STATE
CORONER
VICTORIA

19th September, 2001
Case Nos: 3649/99

The 1999 Gisborne Aircraft Crash

FINDING WITHOUT INQUEST

The deaths of Sean Bysouth,[1] David Kemp,[2] Glen Tisdale[3] and Jodie Thomas[4] occurred on the 1st December 1999 in a paddock east of Macedon Close, Gisborne all from multiple injuries in an aircraft crash.

Summary of circumstances

Mr. Bysouth, aged 18, was the pilot of a hired Cessna 172R *`Skyhawk'*, which crashed into a paddock near Gisborne at about 2.30pm on 1st December. Bysouth and his passengers David Kemp, Glen Tisdale and Jodie Thomas were all fatally injured in the crash. Kemp was aged 19, Tisdale 21 and Thomas was 17.

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1 Coroner's Case Number 3649/99.

2 Coroner's Case Number 3651/99.

3 Coroner's Case Number 3650/99.

4 Coroner's Case Number 3648/99.

Mr. Bysouth decided to take his friend Glen Tisdale for a joyflight in a light aircraft as a present for Tisdale's 21st birthday. Kemp was also invited and he in turn invited his girlfriend Jodie Thomas. They all left Gisborne about 11.30am and set out for Moorabbin airport. On arrival at Moorabbin airport, Bysouth hired a Cessna 172R *`Skyhawk'* registration number VH-EWO. The hired aircraft was owned by General Flying Services, which was also the company where Bysouth learnt to fly.

Witnesses reported seeing the aircraft flying over the Gisborne area at approximately 2.30pm originally approaching from the West. The aircraft flew towards Macedon Close, where David Kemp resided with his family. Kemp had earlier told his sister Renee to watch out for a light aircraft, as they would try to fly over the house. Mount Macedon (3,284 feet) is located approximately 11 kilometres to the North-North-West of this location.

Witnesses described the aircraft enter a series of anti-clockwise turns or *`orbits'* over the Macedon Close area. There was nothing unusual noticed about the aircraft speed or altitude. Upon entering its second or third orbit (reports vary between witnesses), the bank angle steepened considerably, with witnesses describing the turns as *`getting tighter'*. As the aircraft completed this orbit and began to straighten up and head South, witnesses describe the aircraft as spiralling, spinning or plummeting to the ground (again, reports vary between witnesses).

The Cessna Integrated Flight Training System Manual of Flight states that a stall during a steep turn will result in a sharp nose and wing drop and that recovery actions must he prompt and precise.

Witnesses to the lead up and the incident

- The lead up

Ms. Kelli Williams (Tisdale's partner) stated that Bysouth, Thomas and Kemp came around in Sean's car. They stayed for about half an hour. Kemp had a camera that wasn't working properly, so she lent him a camera. At about 11.30am the four of them left to go on the joyflight. She considered that *`everyone seemed normal. I spoke to Sean and he seemed normal. Nothing appeared out of the ordinary.'*

Ms. Renee Kemp, David's sister, stated that her brother asked whether she had any film in her camera and also that:

> *`when I heard a light plane flying overhead I should come out and wave and I said okay.'*

Ms. Kemp commented that when Bysouth arrived at her house:

> *`David was picking up Jodie and was still out. I invited Sean inside, but he chose to wait in the car. When I was talking to Sean he seemed excited. It was only a brief chat before he went back out to the car where Glen was. I didn't see Glen. Sean was his normal happy-go-lucky self.'*

After obtaining the Cessna, Mr Bysouth arranged to have some fuel removed from the aircraft to ensure that he did not exceed his maximum allowable weight limit. Too much fuel was apparently removed, so some had to be replenished. The aircraft eventually departed Moorabbin at approximately 1350 Eastern Summer Time.

It appears that Mr Bysouth was concerned about the issue of weight in the aircraft. Kemp indicated that she overheard her brother talking to Bysouth on the telephone about Jodie Thomas's weight.

- The incident

At about 2pm Ms. Kemp described what she saw leading up to the crash:

> *`I was taking the clothes off the line, which is on the patio out the back. I heard the sound of a plane flying over and looked up. I looked in the direction of a red house over the side of our backyard. I saw a small plane flying overhead. It was white in colour. It was flying in circles, with our house as the rough centre of the circle. I saw it do two circles and I looked at the aircraft pretty much as soon as I heard the sound of the engine. I would describe them as fairly big circles. After it had finished the second circle I saw the nose of the aircraft rise up fairly suddenly. I think I must have looked away briefly, because then I lost sight of it. The shed blocked my view...'*

At about 2.30pm Ms. Iris Politini was at the back of her farm shed in Gisborne when she heard the Cessna approach:

> *`from a Westerly aspect, and it flew over the length of our tennis court, heading east. There was nothing unusual about the height or speed of the aeroplane at this stage, and it's not unusual to have light aircraft flying over. I watched it fly over, and then saw it start to do circuits over the paddock area, east of our house. It did two big circles, and I could not see any problems. It looked as if the pilot was in total control. The weather at the time was hot, and there were clear, sunny skies. There was a bit of a North-Westerly blowing, enough to be a nuisance. I could hear the engine throughout the circuits.*
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> *After the second circuit, as the aircraft was starting to head back towards Macedon Close again, I was still watching the aircraft. At this point I was looking from a rearward aspect. I saw him dip the left wing quite abruptly. He then straightened up. Then he appeared to dip the right wing in a similar fashion. I thought that he must be having trouble with the wind. He straightened up again after this.*
>
> *He continued towards Macedon Close, as though he was going to do another big circle, but seemed to drop altitude. This drop in altitude happened as he was entering another circle. After the drop in altitude he was lower than any other aircraft I have seen around here.*
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> *This drop in altitude happened as he was entering his third anti-clockwise circle, and as he reached a point where he was levelling out again (in altitude) he tightened the circle up. This third circle was unbelievably tight. He completed a full, tight circle.*
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> *As he came out of the circle he looked as though he were going to fly off over the houses. He was at a similar altitude as the tight circle. As he got out over the paddocks again, he just seemed to fall out of the sky. I was looking from the rear, slightly to the right of the aircraft.*
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> *When he started to fall his left wing dipped, almost tipping right over. The nose was starting to go downwards, and the aircraft started to spiral. I saw the aircraft spin around a couple of times, then disappear behind the houses. When I say it was spinning, it was turning around the wings, not nose over tail. It was sort of a corkscrew fashion.*

I do not recall hearing any engine noise at this particular time. I had been outside for about 15-20 minutes before I saw the aircraft...

My husband, Sam and son, Anthony were in the back as well at the time. Neither saw the aircraft actually crash, but Anthony may have seen it enter the third circle. I'm pretty sure both Sam and Anthony saw the first two circles.'

Ms Marlene Borg described the sound of an aircraft that she considered was flying fairly low *`as it sounded louder than other aircraft that fly over on weekends'*. She ran out into the backyard and from *`the moment'* that she *`first saw the aeroplane, it was already rolling. When I say rolling I mean that it was rolling over the span of the wings, not nose-to-tail rolling (see diagram). I think it rolled from right wing over left.'* Borg commented that she was:

`not sure how many times it rolled over, as it all happened so quick. I think I remember it rolling over completely twice, but I'm not 100% sure. During the short time that I was looking at the plane in the air, I noticed a very strong gust of wind that just hit me. The wind was hot, but I don't remember which direction it came from. All I know is the wind wasn't there when I first came outside, but when I was watching the aeroplane rolling, the wind hit me. I saw the aeroplane hit the ground, and I saw dust kick up, but didn't hear any sound.'

And:

> *`When the plane was rolling I don't think I could hear the engine running, but again I'm not 100% sure. I do remember thinking how quiet it was at impact, but I'm not l00% sure if I heard the engine running while the aeroplane was rolling.'*

Mr. Theo Van der Voort stated that he was travelling between Gisborne and Riddell's Creek with his son driving when he saw the Cessna. There was also another passenger in the car, Andrew Bauer. Van der Voort said that the aeroplane was:

> *`slightly to my right as I looked ahead. I saw it fly from right to left, towards a paddock where some houses were. It then started doing an anti-clockwise turn. He did a full 360 . . . turn, and then started to do a second one. This second turn looked tighter than the first. The angle of his wings was very steep, I would say they were vertical. I then saw the nose dip down, and he continued propeller first into the ground. I didn't see the plane spin or spiral, it just seemed to go straight down nose into the ground.*
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> *When I was watching the turns, as he entered the second, tighter turn, he had been gradually descending. As he entered the 2nd turn he had lost almost half the altitude from where I had first seen him. I didn't notice any sudden or violent movements, it all seemed to happen fairly gradually.'*

Mr. Rodney Van der Voort commented that the Cessna was *`fairly low to the ground'* at about *`200 metres'*. The aeroplane was *`banked over, doing an anti-clockwise circle.'* When he first saw it the Cessna *`was doing a normal circle...'* He observed:

> *`about 2 normal circles. As they were going, the circles started to get smaller and the wings got more towards vertical. I think we had the radio on, and the noise of the truck was pretty loud. It was a hot day and we would have had the windows down, the noise of the wind restricted my hearing as well. I don't remember hearing the aircraft engine.*
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> *I remember my dad saying something like " he's getting pretty tight there" and I was straining a bit to look to the left. As we approached the bend in the road I lost sight of it, but dad was still looking at it.*
>
> *About 30 seconds after I lost sight of it, Dad said "it's crashed" ... '*

Mr. Bauer stated that the Cessna did a circuit over the houses and he watched as it did. The:

> *`first circuit seemed normal and I didn't think much of it. I then saw it enter a second circuit, and this appeared tighter than the first. It looked like he was trying to turn on a twenty cent piece. This tighter circuit seemed to be more over the paddocks. As I watched this tighter circuit, I saw that the wings were tipped up straight up and down, almost vertical. After this the vehicle we were in rounded a bend and I lost sight of the aircraft. Theo continued watching it and a short time later he said "It's gone down, it's gone down, it's crashed" '.*

Mr. Brett O'Neill, a Qantas Pilot for eight years, stated that he was driving west along Kilmore Road, Gisborne when he saw an aeroplane. The plane:

`was coming out of a left-hand orbit towards us and I could see that the aircraft appeared to be pitching up and down. He was not banked over when we first saw him, and we discussed whether it was a real aeroplane or not. I said that I thought it was a large scale model, close to us, and I said this because of the way it was being flown. The pitching up and down appeared to be controlled pitching, and I would estimate that we were roughly a kilometre to a kilometre and a half away. From this distance I could not see the control surfaces. I saw the aeroplane bank and turn North. I saw him execute a complete turn, not pitching up and down, normal attitude. During this circuit I realised that it was a real aircraft, some type of Cessna. As he was turned away from us, I could see his wings were "clean", meaning that he had no flaps deployed. I could see that he had a slightly nose-up attitude at this time, but not anything that I would consider unsafe.

After the turn he headed North and climbed - I would estimate his height at between 500-700 feet above ground level during the climb. He then banked left to head West, and he appeared to have a high nose attitude. It was also a steeper bank than I had seen him do earlier. He then started to go left-wing down. I'm not sure if I looked away for a moment, but when I saw him again he was heading South, rather than West as he was when I first saw him enter the final turn. At this stage I was looking from side-on. I could see the aircraft heading nose-down, and rolling slightly from side to side. It did not appear to be rudder-induced, as it didn't appear to yaw. It appeared to be aileron induced roll. The aircraft appeared to peel away slightly to the right, and the nose-down attitude had decreased slightly when the aircraft hit the ground. From the angle that we were watching from, we had an uninterrupted view of the flight in its final moments.

It was a hot, clear day with excellent visibility. When I was standing in the gully at the crash scene, the wind was not noticeably strong.

From our position in the car we were unable to hear anything such as engine noise, impact etc. From what I saw, the propeller was still spinning at the time of impact. It appeared that the aircraft was under power. During the time that I observed the aircraft, there was certainly no excessive speed that attracted my attention, nor did it seem excessively slow at the time. At the time that I observed him I was not surprised at his "clean wings" but in hindsight it is a bit surprising that he had no flaps on, given the heat and the load that he was carrying. I am not certain of what he was taught, as different instructors may teach different flap configurations for low speed.'

Ms.Karen Meredith-Thomas stated that she saw:

`a flat white-winged aircraft, which I thought, was a glider at the time. I thought this because of the manoeuvres it was doing. It looked as if it was a glider catching thermals. The movements appeared similar to a feather carried by the wind. I don't mean that it appeared out of control, because the manoeuvres appeared controlled.

Brett and I were discussing whether it was a glider or a remote-controlled model. We said this because of the unusual nature of the movements, appearing almost erratic. I saw him doing what appeared to be "figure 8" movements. On his third "figure 8" , I saw the wings tip up once or twice each side. He then appeared to recover momentarily, then went over on his side. I don't remember exactly which side dipped down, but he continued straight down into the ground....'

Mr. George Krasauskas, who was working at the back of Macedon Ranges Welding and Engineering in Gisborne, observed the aeroplane undertake *`an anti-clockwise circuit'* which *`appeared to be well executed'* and that:

> *`the airspeed seemed right, not too slow and not too fast. As he completed the circuit and reached the point roughly where I had seen him start the circuit from, he appeared to bank it over a bit more and I noticed the speed dropped off. I yelled out to Ray "come and have a look at this." Ray is my business partner, and he was inside the shed at the time. I called him because when I saw the speed drop off, I thought that he was in trouble.*
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> *The plane kept going around, and when it reached a point where I was looking side-on with the nose pointing to my left, it appeared to me as if the wind kicked up under the wing, and the aircraft wings kicked up to about vertical. The nose then pointed down, and the wings rotated around about 360 degrees, and the aircraft continued nose-down straight into the ground. I saw a puff of blue smoke and some dust...'*

And although Mr. Krasauskas could not estimate the height *`there was nothing out of the ordinary that made me concerned about his height. It wasn't until he banked right over that I thought he was in trouble. Up until then it was beautiful to watch.'*

It is noted that one of the occupants of the Cesna took photographs of the residential area and these were developed after the incident. These photographs assisted in determining aircraft attitude in the last stages of flight.

Recovery of the wreckage of the Cessna from the Sunbury Tip

Shortly after the incident the wreckage of the Cessna was dumped at the Sunbury Tip. This action was taken after discussion between ATSB investigators and the Coroners Assistants Office as the ATSB had completed its inspection of the wrecked aircraft. Subsequent events which occurred on 4th of December[5] necessitated the wreckage being recovered for further investigation. The debris was recovered from the tip on 10th and 15th December.

On 23rd December a fuel problem was identified as broadly affecting the aviation industry in Australia and it was considered prudent to further examine the wreckage to establish whether this incident was influenced by a fuel-related factor.[6]

Also the investigation disclosed safety bulletins from the manufacturer which necessitated further examination of the engine and wreckage in order to determine relevance to the cause of the incident.[7]

The allegation of the aircraft being shot at

On 4th of December 1999 a Cessna 180 aircraft VH-RGC landed at Tooradin airport and upon landing the pilot discovered a hole in the starboard wing. Upon examination by Senior Constable

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5 See discussion under sub-heading *`The allegation of the aircraft being shot at.'*

6 See discussion under sub-heading *`Potential for fuel contamination.'*

7 See discussion under sub-heading *`Maintenance.'*

Vincent, a firearms examiner from the Victoria Forensic Science Centre, the hole was identified as having been definitely caused by a firearm projectile, probably a large calibre high velocity weapon.

There had also been a threat made to Sunbury aerodrome on the 28th November 1999 regarding noise, with the caller stating that he would shoot at aircraft. Due to the proximity of Sunbury aerodrome to Gisborne, and the possibility that portions of the flight paths of VH-EWO and VH-RGC may have coincided it was felt prudent to examine the wreckage for evidence of projectile damage. The wreckage was subsequently recovered from Sunbury rubbish tip and examined by Vincent who discovered no evidence of any projectile damage.[8] Vincent stated that all worthwhile wreckage was recovered, but that the:

> *`remains of this aircraft were in a mutilated condition, owing to severe subsequent damage having been caused to it during burial at the tip.'*

And:

> *`Due to the amount of subsequent damage that has been caused, examination for the presence of possible bullet damage was difficult.'*

After close examination of the remaining debris *`there was no bullet damage or suspect bullet damage located.'*

As there was still a possible area of doubt about this issue it is necessary to examine what the eye-witnesses observed. Ms.Kemp stated that when she saw the Cessna:

> *`doing circuits I could hear the engine and it just sounded like a normal small plane. There was no coughing or spluttering or anything. My dad is a shooter and I can recognise the sound of a gunshot. I can definitely say that I didn't hear any gunshots at the time that the aircraft was flying around.'*

Ms. Williams also commented that, when listening to the sound of the light plane from inside her home she did not *`hear any gunshots...'* Borg was definite that she did not hear anything like a gunshot. Van der Voort, who was a passenger in a car being driven by his son between Gisborne and Riddell's Creek did not hear a gunshot. Van der Voort's son also did not hear any gunshot. The other passenger in Van der Voort's vehicle, Bauer, did not hear a gunshot. O'Neill did not hear a shot, nor did his girlfriend, Meredith-Thomas. Krasauskas did not hear a gunshot. Politini also remarked that it:

> *`was the type of day where the area was quiet, and I would have heard unusual sounds. I hear gunshots regularly around the area, and can recognise the sound of a rifle shot. I can definitely say that I heard no gunshots around this time.'*

In conclusion, on the totality of the evidence of Senior Constable Vincent and the eye-witnesses, it is highly unlikely that the aircraft was shot at on 1st December.

Potential for fuel contamination

[8] Report dated 16th December 1999.

On 23rd December 1999, after the crash of the VH-EWO, it was discovered that Mobil aviation fuel had problems with contamination. The *`Avgas'* was contaminated with a substance that was invisible and attacked brass fittings, creating a black sludge. Problems would be likely in carburetted aircraft, whereas VH-EWO was a fuel-injected aircraft. Inquiries were made with General Flight Refuelling Services, who confirmed that VH-EWO had in fact been fuelled with Shell Aviation fuel not Mobil. Further inquiries revealed that the contamination problem was limited to Mobil and BP aviation fuel, both of which obtained their supplies from the same depot in Yarraville. Shell supplied its own fuel from Geelong.

It was decided to examine the engine of VH-EWO to further exclude contaminated fuel as a possible cause, The aircraft engine was examined by Mr. Steven Nott from General Aviation Maintenance on the 10th of January 2000. The engine was partially stripped and various components examined. Nott concluded (Report dated 26th March 2000) that the engine was developing power at impact because:

> *`A: Propeller bent torsionally back against direction of rotation and not rearwards. This indicates that the engine was turning at speed and power; and*
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> *B: The sheared crankshaft has been twisted off as the propeller struck the ground, with the high torque of the engine causing the crankshaft to separate between the power section of the engine and the propeller attach flange.'*

Also Mr. Nott examined the piston pin plugs (number two cylinder) and found *`no signs of excessive wear.'* He also:

> *`critically inspected the oil system for contamination with no evidence of any contamination.'*

And:

> *If a piston plug had excessively worn, we would have found evidence in the oil suction and pressure screens and filters.'*

Mr. Nott inspected the fuel system and found no *`signs of contamination.'* He concluded that the engine was operating correctly and *`developing high power until it was destroyed on impact with the ground.'*

Maintenance

During the investigation recent Cessna-Lycoming Service Bulletins were examined. The bulletins identified three areas of possible concern.

> (a) A possibility of a faulty muffler leaking Carbon Monoxide gas into the cabin of the aircraft if the heater was being used (Cessna Maintenance Instruction 98-02-05). This was discounted because the VH-EWO maintenance log indicated that the muffler had been replaced in accordance with the relevant Service Bulletin, the day was very hot and the heater in all likelihood would not have been operation, and pathology/toxicology indicated the lack of Carhoxyhaemoglobin in the blood of Mr Bysouth.

Mr. Nott could not determine compliance from an inspection of the engine. He examined the Airframe Logbook and concluded that the muffler was changed (SB98-78-01). However, the part number was not quoted and therefore the degree of compliance was not able to be confirmed. Nott noted that *`the cabin heat system operation was checked which would indicate that the muffler was replaced with the latest design – complying with the SB in total.'*

(b) The possibility of excessive wear of the piston pin plugs. (Service Instruction 1492B)
This was discounted by the removal of the cylinder head and inspection of the piston pin plugs in number 2 cylinder. There was evidence of wear detected in the piston pin plugs, but not of an excessive nature capable of causing engine failure (see comments under the sub-heading *`Potential for fuel contamination'* above).

(c) Service Bulletin (SB99-73-02) relating to the fuel injection system, which was only applicable if the engine had experienced rough running. The effect of the problem would be a decrease in power in certain aspects of flight. Mr. Nott indicated that the:

> *`documentation on hand with us suggests that the fuel injector has not been repaired or changed. If this were the case then this would be indicated by a part number change to a 2576536-2. This was also not the case with the removed fuel injector, serial number 70134293.*
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> *Furthermore, the injector rework is only applicable after rough running has occurred on the ground. This fault has not been viewed by the Manufacturer as a serious risk to air safety or the manufacturer would have mandated the inspection/repair. This repair is currently only recommended.'*

Witnesses also were able to shed some light on the performance of the aircraft engine. Ms. Williams commented that she:

> *`heard a plane fly over my house at about 2.30PM that day. It was a light plane that I assume was them. I didn't see it, I only heard the engine from inside. When I heard the engine it sounded normal. I didn't hear any coughing or spluttering or anything like that.'*

Mr. Krasauskas noted that he:

> *`could hear the engine as the aeroplane was doing circuits and it sounded normal. I could hear the engine as the plane was descending out of control and it sounded like it was revving higher than before, almost like it was over-revving. This was just before it hit the ground.'*

There is no evidence that VH-EWO had ever experienced rough running. Also there is no evidence that any maintenance issues were a factor in this incident.

Weather

Various witnesses described the prevailing weather conditions differently. Some described a warm day with little wind, others described a hot day with *`a bit of a North-Westerly.'* Also others described a hot day with strong gusty North-Westerly winds. Don Whitford from the Bureau of Meteorology provided a report outlining the weather conditions surrounding the area of the accident at the relevant time. That report stated:

`Synoptic situation

A strong northerly air stream was established across Victoria and South Australia ahead of a low pressure cell which was centred over the Great Australian Bight.

Weather conditions December 1st 1999 was a fine, hot day with no significant cloud in the Gisborne area. The Bureau's official observing station at Melbourne Airport (the closest reporting station to Gisborne) recorded winds from the north averaging 15-25 knots throughout the day. The surface wind at the time of the accident was 360 degrees at 15 knots gusting to 27 knots. Winds above the surface were also northerly: 1000ft; 350 degrees 14 knots, 2000ft; 360 degrees 15 knots, 3000ft; 355 degrees 17 knots, 5000ft; 350 degrees 19 knots.

With high temperatures and gusty northerly winds, it is likely that there was some turbulence in the surface to 5000ft layer of the atmosphere although not of a significant nature.

Air temperature at midday was 31.5°C and rose to 34.1°C at 2pm. At the time of the accident the temperature was 33°C.

Surface air pressure remained steady all day at around 1015 hectopascals, there was no low cloud in the area nor were there any showers or thunderstorms.'

It is noted that the report into the incident compiled by the ATSB states that during strong, gusting wind conditions such as existed at the time of the incident, hills and mountains can induce severe turbulence and downdraughts.

In addition, Mr. Max Sereno, Chief Pilot of Transaero Australia (a Flying School/Charter Company based at Penfield (Sunbury) situate approximately 3 NM east from the site of the accident), commented:

`On days with Northeasterly wind conditions at 25 Kts or Northerly winds, as stated on the report sent by you dated 10 Feb 2000. The area on the lee side of the Mt Macedon rangers does experience mechanical turbulence because of the ranges themselves.

This turbulent area tends to extend from approx. Rosslynne reservoir through to the Monugeetta proving grounds, located northeast of Riddels creek township, up to a height of 3000 ft, depending on the direction and strength of the wind at the time. This would explain the gusts to 27 Kts.

The day's hot temperature of 33°C would also cause thermals usually experienced around the red rock bluff area and just to the north.'[9]

As indicated some of the eye-witnesses also commented on the weather. There were differing impressions. By way of example, Mr. Van der Voort commented that he did not *`exactly remember the weather conditions',* but:

`it was fairly warm, probably mid-twenties. I don't remember any strong winds at the time. I think it was a fairly sort of calm day.'

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9 Letter to the Coroner's Assistants' Office dated 4th June 2000.

Also Mr. Bauer recalled that the weather *`was a bit cloudy, and there was a bit of wind around. A bit stronger than a breeze, but certainly not gale force.'* Krasauskas noticed *`a gusty wind'* but was not able to say *`from which direction it was blowing.'* Borg also felt a strong wind which hit her as she was watching *`the aeroplane rolling.'*

Pilot training

Mr. Bysouth received his instruction at General Flying Services, in accordance with the Civil Aviation Safety Authority Day VFR syllabus. The day VFR syllabus covers the effect of temperature and air density on various aspects of flight, including the effect on power output of the engine and take-off and landing performance.

Mr. Bysouth was also undertaking a course at Swinburne University of Technology for a three year Bachelor of Technology (Aviation) degree. At the time of the incident he had completed one year of the course.[10]

Stalling, incipient spin recovery and spin recovery training was conducted, according to documents obtained in at least four dual sessions. However the actual time spent on each manoeuvre cannot be determined. In addition Mr Bysouth recorded two flights in which he practiced stalling on his own. On face value the training records indicate that Bysouth has reached the required standard at each phase of his training in these sequences. The spin training was conducted in an 8KCAB aerobatic aircraft. The Cessna 172R cannot be used for spin training because it is not aerobatically approved.

Detective Inspector Rodney Jouning[11] reviewed the material and supplied an opinion for the coroner. Jouning was supplied with a number of items to assist with this task.[12] He considered

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10 A detailed report on Mr. Bysouth's course results was forward to the Coroner's Office by the Registrar Mr. Anthony Grigg on 28th July 2000. The report indicated that:
`Sean's first semester marks were of average level consistent with an understanding required for PFL level.
At the conclusion of first semester he was judged of satisfactory academic and flying standard during the mid-year review.
During the second semester Sean's attendance at lectures at Swinburne was not consistent and he did not complete or sit the majority of assessment tasks and exams. This is reflected by the second semester final year marks, which in most cases are an average of assessment in semester 1 and semester 2.
He did however continue with his flying training achieving a PPL, the theory of which he would have covered in first semester.
During the review of the final year semester 2 marks Sean's academic performance was deemed not satisfactory and he was automatically referred for exclusion.'

11 Detective Inspector Jouning had been involved in the investigation of many fatal aviation incidents since 1985. He is the holder of an Airline Transport Pilot Licence endorsed with a Command Instrument and Grade One Instructor ratings. He is a Civil Aviation Safety Authority (CASA) Approved Test Officer and Delegate and has held the position of Chief Flying Instructor and Chief Pilot. In this position he has supervised the training of many pilots from ab-initio through to professional licences and ratings (summary of qualifications taken from statement).

12 (a) Inquest Brief surrounding the deaths of Bysouth, Kemp, Thomas and Tisdale prepared by Senior Constable John Gibson of the State Coroner's Assistants' Office and containing:
(i) Summary of circumstances
(ii) Witness statements of Renee Kemp, Kelli Williams, Iris Politini, Marlene Borg, Theo van der Voort, Rodny van der Voort, Andrew Bauer, Brett O'Neill, Karen Merideth- Thomas and George Krasauskas.
(iii) Report of the Chief Flying Instructor of General Flying Services, Mr Phill Betts.
(iv) Meteorological and local area reports from Mr Don Whitford of the Bureau of Meteorology and Mr Max Sereno, a local Chief Flying Instructor.
(v) Air Safety Report prepared by Mr Rod Fearon of the Australian Transport Safety Bureau (A TSB)
(vi) Engineering report by Mr Steve Nott of General Aviation Maintenance (GAM) at Essendon

that *`stall, incipient spin and spin training'* appeared to be the issue. Jouning summarised the incident thus:

> *`EWO piloted by Sean Bysouth and carrying three passengers, was seen flying over the Gisborne area. The aircraft was observed to conduct a number of left hand orbits over the Macedon Close area at a height above the ground varying from 550 feet to 950 feet. During a left hand turn the bank angle was seen to steepen and assume a near vertical nose down attitude. The aircraft impacted the ground in a nose low, right wing down attitude, coming to rest 27 metres from the initial impact point.'*

Having examined the *`stall and spin training'* given to Mr. Bysouth during March and July 1999 Detective Inspector Jouning commented:

> *`... it impossible to establish exactly what period of time has been allocated to stalling, incipient spin recovery and spin recovery. It is equally impossible to determine the time spent on stall recovery in turns. Based upon the training records Sean has received at least four dual sessions that have covered these sequences but to what degree is a matter of speculation. In addition to this Sean has recorded two flights in which he has practiced stalling on his own. On face value the training records indicate that Sean has reached the required standard at each phase of his training in these sequences.'*

Detective Inspector Jouning also made the point that while minimum *`overall aeronautical experience, expressed as hours of flying'*, are set down in the Civil Aviation Regulations *`and must be met before undertaking a flight test'* there are:

> *`no minimum hours specified for each particular sequence (instrument flight excluded). The test of competency throughout training is therefore a very subjective one. Every effort has been made by CASA to standardise competency determination but at the end of the day it is the instructor's perception and standards that is the determining factor.*

Detective Inspector Jouning considered that Bysouth had:

> *`undergone ab-initio training in accordance with the syllabus and in the case of spinning, has actually gone beyond the minimum requirements of the syllabus. In so doing he has logged 37.4 hours at the time he sat for his GFPT. From my experience this would be slightly less than the average time taken to reach this point but not by any means abnormal. Sean's training has been consistent and taken over a relatively short period, both of which are positive features for advancement.'*

And noted that Mr. Bysouth's:

(vii) Pathological & Toxicological Reports in relation to each of the deceased.
(viii)Balistics report by Senior Constable Ray Vincent of the Victorian Forensic Science Centre (VFSC)

(b) Day VFR Syllabus issued by CASA (1.3) dated November, 1998 and endorsed with the name Sean Bysouth.

(c) Copy of a letter dated 16 April, 2000 addressed to Senior Constable Gibson and signed Graham (Bysouth) with enclosures:-
(i) Copy of pages from a pilot log book believed to be that of Sean Bysouth.
(ii) Copy of pages from a pilot log book believed to be that of Graham Bysouth, the father of Sean.

(d) General Flying Services Flying Training Record of Sean Bysouth.

`General Flying Proficiency Test was conducted by Mr John Lindsay on 8 August, 1999 and completed on 11 August following cross wind circuits. It must be pointed out that Mr Lindsay would have to be rated as one of Australia's most experienced general aviation examiners with many years spent as a Chief Flying Instructor and a Civil Aviation Authority Examiner of Airmen. I am confident that this test would have been extremely thorough and any identified deficiencies, particularly in critical phases of flight such as stalling and incipient spin recovery, producing a test failure. This was not the case.'

Detective Inspector Jouning considered that although he had not cited the fight test form for Bysouth's Private Pilot Licence *`it is highly likely that this test would have also included stalling with a wing drop (incipient spin) component as required by the current syllabus.'* Apparently this was not always the case as in *`the past the Private Pilot Licence test concentrated primarily on navigation together with en-route aircraft and systems handling with basic aircraft handling being left'* to the General Flying Proficiency Test phase.

Detective Inspector Jouning also examined Mr. Graham Bysouth's concerns about the apparent lack of training for his late son in relation to *`incipient spins and spinning.'* Jouning, although noting the importance of this training made the point that modern aircraft are:

`designed and manufactured so that the possibility of inadvertent spin entry is greatly reduced when compared with older types of aircraft, to the point that some aircraft are almost impossible to spin intentionally. This has seen a gradually reduced emphasis on spin training. Where full spin recovery was once a compulsory training item, it is now optional. Mr Graham Bysouth's training of 1967 was in an environment of acute awareness of the dangers of inadvertent spin entry and would have been driven home by his instructors.'

That the:

`The recording of incipient spin training in 1967 was specifically identified as being independent of stall training, whereas the current incipient spin training is encompassed in the stall training. This has the effect of masking the amount of time spent on incipient spin training actually conducted.'

And he believed that:

`the number of accidents resulting from inadvertent spin entry are now negligible when compared with thirty or forty years ago and when they do occur it is more often than not in older type aircraft.'

Another concern raised was the possible propensity for the Cessna 172R *to flip onto its back* in certain configurations. Detective Inspector Jouning was unaware as to whether:

`this rather late model of 172 has this attribute or not but based on witness evidence this stall resulted in a dropping of the inside (lower) wing and as such is not an issue. The flipping of the aircraft results from the upper wing stalling before the lower, rolling quickly out of the turn to the point that with certain flap settings the roll continues to the point the aircraft can become inverted. I have only practiced this manoeuvre in Cessna 150 aerobatic aircraft but aerodynamically it is quite conceivable that the 172 would behave in a similar fashion.'

The Detective Inspector considered that this fact was not an issue in this case.

Postmortem examination

Dr. Shelley Robertson, forensic pathologist, concluded that all four occupants of the aircraft were wearing seatbelts at the time of impact. Apart from Mr. Kemp, toxicological analysis did not reveal any drugs or alcohol in bodies of the other passengers or the pilot. Testing indicated that Kemp had a blood alcohol level of 0.04gram/100ml. Robertson indicated for the pilot, Bysouth, the *`pattern of injuries, in particular, those to the hands and feet, are consistent with the deceased having been attempting to control the aircraft prior to impact.'*

The ATSB and expert's reports

- ATSB Report

The Australian Transport Safety Bureau Report (23rd March 2000) explained that Mr. Bysouth had planned the flight from Moorabbin:

> *`via Williamstown, Laverton, Melton and Torquay before returning to Moorabbin. Before departure, the pilot arranged for the fuel load on the aircraft to be adjusted in order to ensure that the aircraft did not exceed its maximum allowable weight limit. The aircraft departed Moorabbin at about 1350 Eastern Summer Time.'*

Mr. Bysouth *`held a private pilot licence and was endorsed on the aircraft type. He had completed spin recovery training, however the training was conducted in a different aircraft type. The pilot had accrued approximately 68 hours total flying experience. The post-mortem and toxicological examination did not identify any pre-existing conditions that could have affected the pilot's ability to fly the aircraft.'*

The Report concluded that explanations of various witnesses to the incident are consistent with photographs taken from the aircraft during the flight. The report summarised what the witnesses saw:

> *`after completing two 360 degree left turns in the vicinity of the accident site, the aircraft headed north and adopted a nose-high attitude before entering a steep turn to the left. Most of the witnesses, including a an experienced pilot, described seeing the aircraft's bank angle steepen as it passed a westerly heading and then the nose dropped such that the aircraft was heading approximately south in a near vertical, nose-down attitude. However, one witness described seeing the aircraft roll in a right-wing-over-left manoeuvre before it pitched nose-down.*
>
> *One witness reported seeing the aircraft spiral to the ground however most witnesses saw it descend straight to the ground in a nose-down, near vertical attitude.'*

That both witness reports and the wreckage *`indicated that the aircraft impacted the ground heading approximately south and in a nose-down, right wing low attitude.'*

The ATSB Report also noted that *`radar information indicated that between 1432 and 1435, the aircraft was flown in a sequence of left turns through 360 degrees in the vicinity of the accident site. These turns were conducted at an altitude of between 1,900 ft and 2,300 ft above mean sea level (approximately 550 to 950 ft above ground level).'*

And:

`The wreckage was located in a paddock approximately 400 m north of the Gisborne-Kilmore Road, approximately half-way between Gisbome and Riddells Creek. The residence of one of the passengers was less than 1 kIm from the accident site. The elevation of the accident site was about 1,350 ft and Mount Macedon (3,284 ft) was 11 kIm to the north-north-west.'

The damage to the Cessna *`indicated that the engine was producing power and that the flaps were extended to approximately 10 degrees at the time of impact. The investigation did not identify any pre-existing defects that could have affected the operation of the aircraft.'*

The Report commented that:

`Coordinated use of aileron, elevator and rudder controls will ensure that an aircraft maintains balanced flight. Discussions with the US Federal Aviation Authority (FAA) indicated that the Cessna 172 aircraft will exhibit mild stall characteristics if the aircraft stalls during balanced flight, and a pilot can regain control of the aircraft with a minimal loss of height. Most aircraft would require significantly more height above the ground to allow a pilot to recover control following a stall during unbalanced flight.

And noted that the Cessna Integrated Flight Training System Manual of Flight stated that:

`a stall during a steep turn will result in a sharp nose and wing drop and that recovery actions must be prompt and precise.'

On the issue of weather, the ATSB Report commented:

`At the time of the accident the prevailing weather conditions were fine with scattered high level cloud. The Kilmore Gap automatic weather observation taken at 1430 indicated that the wind was 340 degrees at 19 kts gusting to 27 kts. The observation taken at Melbourne's Tullamarine airport at 1431 indicated that the wind was 360 degrees at l5 kts gusting to 27 kts and that the temperature was 33 degrees Celcius. During strong, gusting wind conditions such as existed at the time of the accident, hills and mountains can induce severe turbulence and downdraughts.

Finally, the ATSB Report concluded that the aircraft

`was probably operating in turbulent conditions at the time of the accident, given the location of Mount Macedon upwind of the accident site. The manoeuvre described by witnesses was consistent with the aircraft stalling during the steep left turn. It is likely that the aircraft's reduced performance in the ambient temperature and the gusty and turbulent conditions contributed to the stall. In addition, the turbulent conditions would have made it very difficult for the pilot to maintain the aircraft in balanced flight during the sequence of steep turns. The loss of control following the stall and the pilot's failure to recover control in the height available was consistent with the stall occurring during unbalanced flight.'

Detective Inspector Jouning, having reviewed all the material, made the comment:

`I believe it necessary to identify the most likely cause of this incident and then try and identify factors that may have some causative effect, particularly as they relate to training.'

And concurred with the view of the ATSB investigator (in the absence of pilot incapacitation and structural/mechanical failure and after examining all of the material provided and taking into account the untested witness accounts) that the most likely cause for loss of control:

`was aerodynamic stalling of the aircraft. While there has been a significant wing drop, I do not believe the aircraft has entered a spin. Appropriate recovery has not been immediately initiated resulting in significant height loss and the aircraft heavily impacting the ground...'

In the context of pilot responsibility Detective Inspector Jouning made the important point that, in the first instance,

`one may argue that a pilot is responsible for the safe operation of his/her aircraft and the unintentional stalling of the aircraft should never occur. This contention is sound but I am of the view that a number of factors have compounded to create an environment where the dangers of this situation were not apparent to this inexperienced pilot'

These factors are:

- The aircraft was being operated at a reduced speed as evidenced by the deployment of wing flaps. It also fair to assume that power would also have been reduced to some degree.

- The aircraft was being operated at a relatively high angle of bank that has the effect of significantly increasing the stall speed. Where moderate angles of bank, such as up to 30 degrees, only produce minimal increases in stall speed, angles greater than 45 degrees result in a marked increase. As an example an aircraft that stalls in straight and level flight at 50 knots will stall at 70 knots with 60 degrees angle of bank, 85 knots at 70 degrees and 98 knots at 75 degrees. ----------
- It is quite possible for the aircraft to be flown in complete control at a relatively high angle of bank only to have the angle of bank increased either by pilot inattention, rudder misuse or a gust. If being flown close to the stall speed, as was the likely case here, the stall speed can be reached very rapidly and without the normal warning signs of an impending stall.

- It is likely that Sean's attention was either drawn away from or divided between flying the aircraft and looking at the ground. Maintaining a constant angle of bank and balanced level flight then becomes a very difficult process especially so for the inexperienced pilot who still relies very much on instrumentation to fly accurately. The variation of height described by ground witnesses and the altitude extremes recorded on ground based radar would seem to indicate that the aircraft was not being flown accurately. The likely presence of mechanical turbulence and thermal activity would only go to exacerbate the problem.

- When a condition of unbalance is occurring at the stall, the aircraft will inevitably drop a wing and enter the incipient stage of a spin. Because of the inherent directional stability of modern light aircraft, the nose will then tend to drop towards the lower wing and enter a spiral dive rather than a spin. Turbulence can have a similar effect as out of balance flight in initiating the wing drop. As described this can occur very rapidly and catch a pilot by total surprise. As opposed to training where only two people are on board the aircraft, this aircraft was carrying passengers. This has the effect of moving the centre of gravity aft and may have a marked effect on the rate of wing drop, something that Sean was unlikely to have experienced in this type of aircraft.

- Unlike the training environment this unintentional loss of control will initially cause confusion and a delay in taking the necessary corrective action. The natural initial reaction would be to apply further back-pressure to the control column and correct the drop wing

through the application of aileron, both having a significant detrimental effect. Height loss following the stall will be rapid.

- With this rapid height loss at this relatively low altitude, ground rush would soon be experienced, further hampering the decision making process.

Detective Inspector Jouning concluded that Bysouth received:

> *`training in accordance with the required syllabus and to a standard that has permitted him to pass a GFPT and Private Pilot Licence test. While every effort is made to train and expose student pilots to situations that enable them to deal safely with all phases of flight there will inevitably be occasions, where due to a multitude of factors, some pilots may find themselves in unfamiliar situations. The degree of developed flying skills, recent experience and airmanship will dictate how those situations will be identified and dealt with.'*

And that, finally:

> *`Sean is a pilot of very limited experience who has found himself in a situation that has no doubt taken him by total surprise. The onset of this stall, for a number of reasons, has been conceivably very rapid and masked from the normal stall warnings. A delay in identifying the cause for loss of control is to be expected but due to the limited height available this delay was ultimately critical to any chance of recovery. The fact that the aircraft struck the ground in a right wing down and low nose attitude is indicative that recovery had been initiated by Sean but at too late a stage.'*

Conclusion

Having examined all of the material, the ATSB Report effectively summarises the incident in its conclusion. ATSB's conclusion is that the aircraft:

> *`was probably operating in turbulent conditions at the time of the accident, given the location of Mount Macedon upwind of the accident site. The manoeuvre described by witnesses was consistent with the aircraft stalling during the steep left turn. It is likely that the aircraft's reduced performance in the ambient temperature and the gusty and turbulent conditions contributed to the stall. In addition, the turbulent conditions would have made it very difficult for the pilot to maintain the aircraft in balanced flight during the sequence of steep turns. The loss of control following the stall and the pilot's failure to recover control in the height available was consistent with the stall occurring during unbalanced flight.'*

However, as with many aircraft related incidents, there are contributing factors, which may have been affected by the level of experience and training of an individual pilot. As indicated by Detective Inspector Jouning:

> *`one may argue that a pilot is responsible for the safe operation of his/her aircraft and the unintentional stalling of the aircraft should never occur. This contention is sound but I am of the view that a number of factors have compounded to create an environment where the dangers of this situation were not apparent to this inexperienced pilot'*

Detective Inspector Jouning identified a number of factors including (in summary):

- Reduced air speed (close to stall speed);
- High angle of bank (which would increase stall speed);
- Possible wind gust creating turbulence;
- Relatively low altitude (providing an unforgiving time to correct the aircraft and the problem of ground rush);
- Pilot attention either drawn away from or divided between flying the aircraft and looking at the ground;
- Three passengers being in the aircraft as opposed to training where only one passenger is on board (having the effect of moving the centre of gravity aft which may a marked effect on the rate of wing drop). The pilot would probably not have experienced this problem;
- The potential for the resultant unintentional loss of control to initially cause confusion and a delay in taking the necessary corrective action.

It is also noted that the ATSB Report identified that Mr. Bysouth *`held a private pilot licence and was endorsed on the aircraft type. He had completed spin recovery training, however the training was conducted in a different aircraft type....'* Thus lack of experience of spin problems in the actual aircraft he was flying may have been another contributory factor.

Lastly, it is possible that the celebratory nature of the flight resulted in the inexperienced pilot flying too close to the ground in the circumstances (at a minimum height of about 550 feet) to enable one his passengers to take photographs and provide a better view of the local area for the occupants of the aircraft. He may also have been trying to provide friends on the ground with a better view of the aeroplane. At this altitude insufficient airspace remained to effect recovery.

Issues associated with maintenance or fuel contamination did not affect this incident. The aircraft was not shot at.

Recommendations and comments

The findings, recommendations and comments will be forwarded to the Minister for Transport (Commonwealth), the Director, Civil Aviation Safety Authority and the Director, Australian Transport Safety Bureau.

Passenger restrictions on inexperienced pilots

The deaths of Mr. Bysouth and his three young passengers have highlighted the need to balance training with experience. Bysouth had only flown a total of 68 hours before the incident[13]. He was faced with a number of factors that required experience to improve the chances of a satisfactory outcome. As stated by Detective Inspector Jouning, Bysouth was:

[13] 66.9 hours on the Cessna 172R and 1.1 hours on another type of aircraft (8KCAB aerobatic aircraft).

`a pilot of very limited experience who has found himself in a situation that has no doubt taken him by total surprise. The onset of this stall, for a number of reasons, has been conceivably very rapid and masked from the normal stall warnings. A delay in identifying the cause for loss of control is to be expected but due to the limited height available this delay was ultimately critical to any chance of recovery. The fact that the aircraft struck the ground in a right wing down and low nose attitude is indicative that recovery had been initiated by Sean but at too late a stage.'

An inexperienced pilot with a number of passengers can in some circumstances, increase risk factors. Examples of factors that have increased the risk in this case have been - a young and inexperienced pilot with a number of young passengers out on a celebratory flight, concentration on taking photographs of one of the passenger's homes, increased weight load (the number of passengers), sudden wind gusts and manoeuvres at an altitude not forgiving in the event of a problem. These factors demonstrate a potential need to reduce the risk of recurrence in the case of an inexperienced pilot. Restricting the number of passengers that could be carried by a new pilot for a limited period is a potential method of reducing risk.

Recommendation 1

That the Civil Aviation Safety Authority consider restricting inexperienced pilots (where flying as pilot in command) to one passenger for a period of twelve months after the issue of a Private Pilot's Licence or General Flying Proficiency Test or for a minimum of 50 flying hours from the issue of the PPL or GFPT or on being granted a licence in a higher category (whichever is the sooner).

This restriction is not intended to apply to a pilot who is the holder of a higher class of licence in another class of aircraft (ie: Helicopter Licence).

The need for an alert to the aviation industry about factors in this case

There may need to be a general alert to the aviation industry about the factors involved in the deaths of Mr. Bysouth and his passengers.

Recommendation 2

That the Civil Aviation Safety Authority consider a general alert to the aviation industry (in industry safety publications) about the factors involved in the crash of the Cessna.

The investigation and the need to retain physical evidence

The investigation in this case has also highlighted the need for physical evidence (the wreck of the aircraft) to be retained for as long as possible as other factors or circumstances may develop during inquiries that require close examination and expert review of the aircraft.

Recommendation 3

A degree of caution needs to be exercised before disposing of physical evidence such as the wreck of an aircraft as an investigation may discover (at a late stage) issues that require further inspection or testing of the aircraft or its components.

Graeme Johnstone
State Coroner