

AVIATION INVESTIGATION REPORT

A00W0080

VFR FLIGHT INTO TERRAIN—REDUCED VISIBILITY

CESSNA 172RG C-GBEJ

FOX LAKE, YUKON TERRITORY

15 APRIL 2000

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

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Summary

At approximately 1133 Pacific daylight time, Cessna 172RG, C-GBEJ, departed Whitehorse, Yukon Territory, for Dawson, with one pilot and one passenger on board. Shortly after take-off, the pilot reported to the Whitehorse Flight Service Station that he was following the highway at a low altitude toward Dawson. The aircraft was seen by several motorists along the highway near Lake Labarge and Fox Lake. Numerous snow squalls were reported in the area, with strong winds and reduced visibility. At approximately 1355, the aircraft wreckage was discovered on the frozen surface of Fox Lake, approximately 40 nautical miles northwest of Whitehorse. Both occupants were fatally injured, and the aircraft was destroyed.

Ce rapport est également disponible en français.

Other Factual Information

The pilot and the passenger were flying from Whitehorse to Dawson and planned to return to Whitehorse the next day. The total distance for the round trip would have been about 480 nautical miles. The pilot had received a weather briefing before departure. Although several colleagues were aware of the pilot's schedule, no flight plan or flight itinerary was filed.

After departing Whitehorse Airport, the last communication from the pilot was to the Whitehorse Flight Service Station at 1141 Pacific daylight time,¹ when he reported being at the south end of Lake Labarge (approximately 25 nautical miles southeast of the accident site). The pilot reported that he was following the highway and descending to 3000 feet above sea level in light snow showers. He was given the current altimeter setting for Mayo (approximately 170 nautical miles north of Fox Lake).

At 1230, the aircraft was observed flying at an estimated height of 200 feet above ground level along the highway by the south end of Lake Labarge. The aircraft was observed a second time at approximately 1310, still flying at approximately 200 feet, turning north along Fox Lake in a heavy snow shower. The aircraft was last observed turning left (west) and proceeding over Fox Lake at low altitude and in reduced visibility due to a heavy snow shower.

The actual time of the occurrence is unknown, although the passenger's watch had stopped at 1332. The wreckage was discovered on Fox Lake at approximately 1355. When rescuers arrived at the site, they determined that the occupants were deceased and noted that the battery, electrical system, lights, and gyros were operating. Fox Lake is approximately 11 nautical miles long by 1 nautical mile wide, with an elevation of 2580 feet above sea level. It is surrounded by mountains with elevations up to 6700 feet above sea level.

The aircraft struck the smooth, snow-covered ice surface at approximately the centre of the lake. Attitude at impact was a steep left bank (about 90 degrees [$^{\circ}$]) with the nose pitched down about 20 $^{\circ}$ on a heading of 260 $^{\circ}$ magnetic. The wreckage trail was about 650 feet long. The left wing was crushed and folded back along the fuselage, with the right wing intact but separated from the fuselage about 390 feet from impact and 35 feet left of the wreckage trail. The propeller and the left cabin door were about 190 feet and 308 feet, respectively, from the impact point. Both propeller blades were twisted through approximately 180 $^{\circ}$ and had some leading-edge damage. The forward fuselage, the engine, and the cabin were crushed, but damage to the aft fuselage and the empennage was minimal. The nose gear and the left main gear were trapped in the retracted position, with the right main gear partially extended. Flaps were retracted, and the fuel selector was found positioned just left of the "both" position. Speed at impact could not be determined. There was no indication of any airframe failure or system malfunction before or during the flight.

The weather, as forecast by the Environment Canada office in Whitehorse at 0900 for the period from 1100 to 2300, called for winds from 340 $^{\circ}$ magnetic at 10 knots, visibility better than six statute miles, with scattered clouds at 3000 feet and 8000 feet. Visibilities could temporarily be reduced to six statute miles in light snow during the period 1100 to 2000. An amended forecast for 2300 called for the winds to be from 320 $^{\circ}$ magnetic at 10 gusting to 20 knots, with visibilities greater than six statute miles in snow showers.

¹ All times are Pacific daylight time (Coordinated Universal Time minus seven hours).

The METAR² issued by Whitehorse for 1300 reported the wind at 300° at nine knots and visibility of six statute miles in light snow showers, with overcast skies. Between the 1300 and 1400 METARs, specials³ were issued at 1316, 1350, 1353, and 1356: the wind direction changed from 300° to 310° to 010° to 360°, the wind velocity ranged from 7 to 12 knots, and the visibility was reduced from six to one-half statute miles in snow showers.

The pilot's private pilot licence was issued in 1959 and was rated for single-engine land and sea type aircraft operating under visual flight rules (VFR). He had a total flying time of 3340 hours, of which approximately 685 hours was on type. His Class 3 medical was renewed on 03 September 1999. He had had an electrocardiogram on 10 September 1996, and his last audiogram had been on 09 December 1975. There was no record of the pilot having received any night or instrument flying instruction. It was reported that he did not fly much in the winter, with no logbook entries between October and February in the years since he moved to the Yukon Territory in 1983.

Whiteout is an atmospheric optical phenomenon in which the observer appears to be engulfed in a uniformly white glow. Shadows, horizon, and clouds are not discernible, and sense of depth and orientation is lost. Whiteout typically occurs over an unbroken snow cover and beneath a uniformly overcast sky. Transport Canada's *Aeronautical Information Publication* recommends that pilots avoid such conditions, unless they have suitable instruments and are sufficiently experienced.

A search of the TSB database has revealed 18 occurrences between 1990 and 1999 where whiteout or snow squall conditions were identified as having been a factor. In addition, numerous studies, such as the TSB *Report of a Safety Study on VFR Flight into Adverse Weather*, No. 90-SP002, describe the factors and conditions involved in this type of occurrence.

Analysis

About two hours elapsed between the time of departure and the probable time of the accident. At the recommended cruising speed, the time en route from take-off to the accident site was approximately 15 to 20 minutes. Because there was no communication with any agency or other aircraft after the first eight minutes of flight, the pilot's actions for the duration of the flight could not be determined. However, the observed flight path of the aircraft and the time flown suggest that the pilot persisted with his last known plan to follow the highway and had repeatedly circled back when snow showers were encountered.

² A METAR (meteorological aviation report) is an aviation routine weather report.

³ Specials are reports issued whenever visibility decreases below 3 miles, 1.5 miles, 1.0 mile, 0.75 mile, 0.5 mile, or 0.25 mile, and/or whenever wind direction changes by more than 45° in 15 minutes.

Reduced visibility due to snow showers and the flat, snow-covered surface of Fox Lake would have produced a uniformly white environment devoid of the visual contrasts that are essential for accurate depth perception. These conditions are known to have existed at the approximate time and location of the accident. It is therefore probable that the pilot encountered whiteout conditions and was unable to accurately judge, through visual reference, his altitude above the surface of the lake. In the absence of a visible horizon, the pilot might also have succumbed to spatial disorientation,⁴ particularly if he initiated a turn to escape the deteriorating weather. The pilot's lack of instrument training and experience would have made him more susceptible to the effects of whiteout and spatial disorientation.

The damage to the propeller indicates that the engine was developing considerable power at impact, while the length of the wreckage trail indicated considerable speed. The wreckage pattern and the damage characteristics indicate that the aircraft struck the ground in a steep, left bank and a shallow, nose-down attitude, with the landing gear and flaps retracted. It therefore appears that the aircraft was operating at cruise speed in cruise configuration when it struck the surface of Fox Lake.

Findings as to Causes and Contributing Factors

1. The pilot continued his visual flight rules flight in adverse weather conditions but was not qualified, trained, or sufficiently experienced to do so.
2. The flat, snow-covered surface of Fox Lake and the presence of snow showers at the approximate time and location of the accident were conducive to whiteout conditions.
3. The pilot flew the aircraft into the frozen surface of Fox Lake, probably because whiteout conditions degraded his ability to see the aircraft's altitude and orientation.

Other Findings

1. The weather forecast received by the pilot did not predict visibilities below six statute miles in snow showers. The actual visibility dropped to one-half statute mile in the showers.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 08 May 2001.

⁴ Spatial disorientation is defined as "an aviator's failure to sense correctly the position, motion, or attitude of his aircraft or himself with respect to the earth's surface as a result of conflicting sensory information."