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ATSB TRANSPORT SAFETY REPORT
Aviation Occurrence Investigation AO-2010-110
Final

Collision with terrain, VH-FNM Wynella Station, Queensland 20 December 2010

Abstract

On 20 December 2010, the owner/pilot of a Pacific Aerospace Corporation FU-24-954 Fletcher aircraft, registered VH-FNM, was conducting aerial spreading of urea fertilizer at Wynella Station; a property 40 km south-south-west of Dirranbandi, Queensland. At about 1650 Eastern Standard Time, the pilot was returning to the landing strip after the completion of an application run. The aircraft impacted the terrain, and the pilot was fatally injured.

Examination of the accident site indicated that the aircraft's engine was delivering power at the time of impact. Wreckage examination did not reveal evidence of any defect or mechanical failure that would have contributed to the event. Although the post-mortem report on the pilot noted that he had significant coronary atherosclerosis, there was insufficient information available to determine whether pilot incapacitation was involved in the accident.

The investigation did not identify any organisational or systemic issues that might adversely affect the future safety of aviation operations.

FACTUAL INFORMATION

History of the flight

On 20 December 2010, the pilot of a Pacific Aerospace Corporation FU-24-954 Fletcher aircraft, registered VH-FNM, was engaged in spreading granular urea fertilizer on cotton fields at Wynella Station; a property 40 km south-south-west of Dirranbandi, Queensland. The application area consisted of several paddocks adjacent to an airstrip that the pilot used for refuelling and replenishing the load (Figure 1).

During 'turnarounds'[1], a loader/driver operated a mechanical scoop to replenish the aircraft's hopper while the pilot remained in the cockpit with the engine running. The delivery height for the application was about 50 ft above ground level (AGL), with the aircraft approaching to land from the same height. Each application flight was reported to have taken between 4 and 6 minutes. The aircraft was refuelled after every four or five flights, or about once per hour.

At about 1650 Eastern Standard Time[2], the pilot was conducting his 48th application flight of the day. The property owner saw the aircraft flying along the western boundary of the adjacent fields. He noted that there was no urea being dispersed and concluded that the pilot was returning to the landing area. He did not observe the aircraft for a brief period, but then saw dust and smoke rising from an area north of the airstrip. That location was well away from the previous approach flightpaths. When he could not see the aircraft, he concluded that it must have crashed and immediately drove to the scene to see if he could render assistance.

1 Elapsed time between the aircraft parking at the stopping point and moving off to continue flight or carry out a new mission.

2 Eastern Standard Time was Coordinated Universal Time (UTC) + 10 hours.

Figure 1: Area of operation

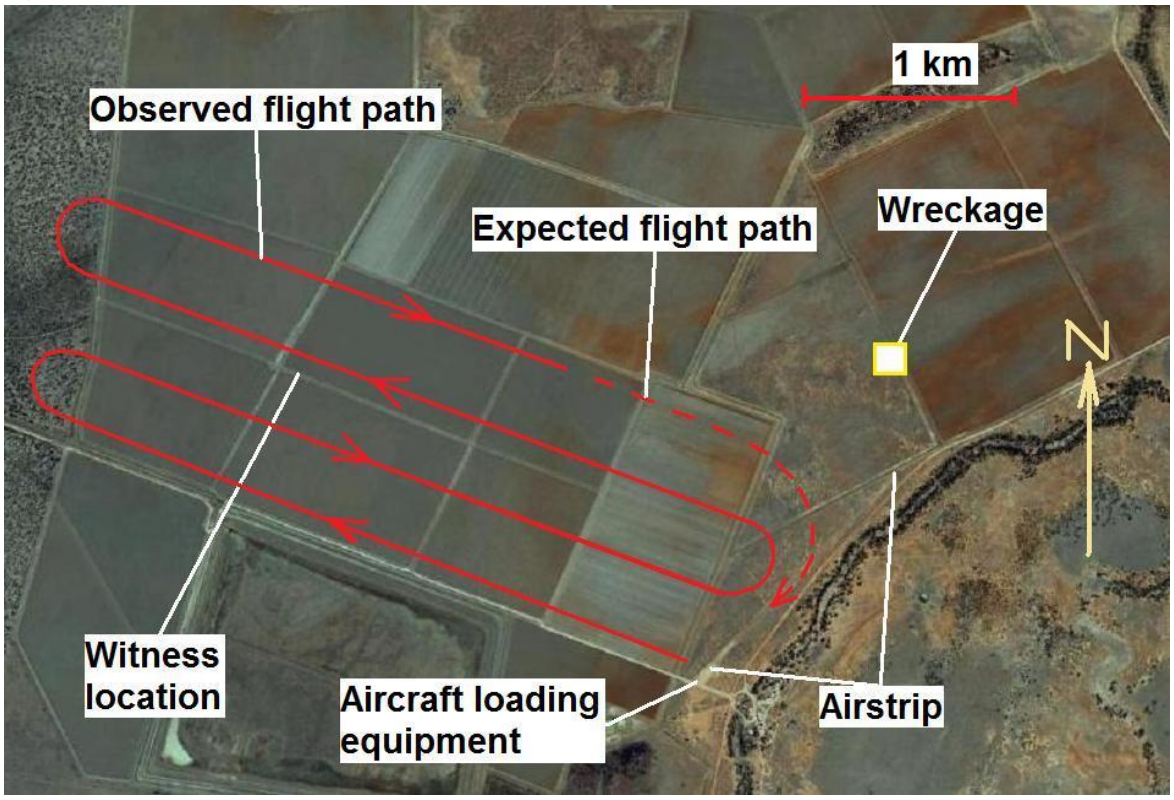

Image courtesy Google Earth

The loader/driver reported that he was at the end of the airstrip near the loading equipment when he observed dust and smoke in one of the paddocks. As he could no longer see the aircraft operating, he concluded that the aircraft had impacted the ground and ran to the accident site with one of the property workers.

The aircraft was found a short distance to the east of the application area. The pilot, the sole occupant, was fatally injured and the aircraft sustained serious damage.[3]

Pilot information

Qualifications and experience

The pilot held a Commercial Pilot (Aeroplane) License that was issued in August 1979. He had a Grade 2 Aeroplane Agricultural Rating and a Grade 3 Aeroplane Instructor Rating, and he was appropriately endorsed for the aircraft type.

According to the pilot's logbook, with the last entry being 14 November 2010, the pilot's total aeronautical experience was 5,815.8 hours, with 4,662.7 hours in command. From 1 January 2010 to 14 November 2010, the pilot had flown 139.6 hours.

Medical and pathological information

The pilot was 63 years old and held a current Civil Aviation Safety Authority (CASA) Class 1 Medical Certificate that was valid until March 2011, with a restriction that required him to use vision correction while flying.

As a result of his 'cardiac risk score', the pilot underwent a stress echocardiogram procedure[4] in May 2010 as part of his last annual aviation medical assessment. The result was normal. As part of his previous aviation medical assessments, he had also undertaken a stress echocardiogram in 2009 and a stress electrocardiogram in 2008, both of which showed normal results. There were no symptoms of

3 The *Transport Safety Investigation Regulations 2003* definition of 'serious damage' includes the 'destruction of the transport vehicle'.

4 The procedure involved conducting a resting echocardiogram, a Bruce Protocol Stress test, and a post-exercise echocardiogram.

cardiovascular-related issues noted in the pilot's medical files.

Research has shown that, if a person has significant coronary atherosclerosis, there is an 85% likelihood that it will be detected using a stress echocardiogram (Fleischman et al. 1998, Marwick 2003). In addition, research has shown that people who receive a normal result on the procedure will have only a 1% chance of a coronary event in the following year (McCully et al. 1998).

Post-mortem examination of the pilot identified 'extensive atherosclerosis involving the coronary arteries', with occlusions of the left anterior descending artery and right coronary artery ranging from 50 to 75%. The pathologist's report stated that it '…was possible that he might be incapacitated by this pathology (resulting in a heart attack)'.

Reviews of post-mortem examinations of general aviation pilots involved in fatal accidents in the United States have found that between 3 to 5% have 'severe' coronary atherosclerosis, defined as more than 66% occlusion of one or more arteries (Booze et al. 1980, Booze and Staggs 1986). The rate for pilots aged over 50 was 7 to 9%. However, in only a small proportion of cases was there sufficient information available to conclude that the condition was a factor in the associated accident.[5]

Post-mortem examination of the pilot found no evidence of smoke inhalation, and toxicological analysis found no evidence of raised carbon monoxide levels. The analysis did detect the presence of over-the-counter cold medication at sub-therapeutic levels. However, due to the degradation in the sample, no conclusion as to the concentrations could be made.

Witnesses reported that the pilot did not appear to have any symptoms of a cold or other medical problem, and they had not observed him taking any medication on the day of the accident.

Recent history

Examination of the pilot's 72 hours leading up to the accident did not reveal any problems related to sleeping, eating or pre-existing personal issues. The urea spreading application commenced 2 days previously and the pilot had reported being tired during that first day. The second day, or day before the accident, was unsuitable for application due to the weather conditions, and the pilot and the loader/driver returned to Moree, New South Wales about mid-morning and spent the rest of the day off duty.

The pilot was reported to have commenced duty on the day of the accident at about 0530, when the loader/driver met him and drove him to Moree Airport. They then flew to the property, which was around 1 hour flying time, to continue the urea application and commenced the spreading at about 0830. Overall, the pilot had been on duty for over 11 hours and conducted over 8 hours flying.

The loader/driver reported that the pilot conducted the aerial application as normal throughout the day. He had three breaks from flying operations during the day, and was observed to regularly eat and drink. At one stage the pilot reported some tiredness to the loader/driver, but not to the same extent as on the first day. The property owner reported assisting with the aircraft refuelling during the turnaround before the second last flight. He observed nothing extraordinary regarding the pilot or the aircraft at that time.

The urea application task had been contracted to the pilot by another operator who was an experienced agricultural pilot. That pilot considered that urea application was not a difficult aerial application task. The height flown (about 50 ft AGL) did not require the concentration and judgement of typical aerial spraying applications.

Aircraft information

General information

The Pacific Aerospace Corporation FU-24-954 was a low wing, all-metal aeroplane with tricycle landing gear that was manufactured in New Zealand as a utility and agricultural aircraft. The

5 If a heart attack occurs immediately before death, there will generally be insufficient time for relevant changes to be detectable in a post-mortem examination.

aircraft was registered in Australia on 20 July 2005.

The pilot was the aircraft owner and had converted the aircraft from its original left- to a right-seat pilot configuration, reportedly to make the aircraft identical to the Cresco aircraft (a turbine-engined variant of the FU24 Fletcher). That modification was not considered a factor in the occurrence.

Aircraft maintenance

The aircraft was being maintained under the CASA maintenance Schedule 5. At the time of the occurrence, the total airframe time in service was 5,035.5 hours. The aircraft maintenance release was issued after a periodic inspection on 26 May 2010 and was valid to 5,069.0 hours or 26 May 2011.

It was reported that the pilot completed daily inspections of the aircraft. However, no entries were annotated or signed on the aircraft's maintenance release since it was issued on 26 May 2010.

The required inspections included an airworthiness directive to daily inspect the leading edge of the aircraft's vertical fin after the last flight of the day.[6] However, there was no indication that these issues had any bearing on the occurrence.

Weight and balance

The investigation estimated that the aircraft was within its weight and centre of gravity limits during the flight.

Engine

The aircraft was powered by a 400 hp Lycoming IO-720 eight-cylinder, horizontally-opposed reciprocating engine, driving a three-blade Hartzel constant-speed propeller. The engine had a total time in sevice of 3,704.5 hours and a total time since overhaul (TSO) of 580.2 hours. The most recent maintenance included the replacement of the right magneto capacitor and points at 495.7 hours TSO, and the cleaning of the fuel injectors at 193.0 hours TSO.

The last engine inspection was coincident with the periodic inspection on 26 May 2011.

Meteorological information

Witnesses reported that the weather conditions at the time were warm and clear with a moderate south to south-westerly breeze of about 5 to 10 kts. The cloud was reported to be scattered[7] and the visibility good.

Sun glare was not a factor as the aircraft was on a south-easterly heading, and the sun was located to the west. The daytime temperatures were reported to be very mild, with a maximum of about 25 °C that day.

Airstrip information

The length of the airstrip was more than adequate for the aircraft's performance. It was reported that throughout the day, the pilot had landed towards the south and touched down about halfway along the strip. That allowed the pilot to position the aircraft at the southern end of the strip adjacent to the refuelling and replenishing facilities at the completion of the landing roll.

The location of the wreckage was further to the north than was expected based on the pilot's previous flights that day.

Wreckage examination

The aircraft was seriously damaged as a result of impact forces and a post-impact fire (Figure 2). The aircraft impacted the ground slightly left-wing low and about 20° nose down.

One propeller blade showed significant chordwise scratching and forward bending, indicating that the engine was delivering significant power at the time of impact. Based on a normal engine operating RPM of 2,300, propeller blade ground scars indicated a forward groundspeed of about 73 kts at the time of impact (Figure 3).

6 The requirement for this inspection was introduced by a CASA Airworthiness Directive in 2007. That directive was withdrawn by CASA on 24 December 2010.

7 Cloud cover is normally reported using expressions that denote the extent of the cover. The expression Scattered indicates that cloud was covering between a quarter and a half of the sky.

Figure 2: Aircraft wreckage

Figure 3: Initial impact ground marks

The wreckage trail was orientated on a heading of 150°(M), and the distance from the initial impact point to the main wreckage was about 31 m. The outboard sections of the left and right wings had fractured at the trailing edge. The propeller had separated at the engine crankshaft attachment and was located to the right of the wreckage trail.

A high intensity, post-impact fire destroyed the left and right inboard wing sections, aft cabin, cockpit and the centre fuselage back to the rear cabin door. There was no indication of an in-flight fire.

Flight control continuity was confirmed from the wing and tail section flight controls to the cockpit area. Fire damage to the cockpit precluded complete continutiy checks of the flight controls in that area.

There were no indications of a birdstrike or a collision with any obstruction or vegetation prior to the impact with the ground.

ANALYSIS

No aircraft anomolies were identified, and the weather and operating environment were reported to be benign at the time of the accident.

The lack of witness evidence or other information leading up to the impact precluded a definitive understanding of the aircraft's 20° nose-down attitude and location remote from the anticipated flightpath. It is possible that the ground impact occurred in response to the aircraft pitching up and entering an aerodynamically-stalled condition, that the aircraft suddenly pitched nose-down into the ground, or that there was some other flight sequence leading to the impact. Any of those scenarios could have been consistent with the evidence at the accident site.

The investigation considered the potential role of fatigue and distraction in the development of the occurrence. The pilot commenced travelling to work at 0530, and the accident occurred at about 1650 that day. However, he was reported to be well rested prior to commencing operations, and to have taken rest breaks during the day. Although the pilot had conducted 48 application runs throughout the day, each flight was considered by another operator to be of relatively low workload in nature. At the time of the accident, the pilot was conducting a less demanding transit flight back to the airstrip over flat, open terrain.

The pilot's post-mortem report indicated the potential for incapacitation as a result of pre-existing coronary atherosclerosis. The pilot had been required to undertake stress echocardiograms during his annual aviation medical assessments. Although this procedure is generally very effective for detecting significant atherosclerosis, the problem was not detected in this case. However, without further information on

the aircraft's flightpath prior to the impact, the investigation was unable to make any definitive conclusion regarding incapacitation.

The investigation did not identify any organisational or systemic issues that might adversely affect the future safety of aviation operations.

FINDINGS

From the evidence available, the following findings are made with respect to the collision with terrain that occurred 40 km south-south-west of Dirranbandi, Queensland on 20 December 2010 and involved Pacific Aerospace Corporation FU-24-954 Fletcher aircraft, registered VH-FNM. They should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factors

No contributing safety factors were identified to explain the collision with terrain.

Other safety factors

- The pilot had significant coronary atherosclerosis.

SOURCES AND SUBMISSIONS

Sources of Information

The sources of information during the investigation included the:

- pilot's next of kin
- maintainer of the aircraft
- Civil Aviation Safety Authority (CASA)
- Office of the State Coroner – Queensland
- Queensland Police Service.

References

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Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003*, the Australian Transport Safety Bureau (ATSB) may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the aircraft operator and CASA. A submission was received from CASA. The submission was reviewed and, where considered appropriate, the text of the report was amended accordingly.