds were flown at certain altitudes. Of the thirty flights sampled and analysed, Mr Hotchin was pilot in command on ten occasions and the differences in the average recorded speeds at 5,000 feet above aerodrome level, 1,000 feet above aerodrome level, 500 feet above aerodrome level and touch down between Mr Hotchin's flights and the flights of other pilots were 10 knots, 15knots, 15knots and 8knots respectively.

Further analysis of the flight data recorder material for the northbound flight to Lockhart River on 7 May 2005 (when Mr Hotchin is assumed to have been the non-handling pilot) discloses that the aircraft was also operated on that leg at high speeds and at a high rate of descent, being flown at or near its maximum operating speed (Vmo) of 246 knots between 14,900 feet and 5,000 feet above aerodrome level.

Similarly, on a flight from Bamaga to Lockhart River on 27 April 2005 when Mr Hotchin was the non-handling pilot and another pilot (not Mr Down) was the handling pilot, the aircraft descended at near Vmo between 15,590 feet and 7,890 feet above aerodrome level. As pilot in command, it was Mr Hotchin's responsibility on those flights to ensure that the handling pilot was operating the aircraft in accordance with applicable operating procedures. Plainly the inference is available that, on various occasions, Mr Hotchin did not take steps to correct the descent speed of the aircraft (by commanding the handling pilot to take appropriate measures) or, alternatively, that he positively encouraged and facilitated the operation of the aircraft by the handling pilot at high descent speeds.

Evidence from fellow pilots who gave evidence at the inquest also supports this assertion. In particular:

Mr Covey says:

- Mr Hotchin was "very confident in his own ability" and thought himself "invincible";
- Mr Hotchin conducted GNSS approaches with Mr Covey before they were endorsed on that approach procedure;
- On one occasion in late 2002 (when neither he nor Hotchin was endorsed to conduct RNAV ((GNSS) approaches) Captain Hotchin "missed a step in the descent" whilst flying into Bamaga in instrument meteorological conditions (IMC), putting the aircraft 200-300 feet lower than it should have been and ignoring the altitude alerter. On that occasion, Mr Hotchin levelled the aircraft, verified the correct altitude himself from his own approach chart and then proceeded to climb back to where he should have been;
- On another occasion in 2002 at Bamaga, on reaching the minimum descent altitude in IMC, Mr Hotchin descended 100 feet below that altitude before obtaining a visual reference to the ground and continuing on to land;
- On a third occasion in 2002 on approach to Bamaga in "exceptionally bad weather in the Cape area", a receiver autonomous integrity monitoring (RAIM) warning came up and Mr Hotchin and Mr Covey worked out an alternative route on descent (so as not to use the GPS for navigation) but when the aircraft reached 1000 feet Mr Hotchin kept going despite having no visual reference to the ground at that point;
- Whilst on approach to Bamaga on a number of occasions, Mr Covey observed Mr Hotchin (as handling pilot) while in a hurry "*often pull the circuit breaker on the GPWS*". This occurred when the GPWS sounded a bank angle or high descent rate warning and Mr Hotchin would de-activate the system, to avoid nuisance warnings, and continue with a visual approach to the airstrip;
- It was his experience, in flying with Mr Hotchin, that Mr Hotchin did not like running late and would sometimes choose the quickest, not necessarily the preferred, approach to reduce the delay. To his knowledge, Mr Hotchin had a history of operating the aircraft at speeds higher than those specified in Transair's Operations Manual and taking unnecessary risks.

Mr Bujold says:

- Mr Hotchin had a "high cockpit authority gradient" and when they first started flying together (in early 2004) their personalities clashed but settled down into a friendly, professional relationship within eight or nine months;
- In the absence of standard operating procedures (SOPs) in Transair's Operations Manual, pilots flying to Lockhart River and Bamaga had to create their own SOP's;
- In his experience, when he flew with Mr Hotchin, he went above the maximum speed of the aircraft a couple of times in descent but was always within the speeds that he had to be during an approach.

I find that Mr Hotchin had a penchant for speed and an authoritative command style that led him, on a number of occasions, to fly Transair's Metro aircraft in an inappropriate manner including flying at excessive speeds on descent and deviating below minimum sector altitudes whilst seeking to conduct non-standard approaches in instrument meteorological conditions.

However, I further find that Mr Hotchin was capable of responding appropriately to professional inputs from co-pilots whose personality, training and experience enabled them to assert their voice effectively in the cockpit environment and convey accurate information (as to minimum safe altitude, descent and approach speeds or other operational information) in a timely manner to the pilot in command. This leaves open the question of whether all co-pilots with whom he flew were able to actively contribute to the safe flying of the plane or whether those who did not command Mr Hotchin's respect were left floundering and the flying then became for all intents a one pilot operation.

The ATSB report contains reference to an email sent by Mr Down that indicated that another captain who was not RNAV (GNSS) endorsed had flown below MSA when attempting to get a visual fix on the airstrip at Bamaga. That captain gave evidence and denied the allegation. Further, Mr Bujold gave evidence of flying with other non RNAV endorsed pilots who came up from Brisbane to relieve. His evidence is not entirely clear but it is open to an interpretation that these pilots participated in RNAV approaches.

Having regard to all of the evidence, although there is a basis to suspect that the practice was more widespread, I consider that I can be satisfied to the requisite standard that only Captain Hotchin failed to adhere to appropriate descent and approach practices, that he did this on an undefined number of occasions with a number of different co-pilots.

Was Transair aware that any of its pilots were using RNAV (GNSS) approaches when they were not endorsed?

This finding prompts inquiry as to whether the chief pilot knew or should have known that unauthorised procedures were being adopted on occasions by his Cairns base manger and if so, what did he do about it?

Mr Wright informed the inquest that he visited the Cairns base about every three months. He did not discuss operational standards with the pilots during these visits and flight standards meetings as provided for by Transair's Operations Manual were not held. He conducted two or three line flying flights from the Cairns base and conducted some of the line checks of Transair pilots from Cairns.

Surprisingly, the Chief Pilot did not take time to observe the conduct of regular line operations so as to be in a position to assess adherence to company procedures by Transair pilots whilst conducting regular public transport services. He claimed that he was always available to discuss any concerns with line pilots and indeed one first officer did raise with him the issue of Mr Hotchin flying too fast in some aspect of descents. However, Mr Wright was adamant that he did not know that Transair pilots based in Cairns and not endorsed on RNAV approaches had been, for over four years prior to 7 May 2005, involved in conducting RNAV (GNSS) approaches.

One of the co-pilots who gave evidence, Mr Covey contradicted Mr Wright's denials in this regard. Mr Covey claimed that Mr Wright was aware of these breaches occurring but his evidence on the point is not completely clear. Mr Covey first said in evidence that he was standing beside Mr Hotchin when he telephoned Mr Wright and told him that non endorsed pilots were using the RNAV approaches. But when asked the exactly what was said Mr Covey replied that "*the gist ofwhat was going on the fact that yes, we needed to be legally signed off to do these things…..and (he) was trying to get Les to commit to that but he wouldn't*."

Although he listed his pilots' instrument approach recency for instrument landing system (ILS) and non-directional radio beacon (NDB) approaches on the whiteboard maintained in the Brisbane office, he did not list on the whiteboard any pilot's RNAV (GNSS) approach recency details.

Mr Wright knew that the only instrument approach that could be conducted at Bamaga was an RNAV approach and that, at Lockhart River, instrument approaches could only be conducted as non-directional radio beacon approaches or RNAV (GNSS) approaches. As the ATSB report succinctly puts it: "RNAV (GNSS) approaches were a pivotal part of operations for the Cairns-based pilots, particularly for operations into Bamaga".

There is no doubt that Mr Wright did know that some pilots assigned to the Cairns base did not have an RNAV (GNSS) endorsement but he said he assumed that if VFR landings were not possible at Bamaga or Lockhart River those pilots would not unlawfully use an RNAV (GNSS) approach but instead diverted to an alternative port such a Thursday Island or Weipa or skip landing at Lockhart River.

In its submissions, CASA seeks to down play the necessity for instrument approaches. It suggests that operations relying on VFR only are feasible and unexceptional that, therefore, no assumption should be made the Mr Wright must have known non endorsed pilots were using RNAV approaches.

This conflicts with the evidence of Mr Bujold that he was told by Mr Wright, when he sought to join Transair in December 2003, that it was a requirement when operating from the Cairns base that he have an RNAV (GNSS)

endorsement because that was the only instrument approach that could be done into Bamaga.

I find that Mr Wright must have at least suspected that unqualified Cairns based pilots were conducting RNAV (GNSS) approaches. I consider that with reasonable diligence, by examining weather reports, flight logs and talking to ground staff and flight crew, Mr Wright could have discovered the true position were he so inclined. Conduct of this nature would have greatly increased the likelihood of all flight crews complying with proper approach procedures. As Chief Pilot, Mr Wright should have rostered pilots to ensure that pilots were not assigned to routes on which there was a high likelihood of their needing to use RNAV (GNSS) approaches until they were appropriately endorsed,

His failure to do any of these things in my view could constitute a failure to carry out his responsibilities under both CAO 82.0 (as Chief Pilot) and s 28BE of the Civil Aviation Act 1988 (as director).

Were Transair's safety management system and standard operating procedures appropriate?

The examination of the evidence this far has focused primarily on the actions of individuals. If incidents like this crash are to be avoided in future it is also necessary to look at how safety systems can be made more effective. The authority to do this is found in s 46 which is not limited, as CASA's submissions suggests, to the cause of the accident; rather a coroner may comment on anything connected with a death that is related to safety.

Safety management system

Transair's organisational structure provides a reporting line for the Maintenance Controller and Safety Manager, Mr Edward Doyle directly to the Chief pilot, Mr Les Wright with a Deputy Chief Pilot and various Base Managers (pilots) to report to him through the Brisbane based Operations Manager, Ms Dianne Kelly. It appears that this organisational structure that was in place as at 7 May 2005 materialised at some time in or after 2000 as a result of concerns raised by CASA.

At a meeting between Mr Wright and CASA officers in January 2000 following CASA audits of Transair in August 1998 and December 1999 Mr Wright undertook to respond to concerns that Transair had "*inadequate systems of corporate management, control and communication*", lacked "*proper documentation and supervision"* and raised a concern that Mr Wright was "*attempting to do too much personally"* and "*stretched a bit thin"*.

Mr Wright indicated that he would appoint various pilots as base pilots, employ a maintenance controller, nominate a deputy Chief Pilot for CASA's approval and appoint a pilot as Safety Manager who, as a "*quality manager",* would be responsible for introducing and managing *"a comprehensive safety management system within the organisation*".

Mr Wright's nominee for deputy (or acting) Chief Pilot, Captain Drew Glidden, was rejected by CASA in March 2001 and it appears that no further nominee was notified to CASA until the following year when, in December 2002, CASA approved Captain Glidden for the position.

Notwithstanding that he was not a pilot, Mr Doyle was appointed to fill the position of Safety Manager in 2001. In evidence at the inquest, Mr Doyle stated that he believed that he commenced duties in that role in the second half of 2003. However, Mr Doyle acknowledged that he had attended, with Mr Wright, a workshop convened by CASA on safety management systems. Other evidence disclosed that the workshop was held in 2001. Mr Doyle's evidence was that he was only concerned with 'audits' of aircraft maintenance issues and did not cover flight operational areas. He indicated that his assuming the new role of safety manager did not substantially increase his workload.

It appears that a Transair Aviation Safety Manual (a copy of which was not produced to the Court) was generated in September 2003 along with the establishment of a hazard and risk management (HARM) database upon which incident reports and the results of any internal investigation were to be kept.

The inquest heard evidence that Mr Wright reviewed the HARM database every six months and that Mr Doyle attended to incidents regarding maintenance issues. It is not however clear the extent to which action was taken to deal with any particular safety issue or incident reported to Transair management through its safety management system or otherwise. For example, Mr Wright had been informed by Mr Hotchin of the need for all pilots to be RNAV (GNSS) approach endorsed but this was neither recorded in the HARM system or acted upon, other than by requiring incoming pilots to have the endorsement before they commenced.

Moreover, as the ATSB report notes, there is no evidence of any consideration of the need for a structured or formal assessment of the risks of, at least, all Cairns based Transair pilots not being trained or endorsed to conduct such approaches. Similarly, Mr Wright confirmed that there was no risk assessment by either CASA or Transair for the introduction of regular public transport services into Lockhart River.

Although a safety management committee comprising Messrs Wright and Doyle with Ms Kelly was established, it met informally, on an irregular basis and no minutes of any meetings of the committee were produced to either the ATSB or to the Court. There was also no documentary evidence that any annual safety audit of Transair's bases had been conducted in accordance with Transair's Safety Manual.

Transair's standard operating procedures

There is no evidence that either Transair or CASA at any time reviewed Transair's operations manual in relation to crew resource management training or considered the adequacy of Transair's standard operating procedures. This is particularly so in the context of Transair's application to conduct regular public transport services into Bamaga in 2001 and its further application to provide those services into Lockhart River in 2004. It is noteworthy with reference to a Flight Safety Foundation task force on Approach and Landing Accident Reduction, that crew resource management is not effective without adherence to standard operating procedures. CASA's submission that better CRM may not have prevented this crash does not

dispose of the issue or address the failure of the operator to provide what its operations manual indicated it would.

There is no doubt that the operations manual stipulated that RNAVV (GNSS) approaches were only to be used if both pilots wee appropriately endorsed and gave some guidance about how those approaches could be undertaken.

CASA submits that this guidance was tantamount to a standard operating procedure for a stabilised approach but I note that even Mr Wright did not claim this to be the case and in fact said he had been told by a CASA officer that this was not needed. Some of the pilots who gave evidence complained that they were given no guidance on how the aircraft should be configured during such an approach.

The following summary of deficiencies in Transair's safety management system, operations manual and safety and training practices was compiled by counsel assisting. I consider it accurate.

- Although the Transair operations manual required the number of check pilots needed to be ascertained by the conduct of a task analysis by the Chief Pilot, Mr Wright did not carry out such an analysis.

- Mr Wright had approved Transair pilots as "check pilots" without approval of those pilots by CASA under CAO 82.0 upon the mistaken belief that he had the authority to so approve those pilots to carry out the responsibilities of a check pilot.

- Mr Hotchin and other Transair supervisory pilots were not required to hold, and did not hold, a flight instructor rating and Mr Hotchin had no prior training or instructing experience before being appointed Cairns Base Manager and supervisory pilot.

- In providing endorsements on the Metro aircraft, Mr Wright provided no training in multi-crew procedures and Transair's system did not provide for such procedures in the course of recurrent training which, in any event, was not provided to Transair pilots.

- Both Mr Hotchin and another Transair supervisory pilot expressed concern to Mr Wright about the level of training provided to pilots during their endorsement on type – although this was not Mr Wright's recollection.

- Neither Mr Hotchin nor Mr Down (nor most other Transair pilots) had been 'cleared to line' by a check pilot before commencing duties as a crew member on a scheduled revenue service contrary to the requirements of Transair's Operations Manual and CAO 82.3

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- Although Transair's Operations Manual required Transair's pilots to complete a recurrent training course in human factors management (also known as crew resource management or CRM training) every fifteen months, no such training was provided by Transair in Australia although Mr Wright and some Transair pilots flying in Papua New Guinea may have undertaken some CRM training.

- Although Mr Wright considered it a requirement for Transair pilots to hold an instrument rating with an non directional radio beacon approach endorsement, he did not, at least before December 2003, require any pilot to hold an RNAV (GNSS) approach endorsement. Mr Hotchin and two supervisory pilots raised the issue with Mr Wright. Transair pilots had to arrange their own RNAV (GNSS) endorsement training and it was no part of Transair's system to track pilot recency for RNAV (GNSS) approaches.

- Transair's Operations Manual provided only brief guidance on procedures in relation to GPWS warnings and there was no training syllabus for the GPWS in the training and checking part of the manual – Mr Wright viewed these matters as simply involving "common sense" with no part of the ground school endorsement training provided by Mr Wright covering what to do from an operational perspective.

- Other than Mr Wright, only one Transair pilot (Mr McGee) had viewed the controlled flight into terrain (CFIT) training video and this was in 1999.

- From a training perspective, there was no standardisation within Transair as to how the Metro aircraft should be operated, especially for Cairns based pilots where Captain Hotchin (without any training or instruction background) had one way of how he wanted the aircraft flown and Captain Baldwin (the other supervisory pilot based at Cairns) had "another way of doing things".

- The Chief Pilot conducted no on-going assessments of Mr Hotchin in his role as Cairns base manager and the contracted check pilot (Mr Telling) was never tasked to report on the Cairns operation or to conduct checks on line operations at Cairns in contrast with Mr Telling's review of the Big Sky Express operation in NSW.

- Whilst Mr Wright maintained that he was always "available" to any Transair pilot to discuss any operational or safety issue, it is plain that, at best, his management style in dealing with such issues was passive or reactive rather than rigorous, systematic and pro-active.

- The appointment of an aircraft engineer to the role of Safety Manager was deficient in at least two respects: (a) not being trained as a pilot, he was unqualified to consider, and did not see his role as involving, any flying operations issue; and (b) as the Maintenance Controller for Transair he could not be regarded (and was not regarded by other Transair pilots) as providing an independent or objective assessment of safety issues.

- The guidance provided in Transair's Operations Manual as to how to accomplish a stabilised approach and the role of pilots in a multi-crew environment was limited and lacked detail. Whilst the manual reproduced the Aeronautical Information Publication handling speeds for relevant aircraft performance categories, there was no information on the appropriate approach configuration for the Metro aircraft or any

information on the concept of a stabilised approach. The guidance provided to a non-handling pilot as to the tasks to be performed during an instrument OR visual approach contained in Part B2 of the Operations Manual was not understood by pilots to constitute a standard operating procedure for a stabilised approach.

- Because no specific standard operating procedures were contained in the Operations Manual, pilots flying into Lockhart River and Bamaga effectively had to create their own standard operating procedures.

On the available evidence, I find that Transair did not have adequate or sufficient safety management systems and standard operating procedures in place in relation to the conduct of its regular public transport services. I further find that, in any event, the Chief Pilot failed to monitor, review or enforce those systems and procedures adequately to ensure that Transair's pilots (including Mr Hotchin) were adhering to safe practices in the operation of Transair's Metro aircraft.

Further, the evidence supports the finding set forth in the ATSB report that Transair did not have a structured process for proactively managing safety-related risks associated with its flight operations.

Mr Wright seemed to rely on passive measures to detect and resolve problems. As it was not his practice to place anything on a pilot's file to record incidents involving that pilot, or to record any disciplinary or counselling action taken in respect of that pilot, Mr Wright failed to put in place a system of managing and supervising pilots that was directed to ensuring their professional development and the safety of their flying operations.

The absence of any records of this kind meant that an independent check captain, safety manager or the aviation regulator could not objectively review developing issues concerning the professional development and safety culture of Transair pilots.

Was the training of Transair pilots adequate and appropriate?

I have previously made mention of some aspects of Transair's flight training and checking. In light of the extent to which this issue was examined during the inquest and having regard to the blatant departure from published procedures that preceded the crash, it is appropriate to reflect further on this issue, particularly in relation to the incident flight pilots**.**

Flying experience and training – Mr Hotchin

As at 7 May 2005, Mr Hotchin was an experienced commercial pilot with more than 6000 flying hours including some 3,248.5 hours flying Metro aircraft in a multi-crew operational environment.

He completed training on the use of global navigation satellite systems (GNSS) for en-route navigation on 12 December 1997. His endorsement on the Metro 3 aircraft (being his first turbine aircraft endorsement) was conducted by the Chief Pilot of Transair, Mr Les Wright, over two days (with 5.8 hours flying training) in January/February 2001. Mr Wright's evidence is that he also conducted ground school training as part of the Metro

endorsement with Mr Hotchin over a three to four day period. The only documentation indicating such training was a copy of an engineering exam located on Mr Hotchin's pilot file, for which Mr Hotchin had been given a pass.

Mr Hotchin paid Mr Wright for conducting his endorsement and then flew a number of times with Transair pilots in February and March 2001 to complete fifty hours flying as pilot in command under supervision (ICUS). Mr Hotchin was then employed with Transair, commencing on 29 March 2001.

On 3 January 2003, Mr Hotchin obtained an endorsement to conduct RNAV (GNSS) approaches from Mr Peter Telling, a contractor check pilot engaged from time to time by Mr Wright. The aeroplane used for the endorsement was a Metro 2. It appears that, thereafter, Mr Hotchin underwent a number of proficiency checks although all required checks may not have been done or, if done, did not include a check of his RNAV (GNSS) approach proficiency. However, Mr Wright believed that when he conducted proficiency checks of Mr Hotchin he checked his proficiency in conducting RNAV (GNSS) approaches, at least in the last (i.e. 28 February 2005) proficiency base check conducted with him.

Mr Wright conducted a proficiency line check on Mr Hotchin on 7 July 2003 and proficiency base checks on 1 February 2004 and 28 February 2005. However, the Operations Manual for Transair, reflecting the requirements of the Civil Aviation Regulations (CAR 217), required Transair pilots to undergo two proficiency flight checks each year. A line check form for 26 July 2004, indicating a flight with a 'supervisory' pilot, Captain Baldwin, was filed on Mr Hotchin's pilot file but Mr Hotchin's pilot log book and the company rosters (including flight and duty records) did not show that Mr Hotchin had flown on that day.

Evidence was given by the former Operations Manager of Transair, Ms Dianne Kelly, that Mr Wright was the only Transair pilot with authority to conduct line and base checks although Mr Brett Baldwin, one of the pilots from Cairns, did a "few" on different pilots at Mr Wright's request.

Ms Kelly explained that on occasions she would phone pilots to ask them to sign blank proficiency check forms and forward them to Transair's head office in Brisbane. This occurred when Mr Wright had forgotten to take the paperwork with him when he was to conduct a proficiency check. In his evidence, Mr Wright confirmed that this occurred on *"one occasion, possibly on two".* Mr Wright asserted that on no occasion were proficiency check forms completed by him when there had not been a check flight done. However, it was also Mr Wright's evidence that he believed (until the ATSB disabused him after May 2005) that he had the authority to approve some other pilot within Transair to be a check pilot when he did not in fact have that authority.

I find no inadequacies in Mr Hotchin's training in the conduct of RNAV (GNSS) approaches and it is unlikely that he displayed any lack of proficiency, on the occasions that he was tested, in his use or understanding of RNAV (GNSS) approach procedures. However, the available evidence strongly suggests that Transair did not in fact carry out all required proficiency checks of Mr Hotchin.

Flying experience and training – Mr Down

Mr Down obtained a commercial pilot licence on 30 January 2004. At that stage he was endorsed to fly certain types of piston engine aircraft. He then obtained a command instrument rating on 19 March 2004 which was issued by an approved testing officer, Mr Peter Telling. The certification for that instrument rating showed that he satisfied the requirements of the instrument rating test for a number of navigational aids, including the test for conducting an instrument arrival procedure using distance measuring equipment, known as a DMEA. Notably, he was not tested for a GPS arrival procedure.

In December 2004, Mr Down completed an endorsement on the Metro aircraft with Transair's Chief Pilot, Captain Wright. This was Mr Down's first endorsement on a turbine aircraft type. For the purposes of the endorsement, Captain Wright conducted ground school training with Mr Down on 12 December 2004. According to the ground training record on Mr Down's pilot file, Mr Wright explained the use of the Garmin GPS system to Mr Down. To obtain the Metro endorsement, Mr Down undertook three flights with Captain Wright between 19 and 22 December 2004 totalling 4.2 hours. The DMEA was not flown as part of the endorsement and there is no record of any in-flight GPS training of Mr Down as part of the endorsement training.

On 3 April 2005, a testing officer (Mr Bob Harris) renewed Mr Down's instrument rating following a 1 hour ground school and a 1.5 hrs flight test (conducted not on a Metro, but on an aircraft type that Mr Down had not previously flown). Although Mr Down's endorsement (certified by Mr Harris on 3 May 2005) included the GPS/DME arrival procedure, the earlier flight test report indicated that the GPS/DME arrival procedure had not been flown on the 3 April 2005 flight test.

Significantly, Mr Down did not have an RNAV (GNSS) approach endorsement. A supervisory pilot at Cairns reported to the ATSB that he had demonstrated a RNAV (GNSS) approach to Mr Down in visual meteorological conditions during flights into Bamaga on about two occasions. However, Mr Down did not receive any training on RNAV (GNSS) approaches by an appropriately qualified instructor.

It is a regulatory requirement that prior to operating GPS equipment for primary navigation, the pilot must undertake training with an approved training organisation and in accordance with a prescribed syllabus of training. Mr Down had not completed the GPS training syllabus set out in Transair's Operations Manual. It was the evidence of Mr Telling that, as a contractor check pilot for Transair, he was to undertake Mr Down's GPS training later in May 2005 because "*he wasn't trained on the GPS system at that time*".

There is no evidence in the available documentary material to show that Mr Down or Mr Hotchin were specifically trained in the use of the GPWS in the Metro aircraft. Mr Wright's evidence was that it was all a matter of "*common sense*" although he asserted that "*certainly during the endorsements phase with the aeroplane … you could demonstrate certain callouts that the GPWS would give you"*. Mr Wright did not say that he had in fact given such a demonstration to Mr Down.

Mr Wright did not fly with Mr Down after 22 December 2004 but the evidence before the Court shows that Mr Down is recorded as flying with Captain Brett Baldwin over a period of five days from 9 March 2005 to 17 March 2005 as part of his route training. It appears that Captain Baldwin demonstrated RNAV (GNSS) approaches to Mr Down in visual meteorological conditions on two occasions during regular public transport flights to Bamaga. Captain Baldwin also conducted a flight proficiency line check with Mr Down, which he passed.

Mr Down started operating Transair's regular public transport freight flights from Cairns on 9 March 2005 and on regular public transport passenger flights, as first officer, on 4 April 2005. As at 7 May 2005, Mr Down had totalled some 150 flying hours on Metro aircraft (in two-crew operations) and had operated as a crew member into Lockhart River on three or four occasions before 7 May 2005.

Mr Down also flew with another experienced Transair pilot, captain Peter McGee who initially thought that the first officer's systems knowledge of the Metro aircraft was "*poor*" but, when he flew with Mr Down the week before the accident flight, he found that his knowledge had "*somewhat improved*" (Down had "*been into the books*" and he was "*slowly getting used to the aeroplane"*).

The evidence indicates that Mr Down was "*generally described as quiet or shy"* with one pilot in command stating that he had *"relatively low assertiveness in the cockpit"* and another observing that he sometimes "*needed prompting to make his own decisions*".

I am satisfied that the evidence illustrates that Mr Timothy Down was adequately trained as part of his endorsement on the Metro 3. While qualified to operate as a first officer of a Metro aircraft, he was not trained in the use of GPS or the conduct of RNAV (GNSS) approaches. It is unlikely that Mr Downs was competent to adequately perform the steps and actions required of a pilot endorsed on RNAV (GNSS) approaches in executing such an approach in instrument meteorological conditions at Lockhart River.

Training of other Transair pilots

In the context of the present inquiry, the question of pilot training may fall to be considered at two levels or stages. The first stage is the training provided by Mr Wright in relation to the endorsement of pilots on the Metro 3 class of aircraft. The second stage is consolidation or ongoing and recurrent training of Transair's pilots. In relation to the endorsement training of pilots, the evidence discloses that Mr Wright was clearly qualified and competent to provide the training necessary for the issue of a Metro 3 class endorsement.

Ultimately, the question of the adequacy of endorsement training cannot simply be determined by reference to the amount of time the trainer spends with the trainee pilot in the type of aircraft concerned, but must involve consideration of both the quality of the training and the comprehensiveness of relevant matters covered in both the flying and ground school components of the training. The ATSB report comprehensively conducts that consideration.

The evidence as to the competence and ability of Transair pilots (in particular first officers who flew in Papua New Guinea with Transair's sister organisation) is mixed. On the one hand, Messrs Grant and Cuyten entertained serious doubts as to the quality of the endorsement training of

some first officers (but not by and large the training of pilots in command) who flew with the PNG company. Mr Telling indicated that the endorsement training provided by Transair was "*basic*" with the standard of endorsed pilots "*barely adequate*".

It is however clear from Mr Telling's evidence that his opinion in this regard was based solely on his assessment of pilots conducting flights under Transair's Big Sky Express operation in NSW. It can be concluded that for many pilots, the ground-based instruction during endorsement training was less than that outlined in Transair's Operations Manual and suggests that some pilots may have passed the engineering exam without adequate systems knowledge.

On the other hand, a number of first officers progressed rapidly to the pilot in command level (eg Messrs Bujold and Donkin amongst others) and the largely unchallenged evidence of Mr Wright was that many Transair pilots progressed to a level from where they were able to secure employment with high capacity and reputable airlines. Some of these pilots were very complimentary of the standard of training offered by Transair.

Whilst the ATSB report concludes that Transair's flight crew training program involved "*superficial or incomplete ground-based instruction during endorsement training*" it is difficult to assess the extent to which this was so in relation to any particular pilot endorsed by Mr Wright. Of significance is Mr Wright's evidence that he tailored the endorsement training to the knowledge and experience of the person undergoing the training. This approach to endorsement training seems unexceptional given the fundamental regulatory requirement that the person conducting the training be 'satisfied' that the trainee pilot can safely fly the aircraft.

While there may be some doubt as to the adequacy of Mr Down's training, I do not consider the evidence establishes that the training of either of the incident flight pilots was inadequate or inappropriate in terms of meeting the prescribed standard for the issue of a Metro 3 class endorsement.

However, different concerns might reasonably attend the question of the provision of post-endorsement (or consolidation) training and recurrent training of Transair's pilots.

Transair's flight crew training program did not provide for formal training of new pilots in the operational use of GPS, nor any controlled flight into terrain training or structured training in crew resource management, or in the safe operation of aircraft in a two-crew environment. There was no provision for formal training in the operation and use of the GPWS and no training program in place for the foreshadowed advent (by no later than 30 June 2005) of the mandatory fitment of a terrain awareness and warning system (TAWS).

Having regard to the way in which proficiency checks were conducted, including the informal delegation of some checking duties to a supervisory pilot, and doubts as to whether all such checks were duly performed, together with the absence of an independent and duly authorised check pilot to review operations on a systematic basis, the adequacy of Transair's recurrent or ongoing flight crew training program is brought more sharply into focus.

Transair's operations manual committed the operator to the undertaking of crew resource management training. However, Mr Wright acknowledged that it was not given. No steps were taken by Transair to remove the crew resource management training requirement from the operations manual and no steps were taken by CASA to require implementation of that part of Transair's Operations Manual.

I find that Transair's program of recurrent or ongoing flight crew training was inadequate. It would seem that these deficiencies arose as a result of Mr Wright paying insufficient attention to the training needs of Transair pilots.

Did CASA adequately discharge its regulatory responsibilities?

These findings have identified a number of deficiencies in the performance of individuals and highlighted the failure of the operators systems to prevent them occurring. This naturally calls for an examination of the discharge of the safety regulators responsibilities.

As detailed earlier, CASA became aware of a number of deficiencies in the operations of Transair in about 1998 and 1999. Those deficiencies gave rise to a concern that Mr Wright, as CEO, Chief Pilot, Head of Checking and Training and line pilot was "*stretched a bit thin*".

Steps were then taken in early 2000 to address those concerns by requiring Transair to appoint a maintenance controller, safety manager and re-organise the structure of Transair's organisation. I have highlighted earlier the considerable delay that occurred before these organisational deficiencies were addressed and the suboptimal manner in which some key positions were filled. CASA sought to "*keep the pressure on*" so to speak, by refusing to at first accept the nominee for deputy chief pilot. It was not so assiduous with the equally important role of safety manager.

Thereafter, CASA conducted various scheduled audits and ramp checks in accordance with its Surveillance Procedures Manual. None of the audits identified any problems associated with the duration or quality of endorsement training, frequency of proficiency checks or whether appropriately authorised pilots were conducting such checks.

It may be suggested that having regard to the concerns that CASA raised with Transair in 2000 concerning the work load of the Chief Pilot as the head of the check and training organisation of Transair, inadequacy of Transair's "*systems of corporate management control and communic*ations" and the need for *"a comprehensive safety system within the organisation*", CASA should have been minded to ensure that Transair was strictly complying with its own operations manual and had an effective program of recurrent training in place.

The extent of CASA's assessment of Transair is well documented and highlights a number of inconsistencies between CASA's oversight of Transair and its regulatory policies and surveillance guidelines. It seems CASA's surveillance did not detect that some of the line and base checks had been

undertaken by pilots not approved to do this, and that training stipulated in Transair's operations manual had not been delivered. It is also apparent that audits of other operations run by Transair, notably the Big Sky Express, did not detect breaches of various aspects of the AOC. Nor did there seem to be much continuity of effort from one audit to the next, and some audits were done with very few resources (often only one inspector) and very little time spent.

CASA's task was made more difficult by its inability to develop an adequate risk assessment tool for targeting its audit and surveillance activities. When the agency switched to systems auditing in about 2000 (an advance that apparently marks it as a leader in aviation safety and warranting commendation) it attempted to apply a safety trend indicator system that failed and was abandoned. Because systems auditing was so new, the guidance the agency could give to its inspectors was minimal.

Further, I accept the ATSB's conclusion that even if CASA had fully met its own requirements, there is insufficient evidence to conclude that it would have detected and corrected the fundamental problems with Transair's operations.

Another area of concern relates to CASA's processes for assessing risks associated with applications by air operators to vary their AOC to add new routes. Such applications required CASA field officers to apply the guidelines and provisions of a particular manual of air operator's certification. In the case of Transair this involved considering the operator's request, in 2001, to add Bamaga as its first mainland Australia regular public transport route (from Cairns), and subsequently in 2004 to seek the addition of Lockhart River.

In neither case did CASA require the operator to conduct a comprehensive or structured risk assessment of the proposed change. In particular, no such assessment was required in relation to Transair's operating procedures, pilot experience or level of training, the rostering practices of Transair in relation to pilots who would be flying the routes involved and the pilot resources available to Transair. In short, it was not part of CASA's processes to require Transair to undertake a formal risk assessment or make out a safety case for the inclusion of Lockhart River as a new port although it did require Transair to revise performance charts.

I find that senior CASA management failed to provide sufficient guidance to its staff to enable them to fully and effectively evaluate risk management issues associated with Transair's application to add Lockhart River to its air operator's certificate as an interim port on the Cairns – Bamaga route. That guidance may have been as straight forward as requiring Transair to engage an independent specialist to conduct an assessment of, and provide a report on, all safety issues that were pertinent to the operation proposed.

It is also strange that two sources of relevant information were apparently not accessed by the regulator. I refer to the newspaper articles indicating that an operator who did not have an appropriate AOC was about to commence an RPT passenger service into Bamaga and later, Lockhart River. I would have thought an agency as large and well funded as CASA would subscribe to a clipping service that would bring such information to its attention for routine checking. Similarly, it is of concern if CASA did not access the inquest findings and transcript in relation to the death of the pilot Mr Short. Had it

done so I would have expected that the evidence given in those proceedings by Mr Hotchin might have caused it to raise a query with Transair about aspects of his flying.

Crew resource management training

There is disagreement among those granted leave to appear as to whether a lack of CRM played any part in this crash. CASA submits that the decision to undertake the RNAV(GNSSS) approach that the crew was not endorsed to fly and the decision to abandon it and attempt to get below the cloud were taken jointly by both pilots. I do not accept that there is sufficient evidence to show that to be the case. Nor does the evidence allow me to conclude that had the crew received CRM training the fateful decisions would not have been taken and followed.

It is clear however, that CRM increases flight safety. The Metro 3 is flown with two crew members not because the manipulations of its controls are so complex or burdensome that it can not be flown solo, but rather, two crew members are on broad so that they can check and support each other in their operational decisions. For that to be effective, each crew member has to be able to have input into those decisions. CRM training is a means of ensuring that.

In his evidence to the inquest, an ATSB human factors expert, Dr Stuart Godley, referred to the world's worst aviation disaster at Tenerife in the Canary Islands. On 27 March 1977 a KLM Boeing 747 collided with a Pan Am Boeing 747 killing 583 people.

As a consequence of the accident, a worldwide rule was introduced requiring all control tower operators and flight crews to use standard phrases (in English). In addition, cockpit procedures were also changed. Following a NASA workshop in 1979, crew resource management was introduced as a mandatory requirement for commercial pilots operating under most regulatory regimes in Europe and the United States of America.

It is concerning that Australia has not yet mandated crew resource management training, and that regulations doing so in respect of airline operators are said to be still in development despite CASA publishing a discussion paper in 2000strongly advocating CRM training.

CASA has only recently announced that all passenger-carrying operations "*will be required to implement safety management systems for their organisations, as well as delivering crew resource management and human factors training for pilots."* CASA intends to "*fast track*" amendments to CAO 82.

Recommendation 1 – Crew resource management training

I recommend that CASA expedite the introduction of mandatory crew resource management training.

CASA's approval processes for key safety personnel

I am convinced that Mr Wright's workload, holding several of the key personnel positions within Transair, as well as operating as a line pilot

himself, impacted on his capacity to give sufficient attention to crucial areas of Transair's management.

In the Hamilton Island air crash inquest, I observed that CASA's process for the approval of Chief Pilots *"apparently does not descend to considering how the chief pilot will discharge his/her responsibilities which include ensuring the flying operations comply with regulatory requirements"*. I recommended that "*CASA consider requiring AOC holders to demonstrate that their work practices will not unduly impinge on their chief pilot's ability to discharge the supervisory aspects of the position and that checking of this be made part of CASA's audit or surveillance processes".*

In the Toowoomba airport crash the workload of a maintenance controller whom CASA had approved despite him also occupying the position of chief engineer of the maintenance organisation, was the subject of a similar observation and recommendation in findings I delivered last week.

I consider that the evidence in this case confirms the necessity for the above consideration and also brings into focus the necessity to guard against potential conflicts of interest in various roles when held by the same person. The regulations already recognise the importance of 'key personnel' within the air operator's organisation. I consider CASA should have greater regard to how other factors may impact upon such office holders.

Recommendation 2 – Limit on multiple or conflicting roles

I recommend that CASA consider creating firm guidelines that require consideration of workload, lines of authority, potential conflicts of interest and any other factors that impact upon the ability of "key personnel" to discharge their responsibilities within an aviation organisation when its officers are approving appointments to those positions.

Revision of air operator's manuals

The accident investigation has brought to light a number of safety issues arising from CASA's relationship with Transair and the guidance provided to the operator as to the structure and content of its operations manual. The suggestion that the crew resource management training provisions of Transair's manual could be ignored, that it was unnecessary to include stabilised approach procedures in Transair's manual, that no consideration was given to the useability of the manual in electronic format (and the apparent lack of access by pilots to a hard copy of the manual), together with the lack of consideration of the need for specific safety measures, such as regular line operations safety audits by the Chief Pilot, underscore the need for further consideration by CASA of its approach to the acceptance and ongoing review of operations manuals.

I note CASA's reservations to prescribing the generic format of operations manuals and acknowledge its intention to produce "*guidance material*" for evaluating the useability of operations manuals. However, I do not consider these considerations should detract from the task of focussing attention on the substantive content of the manuals.

One issue is whether in addition to publishing advisory circulars of the kind contemplated by CASA on "*contemporary safety issues*", CASA should undertake a review of the kinds of information, procedures and instructions

that an operator may be required to include in its operations manual to ensure an appropriately integrated safety management system (and the adequacy of CAR 215 to achieve this). The object here would be to provide better or increased guidance to CASA field staff as to areas to be taken into account in considering the adequacy or acceptability of an operator's manual. This might signal to air operators, in greater detail, what they should be including in their manuals. Such guidance would also serve to structure the exercise of administrative discretion in relation to the identification of safety risks to be addressed by any proposed direction to an operator under CAR 215.

The adequacy of recurrent and ongoing training and checking

At present current training and checking requirements to be observed by air operators are contained in disparate regulatory sources and publications including:

- CAR 217;
- Various CAOs;
- Various Civil Aviation Advisory Publications; and
- CASA's AOC Manual.

At present most regular public transport air operators and other operators specified by CASA are required to have training and checking organisations to ensure that members of the operator's flight crew maintain their competency.

Under proposals for new regulations (to be inserted in the *Civil Aviation Safety Regulations 1998* as Parts 141 and 142) the existing measures will be streamlined and expanded and will allow certified training and checking organisations to be contracted by operators to conduct particular types of training and proficiency checking. CASA contends that under a current 'Industry Oversight Project' the adequacy of training and checking organisations and the standards adopted by CASA to assess those organisations is being 'comprehensively' addressed. However, there is no indication of when the consideration of these proposals and projects is likely to be completed or what specific regulatory measures will be introduced.

The issues brought to light by this inquest suggest that there is an urgent need for greater scrutiny of the adequacy of operators' training and checking systems to ensure the ongoing proficiency of flight crew. While existing regulations (in particular CAR 217) require operators with a training and checking organisation to conduct two competency checks of flight crew each year, those regulations do not seem to be directed to ensuring that the ongoing and recurrent training needs of each pilot, tailored to the circumstances of the pilot's flying operations, are satisfactorily met under the programmes and systems of the training and checking organisation.

Recommendation 3 - Regulation of training and checking

I recommend that CASA reconsider the introduction of measures to ensure the efficiency of training and checking organisations for air transport operations. I recommend that this include the way in which particular training needs of an air operator's flight crew are to be identified (including recurrent training and CRM training) and how those needs are to be met by approved or certified training and checking organisations.

Did CASA adequately attend to a regulatory policy in relation to the installation of TAWS in relevant aircraft?

If the incident aircraft, VH-TFU, had been fitted with a properly operating and fully functional terrain alert warning system (TAWS) it is probable that the accident would not have occurred. This was also the view expressed by CASA's CEO the day after the ATSB report was published but I note that the agencies submission now departs from that position.

TAWS was developed over a number of years in the United States of America. It provides much the same functionality as the GPWS but it has two additional functions. It has a forward-looking terrain function and a premature descent alert function. In addition, terrain information can be presented pictorially with a coloured or continuous terrain display of immediate visual assistance to pilots.

Had there been a TAWS on board the aircraft, the pictorial representation of the terrain would have given the pilots a visual cue to take appropriate action well before the deployment of any of the alerts from the TAWS system. The continuous terrain display provided to the pilots and the graphical presentation of terrain information would have provided the pilots with a definite perception of terrain threats to which they would have responded by correcting the flight path of the aircraft, even before TAWS-initiated alerts were deployed. CASA submits that as the pilots may have ignored the GPWS alerts there is no basis to conclude that a TAWS alert would have been heeded and that if the pilots were focussing intently on the ground the visual prompts on a TAWS screen would be overlooked. Obviously, these conflicting assertions can not be definitively resolved; however, I consider it reasonable to anticipate that a TAWS alert would have increased the chances of the crash being avoided. As such, an examination as to why the system, that has been anticipated for 5 years, was still not fitted at the time of the crash is warranted.

July 1999, CASA announced the impending introduction of special legislation to require operators of turbine aircraft engaged in particulars kinds of regular public transport or charter operations to install either an existing GPWS into the aircraft by October 1999 or to fit the new system, called enhanced ground proximity warning system (EGPWS) or TAWS, by 1 January 2001.

CASA's position appears to be that as a result of difficulties that some operators had in obtaining a supplemental type certificate (STC) to enable the fitment of TAWS, it announced that new regulations would be introduced in 2001 to provide for mandatory fitting of TAWS by 1 July 2005.

The question may reasonably be raised as to why the mandatory introduction of this technology was delayed for four and a half years? It is noted that originally when air operators elected not to fit a GPWS but to fit a TAWS by 2001, those operators were required to amend their air operations manuals by 1 October 1999 to make provision for controlled flight into terrain awareness training for pilots pending the fitting of TAWS by January 2001. However, with the revision of the 1999 requirement to fit TAWS by 30 June 2005, the controlled flight into terrain training program was no longer required to be implemented after the 31st of December 2000.

Accordingly, the delay in the mandatory installation of TAWS carried with it a withdrawal of attention on the importance of controlled flight into terrain training. In the context of Transair's operations, this resulted in only one line pilot receiving controlled flight into terrain training before 30 June 2005. Mr Toller explained that the decision to extend the date for mandatory fitment of EGPWS to 1 July 2005 was not accompanied by a requirement that operators conduct controlled flight into terrain training, as this had been a requirement of the "*fit or commit*" strategy previously devised and should have been taken up in an air operator's manual by 1 October 1999.

If that was so, CASA failed to ensure that Transair's Operations Manual was amended accordingly. Moreover, according to Mr Wright, Transair was not one of the operator's caught by the so-called "*fit or commit*" strategy since, as at 1999, Transair only operated one Metro aircraft and that aircraft was already fitted with a GPWS.

The Federal Aviation Association (FAA) had mandated fitment of TAWS (or 'enhanced' GPWS) on a progressive basis, depending on the date of manufacture of the aircraft, by either 29 March 2002 or 29 March 2005.

After pulling back from its initial date for fitment in 2001, CASA mandated installation by July 2005. It is apparent that there were technical, logistical and commercial reasons for this decision, the details of which are set out in the submissions of counsel assisting and CASA. There seems to be no disagreement about the basic facts, but rather some uncertainty as to which influences predominated.

The evidence discloses that the extension of the implementation date to 1 July 2005 was intended to provide "*considerable scope for savings to operators of the particular older aeroplanes in that conventional GPWS may be fitted at lower cost and operated for four and a half years before being required to be fitted with EGPWS"*. In effect the operator would be able to amortise the cost of the initial GPWS fitment by which time "*many of the affected older aeroplane types will be at the end of their economic life or relegated to non-passenger carrying operations which do not require GPWS or EGPWS fitment."*

On the evidence before me I am unable to determine whether the particular factors that were taken into account by CASA in developing a policy on the mandating of TAWS in commuter aircraft such as the Metro were appropriately addressed or whether the approach adopted by CASA in balancing various economic factors with safety factors produced a reasonable outcome. However, the stark reality, in the context of the present matter, is that the approach adopted by CASA produced an outcome that came, tragically, seven weeks too late.

Were the GNSS approach procedures for Runway 12 at Lockhart River appropriately designed and validated?

The RNAV approach into Lockhart River permits a straight-in approach via a series of waypoints. Due to topography, the approach is off-set by five degrees to the north of the extended runway centreline and has a steeper

descent profile than standard approaches. Additionally, the final leg is seven nautical miles in length, two nautical miles longer than normal.

An approach procedures designer and cartographer from the RAAF, Ms Laura O'Dwyer, evaluated the approach. Based on the "*design criteria*" set out in an International Civil Aviation Organization publication entitled "Procedures for Air Navigation Services - Aircraft Operations" (PAN-OS) Ms O'Dwyer provides qualified support for the design of the RW 12 RNAV (GNSS) approach with a five degree offset angle on the basis that an alignment directly with the extended centreline of the runway would present an unacceptably high minimum descent altitude and other options would involve either non-compliance with the PAN-OPS criteria or produce higher workloads for pilots.

The ATSB has recommended in its report that Air Services Australia (AA) considers the safety issue concerning sub-optimal RNAV (GNSS) approach designs but notes that AA has not accepted that recommendation (seemingly on the basis of the limitations contained in PAN-OPS and in relevant regulations). In relation to approach design, it may be noted that Jeppesen approach charts (of all types) show the runway threshold as the "zero point" for purposes of measuring ground line distances. In his evidence on behalf of Jeppesen, Mr Thompson notes that, in Australia, the RNAV (GNSS) approaches are designed with an 'offset distance' between the missed approach point and the runway threshold of 0.5 nautical miles which is not the case in other countries.

The Jeppesen chart for Lockhart River provides both the distance to the missed approach point and the distance to the runway threshold since they are "*equally relevant to a pilot's situational awareness*". However, Mr Thompson suggests that any pilot confusion over the distance to run to a missed approach point which is different from the runway threshold could be overcome if the RNAV missed approach points in Australia were redesigned to be coincident with the runway threshold "*as is done in most coun*tries".

I am of the view that this issue raises technical issues which appear not to have been the subject of detailed consideration in the ATSB report (with the ATSB investigators relying essentially on Ms O'Dwyer's report) and on which further evidence would be required in order to advance specific factual findings.

It has not been suggested that the validation of the Lockhart River approach undertaken by CASA in 1999 was inadequate in terms of the objective of the exercise. Nonetheless it appears that validation flights are primarily directed toward ensuring that obstacles that may affect the fly ability of the approach have been duly taken into account at the design stage. Thus validation flights, flown in piston-engine aircraft, in visual meteorological conditions, as single pilot operations and without being equipped with GPWS or TAWS, will not necessarily replicate the conditions that pilots using the RNAV approaches will experience.

I accept that design constraints precluded the approach track for the Lockhart River RNAV (GNSS) approach to runway twelve from being located on the extended centreline of the runway 12. Further, I find it is not open to conclude on the available evidence that CASA's validation pilot failed to observe any

anomalies or failed to raise with AA (as the approach design authority) any issues concerning the fly ability of the approach.

I understand that CASA has recently embarked upon a program of revalidating instrument approaches across the country with the object of checking and revalidating instrument approaches at more than 280 locations. To date "*corrections have been required at most locations, many resulting from confirming the position of obstacles and terrain with modern navigation equipment such as GPS*". Presumably, the issues raised above will be considered when the revalidation of the approaches to Lockhart River are undertaken.

False or nuisance GPWS alerts

During the course of its investigation, the ATSB had cause to have the manufacturer of the GPWS system fitted in the incident aircraft simulate what alerts the crew may have heard. During that process it was suggested that even when flying the approach correctly, alerts may sound. This is obviously undesirable as it would, in IMC cause pilots to unnecessarily abandon the approach or encourage them to ignore GPWS warnings.

There was no evidence of any reports of such alerts in Transair's HARM database. However, the co-pilot of a Transair flight from Bamaga to Lockhart River on 27 April 2005 informed the inquest that a GPWS warning was received when he flew a visual approach to the airfield. The inquest received information that the pilots of one operator (not Transair) reported the "terrain terrain, pull up, pull up" warnings being received on the Lockhart River runway 12 RNAV approach. However, a number of other pilots reported that the GPWS did not activate alerts when conducting the RNAV approach.

In response to concerns the ATSB raised abut this possibility CASA commissioned Mr Bryant, an experienced pilot and aviation consultant, to conduct a test flight in a Metro aircraft equipped with GPWS to fly the runway twelve RNAV GNSS approach to Lockhart River using the advisory stabilised slope as published and additionally using the "step down" approach, flying not below minimum safe altitude at each step in the approach. Mr Bryant found that using the stabilised slope method of approach and with the aircraft configured appropriately, at normal speeds, no GPWS alerts were activated. There is however some doubt as to whether, when undertaking this test, the aircraft flew over the highest ground under the approach path.

Further, flying a stabilised approach at high speeds caused GPWS alerts to be activated. So too did the use of the step down approach where at 5.3 nautical miles to waypoint LHRWM, at 2,060 ft, a "terrain terrain" hard warning occurred and at 4.6 nautical miles to that waypoint a further "terrain terrain" hard warning occurred.

I was concerned that the letter sent by CASA to the ATSB advising of the results of its test flights was not as frank as one would expect communications between collaborating safety agencies to be. Neither of the reservations referred to above were mentioned. I was therefore relieved to hear that the agencies will undertake further examination of this issue to determine whether a problem in fact exists.

Approach chart design

The ATSB concluded that several design aspects of the Jeppesen RNAV (GNSS) approach charts could lead to pilot confusion or reduction in situational awareness. However, it is not suggested that any aspect of the chart design was likely to have affected the decision-making processes of the flight crew of VH-TFU on 7 May 2005.

I have had regard to the evidence of Jeppesen's Corporate Technical Leader, Mr Ted Thompson. Mr Thompson notes that Jeppesen has considered the issues raised by the ATSB in relation to Jeppesen RNAV (GNSS) approach chart design and have added contours to the Lockhart River chart as a response to a 'non-standard' request from the ATSB. Jeppesen is still considering other issues raised in the ATSB report including the extent to which it conforms to International Civil Aviation Organisation's standards in not depicting terrain in the profile view of approach charts.

I have insufficient evidence to resolve the ongoing differences of opinion between the ATSB and Jeppersen. It is appropriate that those organisations continue their dialogue.

Who is to "blame"?

Primary responsibly for the incident must rest with the captain of the aircraft, a highly experienced and competent pilot. He knew that the approach he was planning to undertake into Lockhart River on 7 May was inconsistent with official regulations and Transair's policies. He must have also known that his departure from it was fraught with risk. The contribution of the co-pilot, if any, can not be known. CASA submitted that responsibility for the crash started and ended in the cockpit; that there was nothing that any other individual or organisation could have done to prevent the crash. I don't accept that. There is no evidence that Captain Hotchin was suicidal or that he habitually disregarded his safety of that of his passengers. It is necessary therefore to consider the context in which the actions occurred and the external influences that may have impacted on his behaviour. That is what the ATSB report and these findings have attempted to do.

I have also found that Transair failed to adequately monitor its pilots and to take steps to ensure that they were all complying with its policies. In my view the evidence establishes that its safety management system and the performance of key personnel was sub-optimal.

I have highlighted what I consider to be a number of deficiencies in CASA's surveillance and audit of Transair and its departure from its own procedures. I have made recommendations about how some of those issues could be addressed, as has the ATSB.

That does not mean that CASA is to blame for the crash. There is no compelling evidence that if it had scrupulously followed all of its procedures and processes, the deficiencies that led to the crash would have been obviated, although it is impossible to avoid the conclusion that the risk may have been reduced.

The families of the victims of this crash, understandably want someone to blame for their loss. The passengers were entirely blameless and their deaths have caused extensive and on-going suffering. The pilots are dead; the

company is in liquidation and its chief pilot has left the country. It is tempting for those bereaved by the deaths to identify numerous deficiencies or departures from proper standards that Transair had been guilty of in the various operations it was conducting around the country and internationally for five or six years leading up to the crash, aggregate those issues into a cumulative list of failings and say that CASA should have detected them and acted to prevent Transair from operating. With all due respect to those families, the making of scape goats in that manner is not part of my function. I find that CASA could have done more to insist that Transair improved certain aspects of its operations but I do not believe that the evidence supports a finding that they could reasonably have stopped it from operating or prevented the crash.

Interaction between the ATSB and CASA

Finally, I wish to return to the concerns I expressed earlier about the working relationship between CASA and the ATSB. In this and previous inquests I have detected a degree of animosity that I consider inimical to a productive, collaborative focus on air safety. CASA's submissions in this inquest suggest there was a danger of the ATSB's recommendations being ignored and I continue to detect a defensive and less than fulsome response to some of them. I am aware that others in the aviation industry share these concerns, although I anticipate the CEO's of the two agencies will disavow them.

Recommendation 4 – Ministerial assessment of interagency relations

Accordingly I recommend that the Federal Minister for Transport, consider engaging an external consultant to assess whether high level intervention is warranted.

I close the inquest.

Michael Barnes
State Coroner
17 August 2007
Brisbane