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AIRCRAFT ACCIDENT REPORT
RAPPORT D'ACCIDENT D'AVIATION

W50099
29 Dec. 1975

"This accident was investigated to provide guidance toward the prevention of a recurrence. The content of this report is confined to cause-related circumstances and is published for accident prevention purposes only".

W50099

Beech 99

C-GWYD

DATE: 29 December 75 2030 MST
OPERATION: Irregular - Specific Point DAMAGE: Destroyed
PLACE: Slave Lake, Alta 55/18N 114/55W
LOCALE: Bush 2240 asl
WEATHER: Cloud 1000 overcast, vis 1, temp -3°C, wind E 10
PILOT: Airline Transport
TOTAL HOURS: 5460 ALL 170 ON TYPE
LAST 90 DAYS: 210 ALL 170 ON TYPE
CASUALTIES: Crew: 2 killed; pass: 5 minor, 4 uninj.
OCCURRENCE: The pilot was descending northwest of Slave Lake Airport at night in limited visibility when the aircraft struck trees on a ridge one mile south of the lake. He apparently had completed a timed 180° turn and was homing back to the radio beacon when the accident occurred.

The aircraft had been on a scheduled flight from Edmonton to Slave Lake Airport, under instrument flight rules. The pilots received a weather briefing before departure which indicated that destination weather was marginal and that a diversion to another airport was probable.

The flight departed from Edmonton at 1947 MST and climbed to 8,000 feet for the 35 minute trip to Slave Lake. Passengers noticed some turbulence on the climb but it was a smooth flight at altitude. The co-pilot reported over Slave Lake radio beacon at 2025 MST and said he would call on final for runway 09.

Slave Lake airport is on the southeast shore of the lake at an elevation of 1905 feet asl. Instrument approaches are accomplished by the use of a radio beacon. The approved approach procedure involves manoeuvres northeast of the airport, over the land. The authorized minimum altitude is 2520 feet asl, with weather limits of ceiling 650 feet, visibility 1 1/2 miles. The minimum safe altitude within 25 miles is 4300 feet. There is no control tower; landing information is provided through company communications facilities.

The weather, observed at Slave Lake airport, was as follows:

2000 MST - (about 20 minutes before the accident) precipitation ceiling one thousand feet, sky obscured, visibility 1 mile in light snow, temperature -3°C, dew point -4°C, surface wind 120° true at 10 mph.

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2100 MST - (about 30 minutes after the accident) precipitation ceiling one thousand feet, sky obscured, visibility 1 mile in light snow, temperature -3°C, dew point -5°C, surface wind 110° true at 12 mph.

There was no special airport observation taken at the time of the accident, however, according to an aftercast, snow fell continuously during the period with visibilities 3/4 to 1 mile in light snow. Reports from witnesses, including passengers on the aircraft make it apparent that there were areas free of cloud and with much better visibility. There were also areas of heavy snow. Some airframe icing was probable.

Passengers saw lights on the ground, possibly those of the community of Slave Lake, before the engine power was reduced for the descent. At 2029 MST, the pilot acknowledged a runway condition report from the company dispatcher at Slave Lake. A second call from the dispatcher at 2030 MST was not answered and there was no further radio communication with the flight.

A motorist driving west along the south shore of Slave Lake, about five miles west of the airport saw an aircraft cross the road at low altitude from north to south. A few seconds later he noticed a bright flash behind his vehicle. He did not connect this flash with the aircraft at the time but reported it some three hours later when he heard a flight was overdue.

Search aircraft spotted a fire about midnight near the position given by the motorist. A ground party reached the scene at 0230 MST the next morning. All nine passengers on the Beechcraft had escaped serious injury, but the two pilots lost their lives.

A few minutes before the crash, everything seemed to be normal to the passengers. Some persons in the forward part of the cabin overheard the pilot telling the second pilot to "time the turn". Shortly thereafter there was an impact and a fire started in the right wing. Seconds after that, there was a heavy crash and the passengers found themselves hanging upside down suspended by their seat belts. Fire was spreading rapidly outside and the heat could be felt through the windows. There were no lights except from the flames.

When the passengers unfastened their seat belts, they fell on their heads; some were injured in this way, although they had not been injured in the crash itself. A woman seated near the entrance door in the rear attempted unsuccessfully to open it. Finally a male passenger, who had been trained to handle emergency situations, managed to kick the door open. All passengers escaped by this door. They were unable to reach the pilots because of an intense fire in the cockpit area which also appeared to have been crushed.

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Physical evidence at the wreckage site confirmed that the aircraft had been in level flight with landing gear extended and approach flap down, heading 090°M when the right wing contacted a large spruce tree at 2240 feet asl. Eight feet of the right wing separated and spilling turbine fuel ignited. The aircraft rolled to the right and struck the ground inverted. There was no evidence to suggest that control problems existed prior to the first impact. The engines were producing power and there was D.C. electrical power available.

Due to fire and impact damage very little information could be obtained from the flight instruments. One ADF tuner was set to about 370 kHz; the related indicator needle was pointing toward Slave Lake radio beacon. The two altimeters sub scales were set to about 29.64 and 29.65 inches of mercury (laboratory report LP 4/76 refers).

Maintenance records for the aircraft were incomplete. Some information had been lost with the aircraft. Records kept by the previous owner, covering from April 1974 to November 1974 listed recurring problems with the flight instruments, particularly with the air-operated gyro instruments on the co-pilot's panel.

The aircraft had been equipped with electrically spun gyro instruments on the pilot's panel, and air-operated instruments on the co-pilot's side. The only source of magnetic heading information was a "B-16" compass, a simple type without provision for gyro stabilization.

It was learned that at the time of departure from Edmonton, both directional gyros were precessing excessively and the co-pilot's horizon was inoperative. In addition, there was no record of a magnetic compass swing having been done.

A placard in the Beech 99 warns that the magnetic compass may be inaccurate when certain electrical anti-icing equipment is in operation. A test flight was made with a similar aircraft to determine the magnitude of these possible heading errors, using the electrical equipment probably in use at the time of the accident. The following deviations in magnetic compass information were recorded during the test flight:

(a) Prop de-icer and engine lip heaters ON	3°
(b) Windscreen heat ON	3°
(c) Vent blower on manual HIGH position	1°
(d) Pitot heaters (2) ON	10°
(e) Windscreen wipers ON	3°
(f) Undercarriage DOWN	5°

Combined with the effect of the precessing directional gyros, the heading information presented to the pilots could have been in error by as much as 30 degrees.

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It is concluded that the pilot had visual contact with lights on the ground approaching Slave Lake, probably at the minimum enroute altitude of 4500' asl. He elected to carry out a visual let down west or northwest over the lake. The pilot carried out a timed procedure turn and straightened out on an easterly heading, descended to 2300' asl (400 ft. above ground), and attempted to home in on the Slave Lake radio beacon. The aircraft was further south than expected and, instead of crossing the shore of the lake near the airport, it struck a ridge of higher ground.

The procedure attempted by the pilot was, in effect, a non-standard instrument approach, quite different from the one depicted on the approved Instrument Approach chart. If the approved procedure had been used, the applicable weather minima and minimum altitude restrictions would have made a diversion to another airport mandatory. The non-standard approach employed was an attempt to complete the landing by reverting to visual flight rules even though weather conditions were below the authorized limits for an instrument approach.

Although it would have been technically possible to align the aircraft with the runway during the approach over the lake, by use of the ADF equipment and the flight instruments, the lack of an accurate heading reference in this aircraft would render this unlikely.

There is of course, the possibility that the pilot elected to do the non-standard approach over the lake rather than the approved instrument approach procedure because he was aware of the deficient instrumentation of the aircraft.

Transport Canada, responsible for the certification of air carriers, had issued a temporary amendment to this carrier's operating certificate authorizing the use of the Beech 99 for the carriage of passengers at night or under instrument flight rules. The operating certificate certifies that the operator is "adequately equipped and able to conduct a safe operation". Although various inspections of the carrier and its equipment had been done prior to the issue of this amendment, the circumstances of this accident indicates that the maintenance facilities inspections and pilot proficiency and instrument rating reports did not lead to the creation of safe procedures within the company.

FINDINGS

The company dispatched the aircraft on a scheduled instrument flight with unserviceable flight instruments.

The company did not have adequate maintenance procedures for the aircraft.

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The pilot attempted to carry out a non-standard instrument approach during weather that was below the approved limits.

Transport Canada inspections and company practices did not ensure adequate standards pertaining to the maintenance and operation of this scheduled air service.