Aviation Safety Investigation Report 199503369

Cessna Aircraft Company 182R

10 October 1995

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Occurrence Number: 199503369 **Occurrence Type:** Accident
Location: Warrnambool, Aerodrome
State: VIC **Inv Category:** 3
Date: Tuesday 10 October 1995
Time: 1950 hours **Time Zone** EST
Highest Injury Level: Fatal
Injuries:

	Fatal	Serious	Minor	None	Total
Crew	1	0	0	0	1
Ground	0	0	0	0	0
Passenger	2	0	0	0	2
Total	**3**	**0**	**0**	**0**	**3**

Aircraft Manufacturer: Cessna Aircraft Company
Aircraft Model: 182R
Aircraft Registration: VH-XTK **Serial Number:** 18268210
Type of Operation: Non-commercial Business
Damage to Aircraft: Destroyed
Departure Point: Warrnambool Vic.
Departure Time: 1948 EST
Destination: Moorabbin Vic.

Crew Details:

Role	Class of Licence	Hours on Type	Hours Total
Pilot-In-Command	Private	43.2	217

Approved for Release: Tuesday, February 4, 1997

1. FACTUAL INFORMATION

1.1 History of the flight

The pilot planned a private business flight under visual flight rules (VFR). He took off from Moorabbin shortly after 0800 EST and collected two passengers from Melbourne Airport prior to flying to Warrnambool. After working in the Warrnambool area during the day, he took off from runway 31 at about 1948 EST. Conditions in the circuit area were very dark with limited ground lighting, high overcast cloud, some low cloud, and patches of drizzle.

The complete flight path after takeoff is unknown. However, witnesses heard and saw the aircraft flying low to the north-west and west not far from the aerodrome. The last sighting was of the aircraft climbing to the east-south-east towards the centre of runway 31, followed by a left turn and a steep left spiral dive from an estimated height of about 500 feet. At 1950 the aircraft crashed 255 metres to the right of runway 31 centreline. Runway 31/13 lights were illuminated at the time.

At impact the fuel cells burst. There was a flash fire along the wreckage trail. However, most of the fire damage was confined to the detached wings.

1.2 Damage to aircraft

The aircraft was destroyed by the ground impact and by post-impact fire.

1.3 Weight and balance

The aircraft weight and balance were within approved limits for the flight.

1.4 Personnel information

The 54 year old pilot was correctly qualified and endorsed to perform the flight. He held a private pilot licence (aeroplanes) and a single-engine night rating valid for automatic direction finding equipment and very high frequency omni-directional radio range. The night rating was issued on 11 October 1994. His total night flying experience was 22.3 hours. This comprised 13.3 hours dual flight instruction in a Piper PA28, a 3.3 hours flight test in a PA28 with an approved testing officer, and 5.7 hours as pilot in command, of which 2.5 hours were in a PA28 and 3.2 were in the Cessna 182. His most recent previous night flight occurred on 6 October 1995. His Civil Aviation Safety Authority medical certificate was valid until 14 August 1997. He was required to wear spectacles for close vision.

1.5 Meteorological information

A weather observation taken by a trained observer at Warrnambool at 1800 indicated: QNH 1011.6 hectopascals, surface wind 320 degrees 18 knots, visibility 20 kilometres, light rain, cloud 8 octas of altocumulus base at 8,500 feet, temperature 15 degrees Celsius, dew point 15 degrees Celsius.

An observation taken at Warrnambool at 2100 indicated: QNH 1015.5, surface wind 230/10 knots, visibility 50 kilometres, weather nil, cloud 8 octas of altocumulus, base 8,500 feet, temperature 13 degrees Celsius, dew point 15 degrees Celsius.

Charts provided by the Bureau of Meteorology indicate that the accident occurred as the tail end of a cold front was passing through Warrnambool.

Witness evidence of weather at the time of the accident varies. However, the consensus was that it was very dark because cloud had obscured the moonlight, and that there was intermittent drizzle in the area. Because it was so dark, witness estimates of cloud amount and height varied but indicated that there were patches of cloud below 1,000 feet in the area.

At 1900, before leaving Warrnambool city, the pilot telephoned the Civil Aviation Authority briefing office and a briefing officer gave him a detailed update on the forecast weather for the proposed flight. The pilot had already submitted a night visual flight rules flight plan for the return flight to Moorabbin via Avalon. During the five-minute discussion, the briefing officer advised of the area forecast 30/32, Melbourne aerodrome forecast and Moorabbin aerodrome forecast. From the discussion it was apparent that the pilot was fully aware of a weather front passing through Warrnambool at about the time of the telephone call. He advised the briefing officer that there were some fairly low cloud layers at Warrnambool at the time. The forecast weather ahead of the front and well behind it was suitable for night visual flying, whereas weather associated with the front included scattered cloud from 1,000 feet to 2,000 feet and visibility reduced to 3,000 metres in drizzle. He advised the briefing officer that if he could depart Warrnambool quickly, he would be ahead of the trough and that he would telephone the briefing office again to lodge a search-and-rescue time when he was about to depart Warrnambool aerodrome.

The taxi driver who drove the pilot and the two passengers to the aerodrome, arriving at about 1930, advised that as they neared the aerodrome it was a moonlight night but the clouds were rolling in from the west and starting to obscure the moonlight.

At 1933 the pilot telephoned the briefing office from the aerodrome and lodged a search-and-rescue time of 2130 for arrival at Moorabbin. The briefing officer advised that Warrnambool was probably still east of the trough/cold front.

1.6 Aids to navigation

Warrnambool has a pilot-monitored non-directional beacon which was transmitting on 395 kilohertz at the time of the accident.

1.7 Communications

Warrnambool has a common traffic advisory frequency of 126.0 megahertz which is not recorded. The common traffic advisory frequency applies for a radius of five nautical miles and up to 3,000 feet above the aerodrome reference point. Had the pilot flown beyond five nautical miles or above 3,000 feet, he probably would have made a departure call to Melbourne flight service and this call would have been recorded. The flight service communications tape has since been monitored. No departure call was recorded.

1.8 Aerodrome information

Warrnambool Airport is 11 kilometres north-west of Warrnambool city. It has two runways. Runway 31/13 is the only one with runway lighting installed. The runway lighting is a pilot-activated system. Because the runway lights were on, it is probable that the pilot of VH-XTK had activated them prior to takeoff. Runway 31/13 is 1,372 metres long, 30 metres wide, and the surface is asphalt. The aerodrome is 242 feet above sea level. The surrounding terrain varied from relatively flat to gently undulating.

1.9 Wreckage and impact information

The impact site was abeam a position approximately 925 metres along runway 31 and 255 metres to the right of centreline. At impact the aircraft was an estimated 70 degrees nose down, facing 278 degrees magnetic and left wing low. Wreckage was spread over 107 metres in the direction of 008 degrees. The engine was torn out of the airframe and was found four metres from the point of initial impact. Most of the fuselage came to rest within 58 metres of the initial impact point. Both of the wings were torn off.

The control system was inspected and the damage sustained was consistent with impact damage. The flaps were up at impact.

The propeller was torn from the engine. A subsequent inspection showed evidence of its being within one degree of full fine pitch at impact.

The engine and its accessories were inspected. A metallurgist examined the exhaust pipe and confirmed that the engine was producing hot exhaust gases at impact.

The engine-driven vacuum pump was subsequently determined to have been serviceable at impact. The artificial horizon showed impact evidence of a steep nose-down attitude. The turn co-ordinator showed evidence of hard left bank at impact. The altimeter subscale setting was 1013 hectopascals.

Fuel filters were found clean. The fuel on board was of the correct type and of sufficient quantity for the flight.

No fault was found with the aircraft or its systems that may have contributed to the accident.

The accident was not survivable.

1.10 Medical information

The specialist forensic pathologist who performed the autopsy on the pilot documented the cause of death as multiple injuries. However, he advised that the presence of ischaemic heart disease in the pilot may have contributed to the accident.

1.11 Emergency locator beacon

The emergency locator beacon did not function correctly after the accident. The antenna cable was severed at impact. When tested, a low-level signal was received at very close proximity. The battery was one month past its replacement date but the voltage was within tolerance. The negative terminal was corroded, causing a high resistance joint which resulted in low signal strength.

1.12 Spiral dive

Some basic spiral dive trials were subsequently conducted in another Cessna 182R. With his aircraft at 6,000 feet and trimmed to 100 knots indicated airspeed, 20 inches manifold air pressure and 2,400 revolutions per minute, the pilot closed the throttle and gently banked the aircraft 45 degrees left without applying back pressure on the control yoke to maintain height. The nose began to drop. By 100 feet height loss, the vertical speed indicator had reached 500 feet per minute rate of descent. With 280 feet total height loss, the vertical rate of descent was 1,400 feet per minute. With 450 feet total height loss, the vertical speed indicator needle was on the 2,000 feet per minute descent stop and the indicated airspeed was 125 knots.

A similar exercise was conducted leaving the power at 20 inches manifold air pressure. In about 200 feet height loss, the vertical rate of descent reached 2,000 feet per minute and the airspeed was about 135 knots and increasing rapidly.

1.13 Pilot training

The pilot's night VFR training was conducted from Moorabbin by a Grade Two instructor. The training included navigational exercises to Essendon, Latrobe Valley, Bendigo, Ballarat and Mangalore. In excess of three hours dual night circuit training was conducted at Moorabbin and Latrobe Valley. The pilot also performed night landings and takeoffs at Bendigo, Ballarat and Mangalore. The Mangalore circuit area was known to contain minimal ground lighting.

The pilot's instructor taught him to take off and fly solely on instruments from the moment the runway lights disappeared from view on takeoff until 500 feet above ground level. From about 500 feet on the crosswind climb, he was taught to fly 75 per cent on instruments and 25 per cent by visual reference; on downwind, 50 per cent on instruments and 50 per cent visual, on base, 25 per cent instruments and 75 per cent visual. The pilot was given two hours night dual flight instruction practising navigation by reference to navigational aids. He was also trained in recovery from unusual attitudes at night. His instructor advised that the pilot displayed good airmanship and a responsible attitude while under training.

During an interview after the accident, the instructor was asked what he thought the pilot would do if at 500 feet after takeoff he looked out and found himself in cloud. The instructor replied that he thought the pilot would immediately descend to regain visual flight.

2. ANALYSIS

With pre-flight planning/preparation, early departure from Moorabbin, business meetings through the day and the 1948 EST estimated take-off time from Warrnambool, it is possible that the pilot was suffering from fatigue at the time of the accident. However, the degree of fatigue and the degree to which it contributed to the accident remains unknown.

It also remains unknown how the onset of darkness and the degree of darkness hampered the pilot's ability to assess the amount and base of the cloud and/or the existence of drizzle in the circuit area immediately before takeoff.

It is possible that the pilot first looked out at 500 feet after climbing on instruments and found himself in drizzle or in cloud, with limited or no external visibility. If this happened, it is likely that the pilot immediately descended to become visual and then attempted to return for a landing on runway 31. This is consistent with witnesses seeing the aircraft flying at low level.

Why the pilot flew towards the centre of runway 31 immediately prior to entering a steep left spiral dive, could not be determined. Perhaps low cloud or drizzle prevented the pilot from flying further downwind to position for a landing on runway 31, or perhaps he could have been positioning the aircraft for a departure.

As witnesses clearly saw the aircraft climb and then enter the spiral dive, it seems that the aircraft was not in cloud or drizzle for the spiral entry and subsequent descent.

The impact site was only 255 metres to the right of a row of the illuminated runway lights which should have given the pilot a visual reference to avoid the ground. There was no evidence of an attempted recovery from the left spiral dive.

Pilot disorientation is a possible reason for the spiral dive because conditions were dark and there was probably no visible horizon. However, the aircraft was not in cloud or drizzle for the spiral and the accident occurred close to the illuminated runway, which should have given the pilot a reasonable visual reference to level the wings and attempt to recover from the dive.

It is also possible that the pilot suffered incapacitation during the flight.

3. CONCLUSIONS

3.1 Findings

1. The pilot was correctly qualified and endorsed to perform a night flight under visual flight rules, but his night flying experience level was low.

2. The pilot did not hold an instrument rating.

3. Weather forecasts, assessed by the pilot prior to takeoff, indicated that the weather may have been suitable for night visual flight ahead of the cold front trough and behind it.

4. The accident occurred as a cold front was passing through Warrnambool.

5. There was a low cloud cover with associated drizzle in the area.

6. The aircraft was within its approved centre of gravity and gross weight limits at the time of the accident.

7. The fuel on board was of the correct type and of sufficient quantity for the flight.

8. No pre-existing fault was found with the aircraft which may have contributed to the accident.

9. The impact occurred close to and abeam runway 31 while the runway lights were illuminated.

10. The post-mortem carried out on the pilot indicated the presence of ischaemic heart disease may have contributed to the accident.

3.2 Significant factors

The factors which led to this accident could not be positively determined. However, the three most likely factors are:

1. The pilot was suffering from fatigue at the time of the accident.

2. The pilot suffered some form of in-flight incapacitation.

3. The pilot lost control of the aircraft as a result of losing visual reference in adverse weather.

4. SAFETY ACTION

The Bureau of Air Safety Investigation is continuing to investigate a number of possible safety deficiencies in the operations area that have arisen from this accident. Any safety outputs arising from this investigation will be published in the Quarterly Safety Deficiency Report.