

AVIATION INVESTIGATION REPORT

A02P0109

VFR FLIGHT INTO ADVERSE WEATHER
COLLISION WITH TERRAIN

CESSNA 182P SKYLANE C-GASB
NEEDLE PEAK, BRITISH COLUMBIA

06 JUNE 2002

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.

Aviation Investigation Report

VFR Flight Into Adverse Weather - Collision With Terrain

Cessna 182P Skylane C-GASB

Needle Peak, British Columbia

06 June 2002

Report Number A02P0109

Summary

A Cessna 182P Skylane, C-GASB, serial number 18264590, was on an afternoon flight from Abbotsford, British Columbia, to Calgary, Alberta (Springbank Airport). It failed to arrive at its destination. Emergency locator transmitter signals were detected by the aviation satellite system and a search and rescue mission was initiated. The wreckage was located by a search aircraft the same day, less than one nautical mile from the Coquihalla highway, near Needle Peak, 17 nautical miles northeast of Hope, British Columbia, at an elevation of 4048 feet above sea level. The aircraft was destroyed but did not catch fire. The four persons on board were fatally injured.

Ce rapport est également disponible en français.

Other Factual Information

Before departing Abbotsford, British Columbia, the pilot received a pre-flight weather briefing in person from the Abbotsford flight service station (FSS) specialist, who advised that the weather appeared to be suitable for flight in accordance with visual flight rules (VFR). It was suggested that the pilot contact Abbotsford FSS, in the vicinity of Hope, on the peripheral frequency of 122.2 megahertz for a weather update, since the weather in the vicinity of Hope is known to be subject to rapid changes. No such call from C-GASB was received. The pilot held an instrument rating, but filed a VFR flight plan to Springbank Airport via Revelstoke, British Columbia, and indicated he would proceed direct to Revelstoke.

The aircraft departed Abbotsford at 1405 Pacific daylight time¹ and was observed on radar to fly directly to Hope at an altitude of 5000 feet above sea level (asl) at a ground speed of 150 knots. At Hope, at approximately 1430, the radar returns ceased because of the mountainous terrain.

Records indicate that the aircraft was certified, equipped, and maintained in accordance with existing regulations and approved procedures. The aircraft was manufactured in 1976 and had flown a total of 3879.9 hours before the accident flight. A review of the journey, airframe, engine, and propeller logbooks showed nothing remarkable. The engine, a Lycoming O-470-S, serial number L-463943, had accumulated 316 hours since overhaul and 2251.6 hours since new.

The aircraft was equipped for instrument flight, including a transponder, dual VHF omnirange receivers (VOR), distance measuring equipment (DME), low frequency automatic direction finding equipment (ADF), and a global positioning system (GPS). It was not equipped with any anti-icing or de-icing equipment.

It could not be determined if the pilot considered the aircraft weight and balance; no calculations were found. Prior to arriving in Abbotsford, the aircraft had left Boeing Field in Seattle, Washington, where records indicate that it had been refuelled and the two long range fuel tanks filled until fuel was touching the bottom of the fuel collar. Information provided by the manufacturer indicates this would constitute 37 US gallons in each tank. The aircraft's weight on departure from Boeing Field was calculated to have been 3114 pounds, 164 pounds above the maximum allowable take-off weight of 2950 pounds. The centre of gravity (CG) was calculated to be 44.7 inches. The aircraft was not refuelled by either of the two suppliers in Abbotsford, but was estimated, nevertheless, to be overweight at take-off by 70 pounds. Its weight at the time of the accident was calculated to be within limits at 2949 pounds and its CG at 44.5 inches, within the allowable range of 33 to 48.5 inches aft of the datum.

The wreckage was found on a heavily wooded, west-facing 45-degree slope. This site is about one nautical mile south of the direct track from Abbotsford to Revelstoke. The aircraft had hit the top of a tree and struck the ground nearby. Tree damage and contact markings showed that the aircraft's flight path was mainly vertical at the time of impact. The main wreckage component, the fuselage, came to rest on a heading of 330° magnetic. The left wing was 9 feet down the slope while the propeller, engine, and right wing were 24 feet down the slope. The engine crankshaft had broken, and the propeller was 17 feet from the engine. The left door was

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

39 feet down the slope from the fuselage. Although the ambient temperature was approximately zero degrees Celsius when the wreckage was examined, no ice was observed on the wreckage.

The GPS was examined and the only data retrieved was the last recorded position, which is approximately 1/2 nautical mile north of the accident site.

The wreckage was initially examined at the accident site. Later it was recovered to a secure location and the examination continued for pre-impact defects. None was found, and all control surfaces were accounted for. An examination of the engine, its components, and systems revealed no defect or anomaly that could have caused a loss of engine performance. The severed crankshaft indicated that the engine was operating at the time of impact. All engine damage was determined to be associated with the impact. The amount of power the engine was producing at impact could not be determined by visual examination.

The pilot held a commercial pilot licence issued by Transport Canada (TC). The licence was endorsed for single-engine land aeroplanes and for an instrument rating. The medical certificate has a restriction that glasses must be worn while flying and indicates that the last medical was conducted on 10 January 2001. This meant the pilot's licence was valid only for private licence privileges at the time of the accident: the occurrence flight was non-commercial. The pilot had accumulated approximately 3370 flying hours on light, single-engine aircraft, including the Cessna 182P. He was qualified to operate the aircraft under instrument flight rules (IFR).

An autopsy of the pilot, including a full toxicology examination, did not reveal any condition that could have led or contributed to the accident.

The graphical area forecast, a summary of the important area forecasts for the area between Abbotsford and Calgary, Alberta, for 1100, 3 hours and 37 minutes before the accident, and that for 1700, 2 hours and 23 minutes after the accident, are almost identical. They called for the following conditions: broken clouds based at 6000 feet asl topped at 16 000 feet asl; scattered towering cumulus clouds topped at 20 000 feet asl; prevailing visibility more than six statute miles in light rain showers; isolated cumulonimbus clouds topped at 25 000 feet developing after 1300; and the prevailing visibility more than six statute miles in light thunderstorms with hail along the mountains. The freezing level was forecast to be around 6200 feet asl.

The reported weather at Hope, 17 nautical miles southwest of the accident site at 1429, about 11 minutes before the accident was as follows: wind 280° true at 8 knots gusting to 18; visibility nine statute miles in light rain; broken clouds at 5300 feet, and broken clouds at 8700 feet; temperature 14°C; dew point 2°C, altimeter setting 30.18 inches of mercury.

The reported weather at Princeton, 25 nautical miles west-southwest of the accident site at 1500, about 23 minutes after the accident was as follows: wind 260° true at 18 knots; visibility 15 statute miles; a few towering cumulus clouds at 5000 feet and scattered clouds at 18 000 feet;

temperature 14°C; and, dew point minus 3°C; altimeter setting 30.09 inches of mercury; remarks: 2 oktas towering cumulus, 2 oktas altocumulus, wind gusts to 38 knots in the last hour, sea level pressure 1019.0 hectopascals.

Additional weather data was obtained from three British Columbia Ministry of Transportation (BC MOT) weather observation stations, all located within a few miles of the accident site. These stations record data for the BC MOT snow avalanche and weather system. This data showed that, at the time of the accident, the winds were from the southwest at 24 knots, the temperature was close to the freezing mark, and some precipitation in the form of snow occurred.

A surveillance video, taken at the Coquihalla highway toll booth, approximately five nautical miles northwest of the accident site, showed low cloud, rain, and gusty winds at that location around the time of the accident.

The following Engineering Branch report was completed:

LP 063/2002 - Instruments Analysis

This report is available upon request from the Transportation Safety Board of Canada.

Analysis

From Hope to the accident site, at the aircraft's average radar observed ground speed, would take about seven minutes, making the time of the accident approximately 1437.

Information from the three BC MOT avalanche weather stations and reference to the Coquihalla toll booth surveillance video indicate weather conditions at the time and place of the accident were probably much worse than forecast. The ceiling was probably lower than the forecast 6000 feet asl and the freezing level very close to the surface, around 4000 feet asl. In the area of the accident site, the pilot would have encountered rising terrain. He would also probably have encountered a lowering ceiling, likely forcing him to descend below his cruising altitude of 5000 feet asl in order to maintain VFR flight. Near the base of the cloud, he may have encountered turbulence, snow, and airframe icing. But he would have had very little room to descend as the terrain in that area is relatively high, with no less than five mountain peaks ranging in elevation from 6009 to 7088 feet asl, located within a 10 nautical mile radius of the accident site.

While the pilot held a valid instrument rating and had considerable experience in instrument flight, he was not in contact with air traffic control (ATC) and had no IFR clearance. To contact ATC, he would have had to climb several thousand feet because of the high terrain. A climb through cloud from his location would have been risky because of the low performance of the aircraft at its high weight and high elevation, and the close proximity of numerous mountain peaks. Had the pilot abandoned visual flight, made a transition to instrument flight, and attempted to climb to a safe altitude, he would likely have encountered icing and possibly thunderstorms. It is likely that he elected to manoeuvre his way around visually, taking the risk of encountering instrument meteorological conditions.

The aircraft's flight path was mainly vertical at the time of impact, indicating the aircraft was not under control. The severity of the damage and the angle at which the aircraft contacted the terrain indicates the aircraft was likely in a spiral dive at impact, not in a stalled condition. As indicated by the last GPS recorded aircraft

position and the accident position, the aircraft was travelling southward prior to impact. That the fuselage was pointing 330° (northerly) may be indicative of the aircraft being in a spiral dive. A spiral dive is a steep, descending turn with the aircraft in an excessively nose-down attitude. A spiral dive may be recognized by an excessive angle of bank, rapidly increasing airspeed, and a rapidly increasing rate of descent. The most likely scenario to account for this accident involves a known phenomenon encountered by pilots flying in mountainous terrain. The high ground obscures the natural horizon and, in this occurrence, the difficulty in seeing the horizon would be exacerbated by the low cloud.

When he encountered rising terrain and lowering cloud, the pilot probably lowered the aircraft's nose to avoid entering cloud and started a turn to reverse his course. Because no horizon would be visible when looking outside the aircraft, the only way to maintain control during this turn would be by reference to flight instruments. For unknown reasons, the pilot lost control of the aircraft, and because of the relative proximity of the terrain, the aircraft struck a tree before the pilot was able to recover control.

Findings as to Causes and Contributing Factors

1. The pilot encountered adverse weather in mountainous terrain, probably attempted to reverse course with limited or no visual references, and lost control of the aircraft.
2. The aircraft was most likely in a spiral dive when it contacted a tree top.
3. The relative proximity of the terrain meant the pilot had little time to recover control of the aircraft.

Findings as to Risk

1. The aircraft was overweight on departure from Seattle, Washington, and Abbotsford, British Columbia.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 12 March 2003.