

AVIATION INVESTIGATION REPORT

A00P0019

CONTROLLED FLIGHT ONTO ICE

TGH HOLDINGS LIMITED (TERRY AIR)

PIPER NAVAJO CHIEFTAIN C-GBFZ

WILLISTON LAKE, BRITISH COLUMBIA

7 FEBRUARY 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

The pilot of a Piper PA-31-350 Navajo Chieftain, serial number 31-7752151, encountered an area of heavy snow and reduced visibility while on a visual flight rules flight from Bear Valley, British Columbia, logging camp to Tsay Keh. The pilot was unable to maintain visual references and executed a 180-degree turn in an attempt to regain visual flight. Shortly after completing the turn, at about 1055 Pacific standard time, the aircraft collided with the ice on the Peace Reach Arm of Williston Lake, British Columbia. The pilot was the sole occupant of the aircraft and received serious injuries. There was no fire. The aircraft was destroyed during the collision.

Ce rapport est également disponible en français.

Other Factual Information

The pilot was appropriately certificated for the flight. At the time of the accident, he had accumulated approximately 4500 hours total flying time—about 1500 hours on type and about 150 on type in the preceding 90 days. He had been flying with Terry Air for two years and had flown the visual flight rules (VFR) route between Bear Valley and Tsay Keh on several occasions. The pilot was also instrument rated and was proficient for flight under instrument flight rules (IFR). Terry Air was approved for IFR operations on its Transport Canada Operating Certificate, and the pilot frequently conducted IFR flights.

The aircraft was examined by TSB personnel at the crash site. To the extent examined, there was no indication of pre-existing deficiencies that would have caused the aircraft to lose altitude and contact the ice. The aircraft was reportedly operating normally up to the time of the crash. Impact markings reveal that the aircraft contacted the ice in a slight left bank and near-level pitch attitude on a heading of about 050 degrees magnetic (M). The first contact was the left propellor, followed by the fuselage and then the right propellor.

The aircraft was dispatched out of Mackenzie, British Columbia, to transport one passenger to Bear Valley, then fly empty to Tsay Keh where seven passengers were awaiting transport back to Mackenzie. The aircraft departed Mackenzie at about 0956 Pacific standard time and proceeded on an IFR flight itinerary to Bear Valley.¹

Weather conditions at Bear Valley were reported as mostly cloudy, with patches of blue sky visible to the east.² Visibility under the clouds was good; however, a few flakes of snow were falling and a wall of dark cloud was visible to the west. Upon arriving in the vicinity of Bear Valley, the pilot was able to locate an area of clear weather to the east of the airport where he flew the aircraft below the clouds and proceeded to the airport in visual meteorological conditions (VMC). The aircraft arrived in Bear Valley at about 1030 and the passenger disembarked.

The planned route for the VFR flight out of Bear Valley was to proceed west along the Peace Reach Arm, then northwest along the main body of Williston Lake, and then to Tsay Keh at the north end of the lake. The total distance was about 100 nautical miles (nm). The pilot was aware of the dark clouds to the west of Bear Valley before departure, and planned to take the aircraft airborne and have a closer look at the weather. The pilot planned to fly at an altitude of about 800 feet above ground level (agl), descending, if required, to as low as 300 feet to remain clear of cloud. If the clouds and visibility did not allow visual flight, he planned on turning around and returning to Bear Valley.

¹ All times are Pacific standard time (Coordinated Universal Time minus eight hours).

² There are no Environment Canada weather reporting facilities for Bear Valley. However, pilots receive layman accounts of the weather from logging camp personnel either by telephone (before flight) or radio (during flight).

The pilot departed at about 1040 and proceeded westward. He soon encountered snow, but the visibility allowed visual contact with the lakeshore and the pilot elected to continue. The aircraft was configured in a cruise profile, flying at about 160 nm/hour (knots) with landing gear and flaps retracted. About 25 nm west of Bear Valley, visibility diminished to the point where the pilot was unable to maintain visual references. He turned the aircraft around and attempted to regain visual references for a return flight to Bear Valley. However, the aircraft descended, unnoticed by the pilot, and struck the ice. Turn performance calculations indicate that, at 160 knots, the pilot would have to maintain an angle of bank of about 40 degrees (steep turn) to complete a 180-degree turn within the confined valley. The loss of altitude and eventual contact with the ice are results consistent with similar accidents investigated by the TSB.³



The crash site is at latitude 56°02' N, longitude 123°38' W, in a narrow valley section of the lake that is steep-sided and oriented east/west. The valley walls are only about one mile apart at lake level and terrain rises over 4000 feet on either side. The snow storm was progressing from west to east, and wind speed generally increases in this section of the Peace Reach Arm because of the funnel effect.⁴ The pilot was navigating with reference to the north shoreline as he progressed westwards through the valley, and he biased his flight path to the northern side. When the pilot lost visual reference with the shoreline, the lateral distance within which to execute the 180° left turn was about one mile. By this time, the pilot had flown the aircraft down to an altitude of about 300 feet agl in an attempt to remain below the weather.

Routine aviation weather reports (METARs) for Williston Lake are not available. The METARs for Mackenzie Airport, about 50 miles south of the crash site, indicate that snow showers began in the area shortly after 1100, reducing visibility to as low as 1/8 miles. The applicable area forecast for northern British Columbia called for areas of visibility of 1 to 3 miles in light snow grains and mist. In addition, conditions of obscured ceilings at 500 to 1000 feet agl were forecast to persist throughout the valleys.

³ Transportation Safety Board of Canada, *Report of a Safety Study on VFR Flight into Adverse Weather Conditions*, No. 90-SP002.

⁴ CFACM 2-700 *Air Command Weather Manual*, chapter 11, paragraph 27.

The accident flight was conducted in uncontrolled airspace. VFR flights conducted in uncontrolled airspace at altitudes less than 1000 feet agl require a minimum flight visibility of 2 miles and must remain clear of cloud.⁵

Analysis

Few options were available to the pilot if the flight were to be completed. Weather reports from Tsay Keh described overcast conditions, which would have precluded the pilot from finding a patch of clear air within which to descend, as he had done on approach to Bear Valley. The only aerodrome served by an IFR approach in the area was Mackenzie Airport, 50 miles away. Had there been an IFR approach procedure serving the aerodrome at Tsay Keh (or one of the neighbouring aerodromes), the pilot would have had the option of conducting the flight under IFR. He could have departed Bear Valley in the area of clear weather to the east of the airport, climbed to a minimum en route altitude, and flown to destination where an IFR approach could have been conducted. With no IFR approaches at the north end of Williston Lake and overcast cloud conditions, the pilot's only option for completing the flight was to attempt the flight under VFR.

The pilot encountered snowfall that reduced flight visibility to less than that required to maintain visual reference with the ground in an area where the terrain made it necessary to conduct a steep turn to exit the snow conditions. The pilot would have had to remain close to the ice during the turn to regain visual reference; just after rolling out of the turn, the aircraft contacted the ice surface. In conditions of low visibility in snow, and over a frozen, snow-covered surface, it would be difficult, if not impossible, to visually acquire the snow surface as it would be indistinguishable from the snow in which the pilot was flying. The descent was made unwittingly, probably because the pilot was concentrating on regaining visual contact with the surface and not flying with reference to the aircraft's altimeter.

Findings as to Causes and Contributing Factors

1. Weather conditions at the time and location of the occurrence were not suitable for visual flight.
2. While the pilot was attempting to regain visual flight, he allowed the aircraft to descend and it struck the ice surface. The weather and surface conditions were such that it would have been virtually impossible to visually detect the ice surface.

Other Finding

⁵ Canadian Aviation Regulation (CAR) 602.115.

1. In the absence of en route weather reporting facilities, the pilot could only estimate weather conditions based on the area forecast and informal reports received from lay personnel.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 29 March 2001.