

Australian Government Australian Transport Safety Bureau

Visual Flight Rules in Instrument Meteorological Conditions and controlled flight into terrain involving Cessna 182Q, VH-CWQ

15 km north of Tooraweenah, New South Wales | 4 June 2012



Investigation

ATSB Transport Safety Report Aviation Occurrence Investigation AO-2012-076 Final – 4 March 2013



Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT

Aviation Occurrence Investigation AO-2012-076 Final

Visual Flight Rules in Instrument Meteorological Conditions and controlled flight into terrain involving Cessna 182Q, VH-CWQ 15 km north of Tooraweenah, NSW 4 June 2012

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SAFETY SUMMARY

What happened

On 4 June 2012, a Cessna Aircraft Company 182Q, registered VH-CWQ, with the pilot the sole person on board took off from Walgett in good weather conditions for a flight to Mudgee, New South Wales (NSW), initially climbing to 5,500 ft. During the flight, the cloud base lowered and the aircraft was descended until it was flying about 1,000 ft above flat terrain, either close to or in the cloud. The aircraft impacted a rock face in mountainous terrain near Tooraweenah, NSW. The pilot sustained fatal injuries and the aircraft was destroyed.

What the ATSB found

The ATSB found that the risk to flight was increased by deteriorating weather conditions. The risks associated with continuing a flight under these circumstances are highlighted in the ATSB Transport Safety report AR-2011-050, *Accidents involving Visual Flight Rules (VFR) pilots in Instrument Meteorological Conditions*. Additionally, influences on pilot decision making behaviours are described in the ATSB Research Investigation report B2005/0127, *General Aviation Pilot behaviours in the face of Adverse Weather*.

Safety message

This accident provides a reminder to pilots of the insidious risks associated with reduced forward visibility when flying in or near the cloud base. The benefits of leaving a Flight Note with a suitable person in terms of ensuring the early commencement of a search for an overdue aircraft are also evident.

Pilots conducting VFR flights should remain aware that once they fly into weather conditions with reducing forward visibility, their ability to manoeuvre around approaching obstacles could be severely limited because obstacles may not be seen until they are too close to avoid. Such collisions are not often survivable.

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Visual Flight Rules in Instrument Meteorological Conditions and controlled flight into terrain involving Cessna 182Q, VH-CWQ 15 km north of Tooraweenah, NSW on 4 June 2012

Prepared By

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THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau 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 appropriate, or to raise general awareness of important safety information in the industry. 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 (e.g. 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 actions taken by individuals or organisations 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 a person, organisation or agency in response to a safety issue.

FACTUAL INFORMATION

History of the flight

At 0943 Eastern Standard Time¹ on 04 June 2012, a Cessna Aircraft Company 182Q (C182), registered VH-CWQ, departed Walgett Airport on climb to 5,500 ft above mean sea level (AMSL) for a flight to Mudgee Airport, New South Wales under the Visual Flight Rules (VFR) with just the pilot on board. This flight would normally take about 90 minutes in a C182. At the time of departure from Walgett, a witness obtained automatic weather station information indicating that there was overcast cloud at Walgett with a base higher than 12,000 ft above the airport.²

At 1007, the pilot phoned a friend who lived near Mudgee, and asked for an appraisal of the weather at Mudgee. The friend reported describing conditions indicating the possibility that the pilot might not be able to fly to Mudgee because the weather conditions were unsuitable for VFR flight. The friend recalled the pilot indicating that if the weather deteriorated too much, he would turn around and return to Walgett.

Telephone records indicated that the pilot phoned another friend at 1017, and during the conversation stated that he was flying under cloud at 2,000 ft. At that time, based on the normal flying speed for the aircraft type, the aircraft would have been about 25 NM (46 km) to the north of the accident site. The elevation of the terrain in that area is about 800 ft, rising up to about 4,000 ft ahead and to the left of the planned flight track. A small track deviation to the right would have allowed the aircraft to avoid the rising terrain at that point.

At about 1030, the aircraft collided with the side of a hill on the direct track between Walgett and Mudgee Airports (Figure 1), at a point about 100 ft below the top of the hill. Witnesses reported that at the time of the accident, the overcast cloud base was about 100 ft below the accident site.

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

² The elevation of Walgett Airport is 439 ft.

Figure 1: Location of the accident site



The pilot sustained fatal injuries during the accident sequence. The aircraft was seriously damaged³ by the impact forces and a subsequent fuel-fed fire.

A small area of surrounding bushland was burnt by the fire from the accident.

Personnel information

The Pilot held a Private Pilot (Aeroplane) Licence that was issued in September 2009 with a manual propeller pitch control endorsement issued at the same time. The pilot held a valid Class 2 Medical Certificate without conditions. It was believed that the pilot had about 300 hours total aeronautical experience; however, this could not be confirmed as the pilot's logbook was reported to be on board the aircraft. The logbook was not able to be located among the wreckage.

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

The pilot's family reported that he flew regularly in this area and would have been familiar with the topographical features.

The pilot was reported to use a flight planning application on a tablet computer for planning and managing a flight. The application was capable of providing flight briefing information. It was not possible to ascertain whether the pilot had obtained such information on the day of the accident.

The pilot also had an Airservices Australia (Airservices) National Aeronautical Information Processing System (NAIPS)⁴ account. A search of NAIPS records by Airservices for the day prior to, and the day of the flight did not show any use of the pilot's account.

Aircraft information

The aircraft was a single piston-engine, propeller-driven monoplane with seating for a pilot and three passengers. The aircraft details are at Table 1.

The aircraft was owned by an aero club, and the pilot owned a similar aircraft that he normally flew. At the time, the pilot was unable to use his own aircraft because his farm landing strip was waterlogged and unusable.

Manufacturer	Cessna Aircraft Company
Model	182Q
Serial Number	18267031
Registration	9 January 1980
Year of manufacture	1979
Maintenance Release	Valid to 6,758.1 hours or 16 December 2012
Total airframe hours	6,721
Engine type	Teledyne Continental O-470-U
Engine hours since overhaul	1,165

Table 1: Aircraft information

The aircraft was maintained in accordance with Schedule 5 of the Civil Aviation Regulations (1988). The last periodic inspection was certified as being conducted on 16 December 2011, at 6,658.1 flight hours. The maintenance release authorised flight under the VFR by day or night. According to the aircraft maintenance documentation, the aircraft was certified as being serviceable for flight.

The maintenance release was destroyed by the post-impact fire. The pilot who flew the previous flight in the aircraft reported the aircraft had been fully serviceable at that time. The maintenance organisation for the aircraft was not aware of any outstanding defects on the aircraft.

⁴ NAIPS is a multi-function, computerised, aeronautical information system that processes and stores meteorological and Notice to Airmen (NOTAM) information for briefing of pilots.

Meteorological information

The weather at Walgett was reported to be fine at the time of departure.

The flight was to be carried out close to the boundary of meteorological forecast areas 20 and 22.⁵ Bureau of Meteorology forecasts for those areas indicated that there would be stratiform⁶ cloud between 2,000 ft and 5,000 ft along the intended track. The base of stratiform cloud may thin out, allowing a pilot to maintain visual reference with terrain below but with little forward visibility when flying in the lower margins of the cloud

Witnesses about 3 NM (6 km) north of the accident site were interviewed on the day following the accident. The weather in the vicinity at the time of the interviews is shown at Figure 2. The witnesses reported that the cloud base at the time of the accident was similar to that observed at the time of the interview and was described as having an overcast, 'flat' base. Figure 3 depicts the base of the cloud with reference to the terrain in the area of the accident on a clear day. The cloud base was derived to have been about 1,800 ft when looking toward the accident site from the witness location.

Figure 2: Accident site with similar cloud conditions on the day after the accident



⁵ Australia is subdivided into a number of forecast areas.

⁶ Clouds that exhibit extensive horizontal development (in contrast to the vertical development of cumuliform clouds).



Figure 3: Accident site in clear weather with derived cloud base indicated

Wreckage and impact information

The accident site was on the direct track between Walgett and Mudgee Airports.

The aircraft had impacted a near vertical rock formation with about 35° left bank and 5° pitch up attitude. The terrain below the rock formation sloped down at about 40° , resulting in the wreckage slipping down the slope about 8 m before coming to rest against a tree (Figure 4).

Figure 4: Accident site



The airframe was significantly disrupted, and the cabin area consumed by a post-impact, fuel-fed fire. No anomalies were found in the flight control systems or

the parts of the airframe structure that could be examined. Damage to the engine and propeller provided a strong indication that significant power was being produced at the time of impact (Figure 5).

Figure 5: Propeller damage



Medical and pathological information

There was no indication of any medical condition that could have affected the pilot's ability to fly the aircraft.

Survival aspects

When the aircraft did not arrive at Mudgee at the estimated time of arrival, the friend at Mudgee who had been phoned by the pilot at 1007 contacted air traffic control, who then contacted the Rescue Coordination Centre (RCC). The RCC made enquiries and identified the aircraft call sign and the pilot's intentions.

No flight plan was lodged for the flight, and the pilot did not contact air traffic services (ATS) during the flight. There was no requirement for the pilot in command of a VFR flight to lodge a flight plan, or to contact ATS during such a flight. However, in this instance the pilot left a Flight Note with a person at the point of departure indicating the intention to track direct from Walgett to Mudgee.

Other information

Visual Flight Rules

The flight was being conducted in non-controlled Class G airspace under the VFR. Flight under these rules in this aircraft required more than 5,000 m horizontal

visibility, and for the aircraft to remain more than 1,000 ft vertically and 1,500 m horizontally from cloud. However, if the aircraft was flying lower than 3,000 ft AMSL or 1,000 ft above ground level (AGL) (whichever is higher), then a pilot must remain 'clear of cloud and in sight of ground or water' and have a radio that is used on the appropriate frequency. No evidence was found that the pilot had used the aircraft's radio after departing Walgett to broadcast his intentions during the flight.

The aircraft was flying at about 1,000 ft AGL in the period shortly before the accident.

Research reports

The factors that influence operational decision making by general aviation pilots in the face of adverse weather conditions are explained in the ATSB Research Investigation report B2005/0127 *General Aviation Pilot behaviours in the Face of Adverse Weather*, which is available at: http://www.atsb.gov.au/media/36438/Pilot behaviours adv.pdf.

Strategies for managing the risks associated with visual flight in deteriorating weather conditions are discussed in the ATSB Avoidable Accident Series - Transport Safety Report AR-2011-050 *Accidents involving Visual Flight Rules pilots in Instrument Meteorological Conditions*, at: http://www.atsb.gov.au/media/3445290/ar2011050.pdf.

ANALYSIS

The aircraft impacted terrain that was rising into the cloud when the aircraft was operating in or near conditions of limited visibility. There was no indication that a loss of control, mechanical defect or loss of engine power existed at the time of the collision.

The weather along the flight path deteriorated as forecast from high level overcast cloud to low level overcast cloud. The pilot's appreciation of the weather that might affect the flight was probably based on personal observations at Walgett and reported observations from the planned destination. Although unable to be confirmed, the pilot may also have obtained an aviation forecast, which would have provided broadly similar information.

The terrain between the departure point and the accident site was mostly very flat. As the overcast, 'flat' cloud base lowered as the flight progressed, the pilot would have been required to descend from the original cruising altitude of 5,500 ft to maintain visual reference with the ground. Once below 3,000 ft, the pilot could legally fly closer to cloud, so long as visual reference was maintained with terrain, a radio was used and a horizontal visibility of 5,000 m was maintained.

Based on the in-flight conditions reported by the pilot during a number of phone calls, it was estimated that the pilot had been flying close to cloud for at least 10 minutes over flat terrain, possibly with limited forward visibility. The fact that the accident site was about 100 ft above the observed cloud base meant that it was likely that, while the pilot may have maintained visual reference with the ground, he would have had limited forward visibility. Despite the pilot's reported familiarity with the area and therefore terrain around the accident site, it was probable that given the conditions, he could not see the rising terrain in front of, above and to the left of the aircraft.

The pilot planned a direct track to Mudgee at an altitude of 5,500 ft, taking him over the Warrumbungle Ranges. The increased operational risk associated with the need to fly at a lower altitude due to deteriorating weather conditions may have been reduced in the vicinity of the accident site by a minor diversion to the right of track. That action however, would have presented more rising terrain as the flight approached Mudgee. A diversion to a more conservative flight path that allowed for greater height between terrain and the cloud base would have provided more time and opportunity to manage further weather deterioration. This included any decision to divert to a different aerodrome with weather conditions more suitable for VFR flight.

The attitude of the aircraft at the time of impact was consistent with the aircraft being under control. From the observed angle of bank, it is possible that the pilot had initiated a turn away from rising terrain as it became visible, shortly before impact.

The submission of a flight plan by the pilot, although not required, may have allowed for the initiation of the search slightly earlier. However, the provision by the pilot of a Flight Note to a suitable person at departure, and awareness of the flight by people at the destination, enabled the Rescue Coordination Centre to start an effective search after a short delay. In combination, this increased the likelihood that, if the accident had been survivable, there would have been an early rescue.

FINDINGS

From the evidence available, the following findings are made with respect to the Visual Flight Rules in Instrument Meteorological Conditions and controlled flight into terrain involving Cessna 182Q, registered VH-CWQ, which occurred 15 km north of Tooraweenah, New South Wales on 4 June 2012, and should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factors

• The pilot was probably flying with forward visibility sufficiently obscured by cloud to not be able to see and avoid the rising terrain.

Other safety factor

• The pilot did not select a flight track to avoid the rising terrain or a diversion to a suitable aerodrome, which would have been an effective measure to manage the deteriorating weather.

Other key findings

- No anomalies were found in the flight control systems or the airframe structure able to be examined that might have contributed to the accident.
- The weather deteriorated as predicted in the relevant weather forecasts.

APPENDIX B: SOURCES AND SUBMISSIONS

Sources of information

The sources of information during the investigation included the:

- witnesses to the flight
- individuals involved in the flight and the operation of the aircraft
- the Bureau of Meteorology (BoM)
- aircraft records.

Submissions

A draft of this report was provided to the operator of the aircraft, BoM, the Australian Maritime Safety Authority (AMSA) and the Civil Aviation Safety Authority (CASA).

Submissions were received from AMSA and the operator of the aircraft. The submissions were reviewed and where considered appropriate, the text of the report was amended accordingly

Australian Transport Safety Bureau

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