Australian Government
Australian Transport Safety Bureau

Collision with terrain involving Cessna 150, VH-UWR

55 km north-east of Bourke, New South Wales | 29 April 2012

Investigation

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Aviation Occurrence Investigation
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Addendum

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Safety summary

What happened

VH-UWR accident site

Source: ATSB

On the morning of 29 April 2012, the owner-pilot of a Cessna 150 aircraft, registered VH-UWR was aerial stock mustering on a cattle station about 55 km north-east of Bourke, New South Wales. Some early patches of fog cleared such that the weather conditions were fine and calm.

After about 1.5 hours in the air, the pilot radioed stockmen on the ground to direct them to an area where cattle were not moving. The aircraft was observed circling over the area then in a steep descent followed by the sound of an impact. The aircraft was seriously damaged and the pilot sustained fatal injuries.

What the ATSB found

While manoeuvring at low level the pilot inadvertently allowed the aircraft to aerodynamically stall, resulting in a high rate of descent and collision with terrain. There was insufficient information about pilot control inputs to establish the factors that precipitated the stall.

The pilot did not hold a valid medical certificate and had not completed a flight review for a number of years, increasing the risks of operating an aircraft, especially during aerial stock mustering.

Safety message

Pilot proficiency can decline without regular practice of non-routine procedures under the supervision of instructors or approved training/check pilots. As such, pilots should take every opportunity to refresh their knowledge and skills, at a minimum during a flight review every two years.

Contents

The occurrence

On the morning of 29 April 2012, the owner-pilot of a Cessna 150 aircraft, registered VH-UWR, departed Warraweena homestead airstrip to conduct aerial stock mustering on an adjoining cattle station located about 55 km north-east of Bourke, New South Wales (Figure 1). The muster was being conducted with the assistance of three stockmen, including the property owner and the cattle owner, on motorcycles.

The stockmen advised that the pilot had requested that they be at the yards by about 0645 Eastern Standard Time[1]. When they arrived, the ground was still wet from rain the previous day and initially there were patches of shallow fog. The fog soon cleared and conditions for the muster were fine and calm. Automatic weather observations recorded at Bourke indicated that the wind was easterly at about 5 knots and that the temperature and dew point were 15 °C and 10 °C respectively.

Figure 1: Accident site location and muster area (outlined)

Source: Google Inc.

Two of the stockmen recalled talking to the pilot via two-way radio at about 0700 and they were advised to wait at the yards for further instructions. The third stockman, who was also waiting at the yards, stated that he had heard the aircraft operating in the distance, '…gridding out the paddock back and forth [working the cattle] into a group towards the east and muster area'.

At about 0730, the pilot radioed the stockmen to come up along the eastern fence line and subsequently provided them with directions to assist with the mustering of the cattle. The stockmen recalled that initially the aircraft was operating behind the cattle at a height estimated to be about 100–200 feet above the ground. The aircraft appeared to be operating normally and the aircraft's engine tone was constant.

[1] Eastern Standard Time (EST) was Coordinated Universal Time (UTC) + 10 hours.

Shortly before 0800, the pilot advised the stockmen that there was a mob of cattle that didn't want to move from an area of scrub. The pilot directed the stockmen to the cattle by indicating that they were '…over here under my left wing'. At about the same time, one of the stockmen observed the aircraft in a turn but had to re-focus his attention to the ground as he made his way towards the area of scrub. Less than a minute later, another stockman observed the aircraft in what was described as a near-vertical descent followed by the sound of an impact, and immediately rushed towards the accident site. On arrival he observed that the aircraft had collided with terrain (in the vicinity of the cattle) and advised the other stockmen of the situation via the two-way radio.

The aircraft was seriously damaged and the pilot sustained fatal injuries.

Figure 2: Aircraft wreckage from the front (after some disturbance)

Source: ATSB

Context

Pilot information

The pilot held a Private Pilot (Aeroplane) Licence issued by the Civil Aviation Safety Authority (CASA) in March 1977 and endorsed for stock mustering in April 1986. The most recent entry in the pilot's log book was made in June 2002. Based on the information available, it was estimated that the pilot's total flying experience was about 4,000 hours, including about 200 hours on VH-UWR.

The pilot acquired VH-UWR in July 2011 as a replacement for a Cessna 172. Since that time, the pilot had reportedly flown on average once every few weeks with periods of increased activity. The pilot's previous flight was in the local area about a week before the accident.

For the pilot to exercise the privileges of his private pilot licence, aviation regulations stipulated that an aviation medical examination be undertaken within the 2 years prior to the flight. The pilot passed one such examination in August 2003 and a Class 2 Medical Certificate was issued with validity until August 2005. The pilot's next and most recent examination was in July 2007. That examination revealed an abnormal echocardiogram (ECG) and CASA subsequently informed the pilot that certification of his medical certificate was delayed pending a report from a cardiologist.

A cardiologist examined the pilot in April 2010 and found that that the concurrent ECG was within normal limits. No subsequent interaction with CASA was identified and, at the time of the accident, the pilot did not hold a valid medical certificate.

A post-mortem examination was conducted on the pilot by the relevant State authorities. The examining pathologist found that there was a low probability the pilot experienced a heart attack. Overall, there was no indication of a physiological factor in the accident.

Aviation regulations also stipulated that a flight review be undertaken within the 2 years prior to the flight. The pilot's log book indicated that the last flight review was conducted in September 2001. While it is possible that subsequent reviews had taken place, it is unlikely that a flight review would have occurred without the pilot holding a valid medical certificate. In that case, a flight review might have occurred as late as August 2005 and not been recorded.

Additional requirements applicable to aerial stock mustering required that, within the preceding 12 months, the pilot either complete a minimum of 20 hours mustering or undertake an appropriate flight test. Given the lack of records, it was not possible to establish how much mustering had been undertaken within the preceding 12 months. Similar to the flight review, it is unlikely that a recent flight test would have been conducted.

Without a valid aviation medical certificate and flight review, the pilot was not authorised to operate the aircraft. The safety implications of these anomalies are discussed in 'Safety analysis' following.

Aircraft information

The last recorded maintenance was at the last 100-hour inspection in May 2011 when the aircraft total time in service was 3,189 hours. At that time, a maintenance release was issued, valid for 12 months or 100 hours time in service. The daily inspection had not been certified and the aircraft hours had not been recorded since July 2011.

Although the recording of aircraft hours was not up to date, the aircraft's hour meter indicated that the aircraft had probably been operated for 116 hours since maintenance release issue. Any exceedance of the 100-hour limit rendered the maintenance release invalid and the aircraft technically unairworthy.

There were no recorded defects endorsed on the maintenance release. There was also no evidence of the pilot being aware of any aircraft defects or anomalies.

Fuel for the aircraft was stored in drums on the pilot's property. Although the timing and quantity of the last refuelling was not known, at that time of year the pilot was reported to routinely depart with the fuel tanks at least three quarters full. With that quantity, the aircraft would have had sufficient fuel for the flight. A sample of fuel recovered from the aircraft was free of contaminants.

Accident site and wreckage information

The aircraft wreckage was in a lightly wooded area towards the eastern boundary of the paddock being mustered. It was 5 m from the initial impact point, which was about 12 m from an undisturbed stand of trees up to 15 m high in the line of flight. In clearing those trees the aircraft was at a descent angle greater than 45 °.

Prior to impacting the ground, the aircraft's left wing tip made contact with a small tree about 3.5 m above the ground followed by the right wing impacting and becoming severely disrupted by a large tree a short distance later. Damage to the leading edge of the left wing and the propeller spinner were consistent with the aircraft impacting the ground at a very steep, nose-down attitude.

Examination of the wreckage, including the aircraft structure, flight controls, engine and propeller did not detect any pre-impact defects or anomalies. Damage to the propeller was consistent with engine power being applied at impact. The stall warning device was checked and it responded appropriately with an audible tone.

The wing flap actuating mechanism was in the flap-retracted position and the elevator trim was in the neutral position. The carburettor heat control was found in the fully-forward, OFF position.

Related occurrences

A search of the ATSB database yielded 26 accidents involving fixed-wing aircraft engaged in aerial stock mustering in the previous 20 years. Of those accidents, at least seven were identified as being the result of an aerodynamic stall.

Five of the 26 aircraft mustering accidents involved Cessna 150 aircraft, two of which were attributed to an aerodynamic stall. The ATSB investigated one of those occurrences which occurred in 2005 in similar circumstances to this accident (Investigation No. 200506306).

More recently, the pilot of a Cessna 172 experienced a loss of control while orbiting during cattle spotting at about 500 ft (Investigation No. AO-2010-047). The pilot reported that the loss of control was most likely the result of an inadvertent stall.

Copies of the ATSB investigation reports are available at www.atsb.gov.au.

Safety analysis

Introduction

Examination of the aircraft, accident site and witness information indicated that the aircraft impacted the ground with relatively low forward speed, a high rate of descent and a steep nose-down attitude, all of which were consistent with uncontrolled flight. This analysis will examine the factors that may have contributed to the loss of control and discuss anomalies relating to the pilot's qualifications.

Loss of control

In the context of the Cessna 150 operation, the ATSB considered that the loss of control could have been the result of severe environmental conditions, flight control malfunction, pilot incapacitation, or an aerodynamic stall.

All of the indications from witnesses and nearby recording sites, were that the weather conditions were benign and therefore not a factor in the occurrence. Similarly, the aircraft's flight control system was found to have no defects or anomalies and therefore a malfunction was unlikely to be a factor.

Pilot incapacitation is a difficult factor to establish because the evidence is not always conclusive. In this case there was evidence of a pre-existing heart condition, but a cardiologist had subsequently considered that the pilot's cardiology was within normal limits. In addition, a post-mortem examination indicated that there was a low probability that a heart attack precipitated the accident. On balance, pilot incapacitation was unlikely to be a factor in the occurrence.

In regard to the occurrence of an aerodynamic stall, there was no direct evidence such as recorded aircraft parameters or witness reports of the aircraft entering a stalled condition. There was, however, evidence of local preconditions conducive to stalling and a collision with terrain that was symptomatic of a low-level stall.

The situation shortly before the accident was that the pilot was turning above some cattle to indicate the location to ground-based stockmen as they were still making their way to that site. In that case, and with the wreckage found in the same area, it is likely that the pilot had continued to circle the area.

With the aircraft banked in a turn, the lift generated by the wings is at an angle and is therefore less effective in supporting the aircraft's weight. To maintain height in this situation, the pilot needs to increase wing lift. This is typically achieved by using the elevators (rearward control column movement) to increase the angle of the wings relative to the airflow. Drag consequently increases and more engine power is required to maintain airspeed.

If the control column is moved too far rearward such that the angle of the wings relative to the airflow exceeds the stall angle, lift will decrease significantly. Typically, the nose of the aircraft will drop and the aircraft will lose altitude. The steep nose-down descent witnessed by a stockman and the steep angle of descent evident at the accident site are consistent with the immediate effects of an aerodynamic stall. Although the pilot might have initiated appropriate recovery actions there was limited height available to allow those to take effect.

There was insufficient information about pilot control inputs to establish the factors that precipitated the stall. It is possible that, based on the temperature and dewpoint, some carburettor ice formed that led to an undetected reduction in engine power. If that occurred, it might have resulted in lower airspeed and/or a descent. While carburettor icing should not necessarily lead to a stall, a pilot might respond intuitively with control inputs that subsequently induce an aerodynamic stall.

In aerial stock mustering, pilots can become focussed on the mustering task to the detriment of the flying task. Over time, pilots can lose proficiency in the recognition and avoidance of stalls. This risk is discussed in context in the next section.

Operational anomalies

The primary means for a private pilot to maintain proficiency in the recognition and avoidance of aerodynamic stalls is to practice them under the supervision of an instructor or training/check pilot during a flight review. By not completing regular flight reviews, the pilot was increasing the risk level of his operation that was already relatively high as a result of the low-level manoeuvring routinely involved in aerial stock mustering. Those risks can be further mitigated by maintaining mustering proficiency or undertaking an applicable flight test.

The pilot did not hold a valid aviation medical certificate at the time of the accident. While there was no evidence that the pilot was incapacitated, there was a lack of assurance that the pilot was medically fit to operate the aircraft.

As the aircraft was probably operated in excess of the 100-hour limit of the maintenance release, the aircraft was not technically airworthy. Although this was found to have no effect on the loss of control, such inattention to regulatory requirements weakens the system in place to ensure the proper functioning of the aircraft.

Findings

From the evidence available, the following findings are made with respect to the collision with terrain involving Cessna 150M, VH-UWR, and should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factor

- While manoeuvring at low level during aerial stock mustering, the pilot inadvertently allowed the aircraft to aerodynamically stall resulting in a high rate of descent and collision with terrain.

Other safety factor

- The pilot did not hold a valid medical certificate and had not completed a flight review for a number of years, increasing the risks of operating an aircraft, especially during aerial stock mustering.

Other key finding

- At the time of the accident, the aircraft had probably been operated in excess of the 100-hour maintenance release limit.

General details

Occurrence details

Date and time:	29 April 2012, 0800 EST	
Occurrence category:	Accident	
Primary occurrence type:	Collision with terrain	
Location:	55 km NE of Bourke, NSW	
	Latitude: 29° 43.7' S	Longitude: 146° 23.2' E

Aircraft details

Manufacturer and model:	Cessna Aircraft Company, 150M	
Registration:	VH-UWR	
Operator:	Private	
Serial number:	15079278	
Persons on board:	Crew – 1	Passengers – 0
Injuries:	Crew – 1 fatal	
Damage:	Substantial	

Sources and submissions

Sources of information

The sources of information during the investigation included the:

- witnesses
- Civil Aviation Safety Authority (CASA)
- Bureau of Meteorology
- New South Wales State Coroner.

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the *Transport Safety Investigation Act 2003 (the Act)*, 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 CASA and parties with an involvement.

Submissions were received from CASA and a member of the pilot's family. Those submissions were reviewed and, where considered appropriate, the text of the draft report was amended accordingly.

Australian Transport Safety Bureau

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated. The terms the ATSB uses to refer to key safety and risk concepts are set out in the next section: Terminology Used in this Report.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

Terminology used in this report

***Occurrence*:** accident or incident.

***Safety factor*:** an event or condition that increases safety risk. In other words, it is something that, if it occurred in the future, would increase the likelihood of an occurrence, and/or the severity of the adverse consequences associated with an occurrence. Safety factors include the occurrence events (for example, engine failure, signal passed at danger, grounding), individual actions (e.g. errors and violations), local conditions, current risk controls and organisational influences.

***Contributing safety factor*:** a safety factor that, had it not occurred or existed at the time of an occurrence, then either: (a) the occurrence would probably not have occurred; or (b) the adverse consequences associated with the occurrence would probably not have occurred or have been as serious, or (c) another contributing safety factor would probably not have occurred or existed.

***Other safety factor*:** a safety factor identified during an occurrence investigation which did not meet the definition of contributing safety factor but was still considered to be important to communicate in an investigation report in the interests of improved transport safety.

***Other key finding*:** any finding, other than that associated with safety factors, considered important to include in an investigation report. Such findings may resolve ambiguity or controversy, describe possible scenarios or safety factors when firm safety factor findings were not able to be made, or note events or conditions which 'saved the day' or played an important role in reducing the risk associated with an occurrence.

***Safety issue*:** a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operational environment at a specific point in time.

***Risk level*:** The ATSB's assessment of the risk level associated with a safety issue is noted in the Findings section of the investigation report. It reflects the risk level as it existed at the time of the occurrence. That risk level may subsequently have been reduced as a result of safety action taken during the course of an investigation.

Safety issues are broadly classified in terms of their level of risk as follows:

- **Critical safety issue:** associated with an intolerable level of risk and generally leading to the immediate issue of a safety recommendation unless corrective safety action has already been taken.
- **Significant safety issue:** associated with a risk level regarded as acceptable only if it is kept as low as reasonably practicable. The ATSB may issue a safety recommendation or a safety advisory notice if it assesses that further safety action may be practicable.
- **Minor safety issue:** associated with a broadly acceptable level of risk, although the ATSB may sometimes issue a safety advisory notice.

***Safety action*:** the steps taken or proposed to be taken by an organisation or agency in response to a safety issue.

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