Submission to the Senate Rural and Regional Affairs and Transport Committee

Regarding an Inquiry into the Administration of CASA and related matters

By Richard Thompson

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Introduction and Preamble

My name is Richard Thompson.

On November 27th 2001 my daughter Katharine was one of three Queensland Health Workers who were killed, along with the pilot, in a plane crash at Toowoomba.

My wife and I attended every day of the inquest, and I have read through all the testimony several times. I am fully conversant with the issues. We were surprised at the dangerous inefficiencies in CASA's organization and administration.

Several CASA policies were shown to be dangerous to the flying public, (and those on the ground under the planes).

The supervision shown by CASA officers was often so negligent that I feel there should be the possibility of criminal charges being laid.

We were further surprised with the hostile attitudes of many of the CASA representatives in their testimony.

The points I would like covered are all arising from the Toowoomba inquest. I am not experienced at this sort of thing, but the items I mention are all glaringly obvious. I would like to make our daughter's death count for something in the way of improvement in air safety.

I feel that this Inquiry should be extended to several days. My submission alone would take some hours to cover adequately.

I have set the submission out with a Summary at the start, followed by a series of "Topics" with a header followed by an expansion of the topic, followed by references to the page and page section of the Inquest document.

At the end of my submission I have added what I would like to see as a result of this Senate Inquiry.

I have also included

a) PDF excerpt from the Coroner's Report .
b) PDF excerpt from the ATSB Report

These excerpts contain strong official condemnation of CASA.
They are only short items in each case and are presented in this manner for the convenience of the Inquiry.
They are extremely pertinent to this enquiry and I feel strongly that the Inquiry should examine them.

I have also included the full ATSB Reports and the full Inquest document, (including the Coroner's findings from page 1125 to the end) in case the need arises to reference this material.

I welcome the chance to put my case before the Senate committee.

Summary of my Submission

1. Dangerous amendments are introduced by CASA with little or no consultation.
2. There is a slow response from CASA in situations demanding immediate action.
3. CASA is able to break the law with immunity from prosecution.
4. CASA has dangerous and illogical Aircraft Classifications.
5. CASA accepts slipshod verbal agreements without documentation and without further surveillance.
6. CASA's checks and balances are seriously deficient.
7. CASA fails to check that maintenance requirements are met.
8. CASA staff need re-training in many aspects of their jobs.
9. CASA has no system of notification of lapses of Certificates of Approval.
10. CASA has 14,000 AD's in operation without systems or resources for monitoring them.
11. CASA has an extremely lax and lenient policy toward people who do not comply with laws, rules and procedures.

Expansion of Topics for the 27 November 2001 crash of Beech Aircraft Corp. C90, VH-LQH

Topic 1

Why was a CASA engineer able to introduce an engine maintenance requirement amendment *against the advice of the manufacturers*?

Mr Les Lyons (now retired) of CASA introduced a system of his own called AD-Eng5 which allowed airlines with Pratt & Whitney PT6 engines to extend the TBO (Time Between Overhauls) from 3600 hrs as required by the manufacturer, to in some case over 7000 hours, subject to the engine being monitored. This amendment was ***against the wishes of Pratt & Whitney*.** Mr Lyons stated several times at the inquest that he knew better than the manufacturers.

I feel this shows arrogance and self interest on the part of Mr Lyons.

As well as Pratt and Whitney, The Australian Transport Safety Bureau (ATSB) had adverse criticism of this amendment, as did Eastland's own engineer Mr Bannister.

This amendment was *not to correct any unsafe condition, it was based on economic considerations for small operators*.

Furthermore, the *manufacturer's requirements did not require monitoring*, as there was a specified TBO, ***but*** the *CASA* amendment introduced *a need for significantly increased surveillance* to make sure operators were complying with collection and analysis of data.

Even the majority of CASA staff were under trained for extra surveillance necessary:

Email from Lyons to another CASA employee reads, "Ted, CASA ECTM auditing is a bit of posturing and a lot of bluff. Some of our inspectors have done the ECTM course. Few would be proficient but we won't tell the industry that. By requiring them to send in data on a regular basis it puts them on notice." Would it be unfair to characterise that as the expression of your view at April '02 that indeed there were marked shortcomings in CASA surveillance of ECTM?-- Yes

These engines are one of the most used on light aircraft in Australia, and there are many more flying time bombs still using this engine extension with inadequate monitoring.

Ref: P103 - 20 Not for safety
P103 - 40 Increased surveillance
P749 - 40 Against advice
P255 - 30 Problems with other operators
P279 – 40 Engineer questions safety of AD-Eng5
P753 – 40 Lyons email.

See also PDF with this submission,entitled ”Excerpt from ATSB report #2.pdf” with criticisms by ATSB

Topic 2

Why did CASA allow the situation of poor maintenance to continue for another *five* months in the *same airline* with another *four* planes with PT6 engines before acting?

Eastland Air which owned VH-LQH had its other four aircraft with the same engines removed from the extension of TBO program by Mr Lyons when it was determined that there was an ongoing problem with maintenance. However this was not done until 17th April the following year. The same Maintenance Engineer Mr Bruce Tyndall was in charge, and was *still* not qualified to read ECTM Data.

Ref P791-10 Lyons grounding order.

Topic 3

Why did CASA issue an Airworthiness Certificate illegally? Surely some individual can be found and held responsible?

VH-LQH was brought in from the US with insufficient documentation. The age of the engine was not known. The number of hours flown since overhaul was unknown. ***Without this documentation it was illegal for CASA to issue an Airworthiness Certificate until the engine underwent an overhaul. Without an Airworthiness Certificate the plane must not fly.***

An Airworthiness Certificate was issued illegally and the plane put into service. CASA was responsible for ensuring this could not happen. The left engine subsequently failed.

Mr Lyons CASA chief engine specialist says that if the length of time in service of the turbine blades can't be determined, the plane *must be grounded until the turbine blades are replaced.* It was not grounded and the blades were not replaced.

Head of CASA Brisbane office Richard Purdie agrees absolutely.

Ref P754 – 60 Lyon's statement.

P1041 – 40 Purdie's statement.

Topic 4

Why does CASA have several classes of maintenance for the same make and model of plane?

VH-LQH was classified (legally) as Class B aviation. These classes differentiate between Passenger Carriers, Charter and Freight, with succeedingly *less stringent requirements for maintenance.*

Why is this so? They all have pilots who are able to die, and they all can crash in populated areas.

I would like to see ***all*** planes maintained to the highest standards.

Topic 5

CASA was aware that the Maintenance Engineer did not possess the required qualifications. Why did CASA accept an *informal verbal agreement* to read vital data when formal agreements were available, and knowing all of this, why would CASA not increase surveillance to ensure this work was being done properly?

The data referred to in Item 1 is called ECTM data and is to be collected whenever the aircraft flies (with some exceptions for short flights) and submitted to the Maintenance Engineer for analyzing. According to Regulations put in place by CASA, if this data was not being recorded and analysed twice a week, then the plane should *not be allowed to fly* as it was in contravention of the engine extension AD-Eng5.

The Maintenance Engineer Bruce Tyndall, who took over this job on August 6th 2001 was not qualified to analyse ECTM data. There are firms available to analyse the collected data for a fee. However Mr Nimz of CASA put the Engineer in touch with a Pratt and Whitney representative in Toowoomba, who reluctantly agreed to analyse the data until the Engineer could gain qualifications.

This agreement was verbal only. CASA was aware of it but did not require it to be formalized in any way. The P&W rep was so reluctant he refused to charge, stated it was not a service P&W offered, that it would be of a temporary nature, and that if the data was not given to him regularly, he “would certainly not go chasing it”.

Despite the fact that data should be analysed twice weekly, there was only submission of data *once in August* and *once in Sept.* None since the 12th Sept. However, with only two readings, overheating was shown to be *seriously high and the* plane *should have been grounded*.

Ref P101 – 10 Only two sets of data submitted.

P105 – 50 Engineer unqualified for ECTM

P977 – 20 Pratt & Whitney rep's verbal agreement.

Topic 6

Why did CASA not insist the plane was grounded pending further examination as mandated in their AD-Eng amendment? CASA needs an upgrade to their software to notify them of anomalous situations.

The purpose of the ECTM data is to monitor a trend in the engine. It should be carried out approximately *twice per week*. In the case of VH-LHQ it was only done twice in *5 months* On the two occasions that the data was submitted it showed a significant rise in the heat of the engine. This is a red flag situation which requires immediate investigation.

CASA should have known a) that the readings were not being submitted and b) that the engine was overheating.

CASA had all the requirements in place, but never followed up to see if they were being adhered to.

Ref P93 – 20 Frequency of plotting.

P94 – 50 Serious overheating

Topic 7

Why did CASA allow VH_LQH to fly when the engine power recovery washes mandated by their own AD_Eng5 amendment had not been performed? Where was their surveillance?

The first action upon indications of overheating should be to flush any dirt buildup from the engine. The job takes about 20 to 30 minutes flushing with an ordinary garden hose. This was done on June 7th 2001 and it appears very unlikely that it was ever flushed again, despite evidence that the engine was overheating.

*In any case it was **mandatory** to do a wash at least every three months* so it should have been done on 7th Sept. It was not.

If the engine keeps overheating after flushing, the plane ***must*** be grounded until the engine is taken apart and inspected and/or overhauled. This particular engine was overheating and was not being monitored. If monitoring or the washing had been done, or if the engine had been inspected, or if the plane had been grounded, it is extremely likely my daughter would still be alive.

Where was CASA's surveillance?

Ref P93 - 1 Mandatory washes

P99 - 30 Last wash in June 2001

P102 -10 Last wash June 7th

P330 – 30 No wash on 27th Sept 2001

Topic 8

Why did CASA not introduce increased surveillance of Eastland Air in response to their retiring engineer's remarks to a CASA inspector? The staff need retraining to help them recognize dangerous situations developing.

The Maintenance Engineer who retired from Eastland in July 2001 expressed concern about lack of control on remote aircraft, about airworthiness and about lack of resources available for maintenance. He mentioned this to the CASA rep but there was no increased surveillance of Eastland.

Ref P474 – 50

Coroner's Findings Page 1139

Topic 9

Why did CASA's systems fail to alert them to the fact that the Operators Certificate of Approval to perform Maintenance had lapsed for *seven weeks*? Why did CASA try *to cover this up* 6 days later, after the crash, as evidenced by emails and a visit to Eastland's office (500 metres from the site where the plane crashed and was still burning) on the day of the crash.

CASA failed to pick this up. The engineer from Eastland advised them of it on 21st November, 6 days before the crash. It had lapsed on the 30th of September. I am sure that CASA is unable to monitor many other Certificates and Licenses of which I have no direct knowledge.

Ref P254 – 10 Lapsed Cert

P255 – 10 21st Nov notification

Topic 10

Why can't CASA monitor its' own register of unsafe conditions, or at *least* monitor the system set in place for operators?

CASA has about 14,000 Airworthiness Directives in existence. An Airworthiness Directive is a directive that is in force due to an unsafe or potentially unsafe situation that CASA has identified. CASA says it cannot monitor compliance, so it sets in place systems for operators. When asked Mr Bowler, Air Safety Officer with CASA Brisbane office said CASA could not identify those systems within Eastland Air. "It is not something we would know".

Ref P550-30 above paragraph.

Topic 11

CASA called the Engineer in for "formal counseling" on the 1st of November 2002. Why did it do nothing for almost a full year? And why only formal counseling? Surely negligence which can have such dire results requires stronger and more immediate action?

Ref P476 - 50

Ref P570 – 20 CASA's lack of surveillance.

P568 – 10 Lapsed 30 Sept

P569 – 30 CASA's visit to Eastland on day of crash.

What I would like to see from this Inquiry

CASA needs a complete overhaul of their "culture". They appear to cover up detrimental reports, conceal evidence, answer obstructively under examination, and cast doubts and red herrings to hide their own shortcomings.

For instance, CASA officers from Brisbane office attended Eastland's office at Toowoomba within 2 hours of the crash, and yet in their report *never* mentioned that the crash had occurred. They did a favourable audit on Eastland in an attempt to hide the fact that the maintenance organization was in disarray and their license had been renewed only 6 days before the crash, after a seven week lapse which CASA never picked up until notified by Eastland's engineer.

It is enlightening to read all of the answers of Mr Bowler (CASA Brisbane) from page 514 to page 589 to see an example of the obstructionism existing in CASA.

- *I would like to see that any amendments which could impact on safety have to be introduced by a CASA board rather than individuals. The members of this Board should be subject to criminal prosecution in exactly the same way Directors of private companies are subject to the rules of law in cases of criminal negligence and dereliction of duties.*

- *I would like to see CASA made subject to the recommendations of the ATSB and the Coroner, with failure to comply without strongly substantiated reasons subject to criminal prosecution of directly concerned members of CASA as outlined above.*
- *I would also like to see CASA officers undertake a mandatory training course to show them the consequences their job can have. They need to be instructed on the need to be helpful and open in their dealings, rather than suspicious. We should all be on the same side in matters of air safety.*
- *CASA also needs to have systems put in place to enable them to identify problems with operator organizations, maintenance organizations, lapse of certificates etc as evidenced in the transcript of this and other inquests. These days it is relatively simple to introduce automatic "flags" in computer software.*
- *I feel strongly that an independent Transport Ombudsman should be appointed rather than have internal CASA handling of complaints.*
- *Lastly, I feel that in the interests of safety, the engine extension program for all of the many PT6 engines should be abandoned, and maintenance requirements be returned to the manufacurer's recommendations. The engine extension program is dangerous due to the extensive extra monitoring necessary, and the lack of trained personnel and resources for monitoring by CASA. Self regulation by the industry is dangerous path to take.*
  The manufacturer's program does not require extra monitoring. Overhaul times are set in concrete.

  Thank you for considering this submission.

EXCERPT FROM THE CORONER'S REPORT

The full report is with this submission as a complete document. I have included these pages her for the sake of convenience. I have highlighted the sections which pertain to criticisms of CASA by the Coroner, and his recommendations for improvement. The sections without highlights are not pertinent to this Senate Inquiry and can be ignored.

The other complicating factor was that the engine did not completely cease to operate and the pilot was placed in the invidious position of not knowing how much power he was going to be able to continue to extract from it. I accept the evidence that in those circumstances it was reasonable for the pilot to attempt to continue to fly the aircraft without immediately shutting down the left engine.

However, as the aircraft continued to struggle to gain altitude it should have become apparent that the left engine was not assisting. In those circumstances the propeller on the left engine should have been "feathered", that is adjusted so that the blades were rotated to present their smallest profile and produce the least drag. This was not done and nor did the automatic feathering system that should have been activated prior to take off cause it to happen. Similarly, by not retracting the undercarriage of the aircraft the pilot failed to take a step that may have, to some small extent, reduced the impact of the engine malfunction.

It is important to recall that the aircraft was only airborne for about 20 seconds and undoubtedly the pilot would have been devoting all his effort and attention to trying to maintain a level flight path in the hope of gaining sufficient altitude to find a place to land. All in the aircraft would have been acutely aware of the emergency that was enveloping them. In those circumstances I do not believe criticism of his performance is warranted. Further, it is most unlikely that any action of the pilot could have enabled him to gain sufficient control to fly away.

I am satisfied that the pilot's training and experience were in accordance with industry standards. For obvious reasons giving practical training to prepare pilots for engine failure so soon after take off is extremely difficult and I am satisfied that the issues are adequately discussed in pilot training and in aviation literature.

Did CASA adequately discharge its obligations in relation to the operator and the incident aircraft?

I have found that the operator did not have an adequate system of maintenance and that a key maintenance person failed to adequately discharge his responsibilities. This naturally calls into question the efficacy of CASA's oversight of the operation.

I accept that it is not CASA's role to check or supervise the maintenance undertaken by an AOC holder or its maintenance organisation. Nor is it CASA's role to micro manage air operators by scrutinising their resource allocations and management performance. Its audits can not cover every aspect of an operator's documentation and systems.

However, CASA did approve the operator's internal maintenance organisation in early 2001. It is unclear on what basis CASA determined that the resources

the operator intended devoting to maintenance were adequate and there is a basis for questioning this assessment.

In August of that year CASA approved the organisation's chief engineer assuming the added role of maintenance controller for the operator. Again no objective or empirical assessment seems to have been undertaken of the workload this would result in that person having to discharge.

CASA was involved in the operator entering into an unusual and informal arrangement with Pratt and Whitney concerning the ECTM, an essential element of the program under which the operator was allowed to extend the TBO of the engines on the incident aircraft. It is salient that the scheme under which CASA approved operators extending TBO allowed them considerably more latitude and contained fewer safe guards than the equivalent scheme promulgated by the manufacturer. However CASA took no steps to ensure that it was adhered to even though its audit of the operator in August 2001 gave reason to question that the extent to which maintenance records were being updated and managed.

In those circumstances, I do not accept CASA's submission that it no basis to query whether the operator was diligently following the requirements relating to TBO extensions for the incident aircraft. I am of the view that CASA did have information that should have alerted it to the need to more thoroughly investigate Eastland Air's maintenance systems and to consider whether its key maintenance officer was so over burdened that he could not be relied on to properly discharge his dual roles. I also consider that it would have been prudent for CASA to focus on the ECTM procedures when auditing or conducting surveillance of operators who used it to extend TBO, particularly in the case of this operator as it had explicit knowledge of its limitations in this regard.

It is impossible to say that had CASA been more searching during the audit undertaken in the period 20 – 23 August 2001 that the problems that lead to the fatal crash would have been detected. Nonetheless the failure of CASA to make any further inquiries in relation to these aspects of the operator's maintenance systems and performance was, in my view, less than the public could reasonably expect of the authority.

Findings required by s43(2)

I am required to find, so far as has been proved, who the deceased were and when, where and how they came by their deaths. As mentioned earlier, these are not criminal proceedings and I am therefore to apply the civil standard of proof when considering these issues. I am also required to consider whether any persons should be committed to stand trial in connection with having caused the death.

Having regard to all of the evidence presented to the inquest I make the following findings:-

Allen John Hughes
Bruce William Johnson
Katharine Anne Thompson

Place of death – They all died in Toowoomba

Date of death – They all died on 27 November 2001

Cause of death – All died as a result of injuries sustained in an aircraft crash. In addition, Dr Thompson and Mr Duckett suffered severe smoke inhalation that also contributed to their deaths.

Whether any person should be committed to stand trial

No person should be committed to stand trial on any of the charges listed in s41(1)(a) of the Act

Riders

Pursuant to s43(5) of the Act I am authorised to make riders or recommendations designed to reduce the occurrence of similar deaths to the one investigated by this inquest.

Obviously I have no independent knowledge of matters impacting on safety in the aviation industry. I must base my recommendations on the expert reports put before me, the evidence of the witnesses who do have experience in the industry and the reports prepared by the specialist safety agencies.

I was greatly assisted in this regard by all of the aviation experts who gave evidence and whose reports were tendered in this inquest. As a result of considering that evidence I make the following recommendations.

Recommendation 1 - Automatic recording of engine parameters

As discussed earlier, the effectiveness of ECTM as a diagnostic tool can be negated if an over temperature event is not noted and reported by the pilot or if pilots fail to accurately record data in the correct circumstances. Apparently, there are now available systems that automatically record the relevant engine parameters so that destructive events such as a "hot start" can become known to maintenance personnel via ECTM.

I recommend that CASA consider rescinding the Airworthiness Directive that allows time between overhauls to be extended based on manual ECTM systems and stipulate instead that such extensions can only be accessed when monitoring of the engines' condition utilises automatic recording of relevant engine parameters.

Recommendation 2 – Auditing of ECTM compliance

The time allowed between overhaul of the engine of the incident aircraft was extended from 3,600 to 5000 hours if the requirements of the relevant Airworthiness Directive were adhered to. ECTM is a crucial element of this arrangement. On this basis, the ATSB recommended that CASA review compliance with the relevant AD and in particular adherence to ECTM procedures. CASA declined to alter its audit system to give particular focus to this. In my view its refusal was misconceived and I recommend that they give further consideration to the issue.

Recommendation 3 – Guidance for CASA field staffing assessing maintenance resources

CASA is required to oversight various aspect of an operators maintenance systems. For example, it must approve the appointment of key personnel such as the maintenance controller and must issue a certificate of approval before an individual or organisation can engage in maintenance of an aircraft.

Obviously, the experience and qualifications of individuals intending to undertake these roles is only one factor which is likely to impact on their standard of performance. The evidence given at this inquest demonstrates that workload is also important, yet the CASA officers involved in the various approval processes seem to have given scant attention to that issue CASA manuals do not give any guidance as to how they should undertake such assessments. CASA submits that its inspectors have extensive industry experience and can therefore adequately determine whether, for example, an organisation has adequate staff. I consider the evidence in this case shows that confidence is misplaced. Accordingly I recommend that CASA give further consideration to the development of tools designed to assist its inspectors undertake these assessments.

This inquest is now closed

Michael Barnes
State Coroner
Brisbane
9 August 2007

The factors which contributed to this accident were primarily maintenance-related. The ATSB issued six recommendations to the Civil Aviation Safety Authority (CASA) including reviewing:

- operator compliance with the requirements of mandatory turbine engine condition monitoring programs
- surveillance processes for confirming operator compliance with mandatory engine condition monitoring programs
- processes for identifying priority areas for consideration during airworthiness surveillance and approval activities
- processes to assess whether a maintenance organisation has adequate resources to conduct its required activities.
- the provision of formal advisory material to operators and pilots about managing engine failures and other emergencies during takeoff
- the assessment of synthetic training devices for the purpose of training pilots in making decisions regarding emergencies during critical stages of flight.

Since the accident, CASA has made changes to the requirements of AD/ENG/5 and to the processes for assessing the suitability of maintenance controllers.

The engines (Pratt and Whitney Canada (P&WC) PT6A-20A) had been subject to an engine condition trend monitoring (ECTM) program in accordance with Airworthiness Directive AD/ENG/5. The pattern of ECTM data from the left engine indicated that a potentially safety-critical problem existed in that engine for some months prior to the accident. For a variety of reasons, that evidence was not detected and analysed, nor was appropriate remedial action initiated. Without timely intervention to address the developing engine problem, it was increasingly probable that the aircraft would have an in-flight emergency involving the left engine.

were deficient in a number of other areas. The chief engineer had minimal preparation for his role as maintenance controller. He had also not completed ECTM training, and therefore the operator arranged to send the data to the engine manufacturer's field representative for analysis. However, the ECTM data were not being recorded or submitted for analysis as frequently as required by the engine manufacturer's requirements or AD/ENG/5. In addition, there were deficiencies in the operator's maintenance scheduling processes.

CASA was aware that the chief engineer had not completed ECTM training and that the operator had an arrangement to send ECTM data to the engine

manufacturer's field representative for analysis. However, CASA surveillance had not detected any problems with the operator's ECTM program prior to the accident.

Following the accident, CASA inspectors conducted a review of the engine condition monitoring programs of operators in their region. The review found that a number of the operators were not complying with relevant requirements.

The introduction of AD/ENG/5[3] allowed life extensions to be approved for PT6A engines in Australia under less restrictive circumstances compared with those required by the engine manufacturer.

By allowing a wider range of operators to extend time between overhauls (TBO), there was an onus on CASA to take measures to assure itself, during its surveillance activities, that operators were complying with the AD and conducting ECT appropriately. However, CASA's surveillance system was not sufficiently rigorous to ensure that the mitigators it had introduced within AD/ENG/5 for allowing TBO extensions were effective.

The investigation also noted that the CASA system for approving maintenance organisations and maintenance controllers did not appropriately consider the maintenance organisation's resource requirements.

- Finding 3.1.7, 'The pattern of ECTM data from the left engine indicated that a potentially significant problem had also been developing in the cold section of the engine over the months preceding the accident'.

In summary, the ATSB considered that a developing problem in the left engine, evidenced particularly by elevated ITT (approximately 20 degrees Celsius) over a prolonged period, warranted further investigation in accordance with the requirements of the manufacturers maintenance manual table 2-7-1, ECTM Shift Fault Isolation table procedures, or Engine Performance Fault Isolation Chart Figure 2-7-3 in the P&WC PT6A -20 maintenance manual. Had maintenance

personnel followed an escalating sequence of analysis and rectification activities, the chance of identifying the origin of the engine problem, and taking appropriate action to rectify the problem, would probably have been significantly improved.

The ATSB maintains that the quantum of the rise in the ECTM data was significant enough to be an indicator of a problem more serious than a general loss of efficiency in the compressor and warranted an active investigation to determine the cause of that upward trend. In addition, if it is accepted that the problem was in fact in the power turbine with the power turbine blades deteriorating in the manner proposed by the ATSB principal failure analyst, then it is possible that a simple visual examination of the power turbine blades through the exhaust, could have identified the cause for the ECTM data trending up.

original ATSB investigation report. The management of and response to the increasing ECTM trend data remains the central safety issue of that investigation.

If the staged maintenance actions required in response to the upward trending ECTM data were accomplished in accordance with the engine manufacturer's guidance, which has as a primary requirement to determine and correct the cause for over temperature, it is probable that one of the increasing stages of examination specified would have identified the problem. Irrespective of whether the upward trend in ECTM data was caused by a problem in the compressor or the power turbine section of the engine, it is not considered appropriate to allow an engine to

continue in service without taking all reasonable steps to determine and rectify the reason/s for the elevated trend.

In light of a further review of the evidence, the ATSB has reconsidered its original finding that the initiating event of the engine failure of VH-LQH was a blade release in the compressor turbine and proposes that an alternative possibility could have been that the initiating event occurred in the power turbine. Notwithstanding this possibility, in either scenario, the remainder of the findings and safety recommendations contained in the original ATSB report are still relevant.