Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

AVIATION INVESTIGATION REPORT
A10Q0070

COLLISION WITH TERRAIN

SASAIR INC.
CESSNA 172 C-FEAR
L'ISLE-AUX-GRUES, QUEBEC
19 MAY 2010

Canada

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

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Summary

The pilot rented a Cessna 172 (registration C-FEAR, serial number 17260105) from Sasair Inc. for a 2-hour period from 1400 to 1600 hours, for a pleasure flight under visual flight rules from Quebec City/Jean-Lesage International Airport to L'Isle-aux-Grues, Quebec. The aircraft was carrying the pilot and three passengers. At approximately 1518 Eastern Daylight Time, the aircraft made a touch-and-go on runway 25 at L'Isle-aux-Grues airport. On the climb-out, the aircraft halted its climb and started flying around the island at low altitude. At 1522, a quarter of a mile south of the runway, the aircraft struck a pile of rocks and earth in a field, then crashed and caught fire. The aircraft was partly destroyed by fire. The four occupants died as a result of the accident. The emergency locator transmitter (ELT) activated on impact; satellites received a signal a few seconds after the accident and Canada Search and Rescue was notified.

Ce rapport est également disponible en français.

Other Factual Information

History of the Flight

The pilot had rented the aircraft for 2 hours in order to land at L'Isle-aux-Grues airport for 1 hour of sightseeing.

At 1447 [1] the aircraft took off from Quebec City Airport and was progressively cleared to climb to 2000 feet, 3000 feet, and finally 3500 feet above sea level (asl). At 1507 the aircraft commenced its descent, and 3 minutes later, about 5 nautical miles (nm) from destination, the pilot reported on the aerodrome traffic frequency (ATF) for L'Isle-aux-Grues that the flight was at 3000 feet inbound to the airport.

The aircraft entered the circuit for runway 25 by initially following the south shore of L'Isle-aux-Grues island (see Annex A – Track based on GPS and radar) [2] to a position abeam south of the airport. The aircraft then proceeded overhead the runway for the left-hand downwind leg. About 1 nm northeast of the runway threshold, the aircraft entered the base leg. At 1517 the aircraft vanished from the radar screen as it commenced its final approach 1 nm from the runway at 900 feet asl.

The Cessna halted its climb shortly after its touch-and-go and continued flying at low altitude. It disappeared behind the trees on the western tip of the island, then proceeded east along the south shore of the island about 200 feet above the ground. Abeam the airport, the aircraft turned left and headed northwest on a track perpendicular to the runway centre line. The aircraft overflew a small wood then descended to a few feet above a field. The aircraft flew just above the ground for a distance of 350 feet before striking a mound of rocks and earth. The aircraft partly broke up and continued in the air until it struck the terrain and caught fire. The final impact was in a field about 255 feet from the mound. The pilot and two passengers were fatally injured. The other passenger died in hospital a few hours later.

The aircraft was not equipped with a flight data recorder or cockpit voice recorder. It was not required to have them.

At the Montmagny airport, Quebec, some 4 nm south of the L'Isle-aux-Grues airport, the pilot made a second transmission on the ATF about 10 minutes after the first transmission. The pilot's speech was such that the message was unintelligible. There was no indication, however, that the aircraft was in distress.

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1 All times are Eastern Daylight Time (Coordinated Universal Time minus 4 hours).

2 An automobile GPS in the aircraft recorded the track and altitude of the aircraft. The TSB Laboratory collected GPS and radar data to reconstruct the track of the flight. Discrepancies in the data are due to the inherent limitations of radar and the automobile GPS.

Pilot Information

The pilot was certified and qualified for the flight in accordance with existing regulations and held a private pilot licence since July 2005. The log-book showed that the pilot had about 230 flying hours, 148 of which were with an instructor and 82 hours were solo. The pilot had a reputation for complying with the regulations. It was not in the pilot's character to to fly at low altitude.

Weather

Weather conditions were suitable for visual flight. Visibility was over 30 miles, the ceiling was 22,000 feet, the wind was from the west at 5 knots, the temperature was 24°C, and the dew point 5°C. There was nothing to indicate that weather was a factor in the accident.

Aircraft Information

The aircraft was certified, equipped and maintained in accordance with existing regulations and approved procedures. The last inspection of the aircraft, on 21 April 2010, was a 50-hour overhaul. At the time of the accident, the aircraft had no deferred maintenance items.

The pilot inspected the aircraft before the flight and did not report any deficiencies. A weight and balance form was not found. But TSB calculations determined that the weight and centre of gravity of the aircraft were within the prescribed limits.

Accident site

The accident occurred in an alfalfa field. Oriented northwest, the field was not suitable for a precautionary landing. Plant cover was such that obstructions could be hidden, its surface was bumpy, and it contained some ploughed furrows (see Figure 1).

The aircraft struck a mound composed of rocks and earth that was 8 feet high and 30 feet wide and located about 2000 feet south of the runway. It was the only elevated point of terrain in the area. The mound was partly covered with grass and small shrubs. The Cessna 172 was on a heading of 325 degrees magnetic at the time of the collision. The first impact marks indicate that the landing gear of C-FEAR struck the mound about 5 feet from its base. The wings were horizontal or almost horizontal. Two propeller blade marks approximately 14 inches apart were found on the mound. Due to impact forces, C-FEAR partly broke up. The aircraft continued in the air until it crashed on its back in a ditch 255 feet from the initial point of impact. The impact resulted in a fire. There was no evidence found of any pre-impact fire damage.

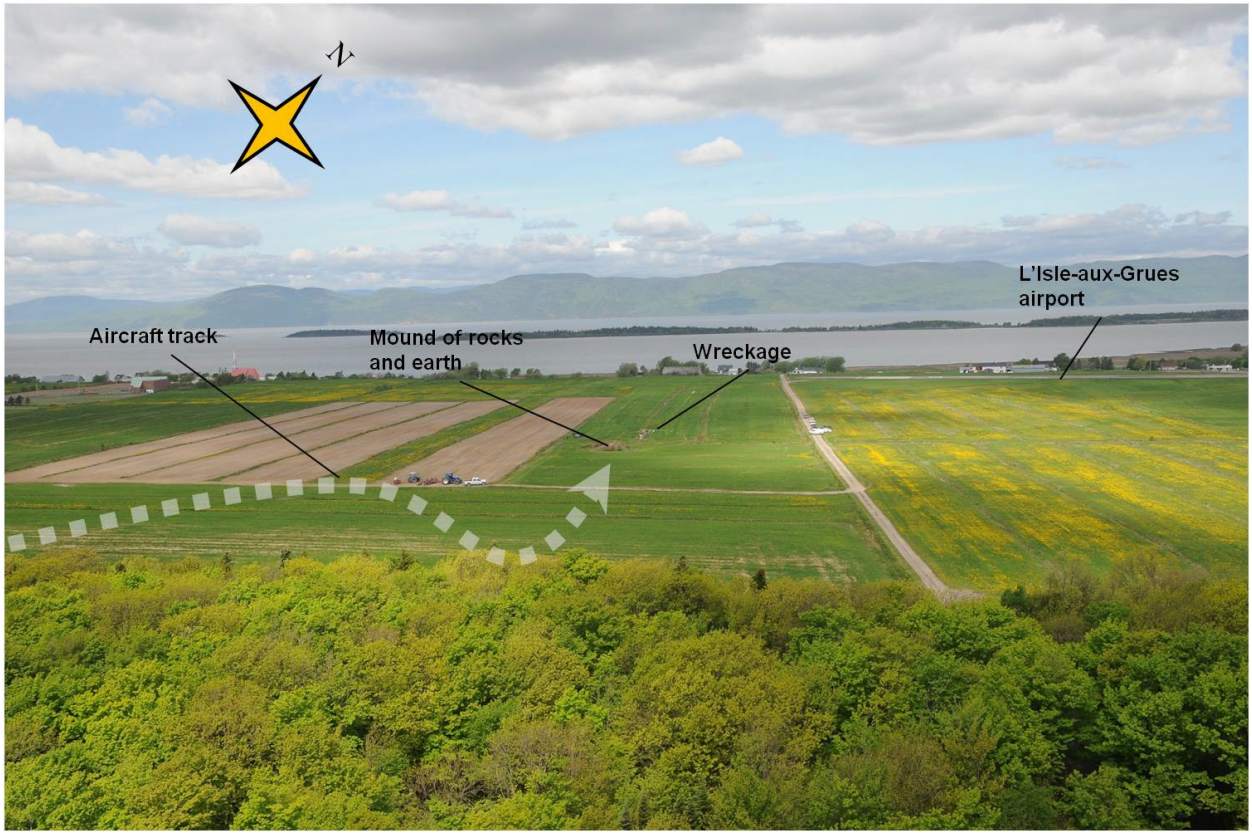

Figure 1. Aerial view of accident site

Wreckage Examination

The cockpit and cabin were severely damaged by the impact and post-impact fire. The accident allowed almost no chance of survival.

Examination of the wreckage, systems and all the parts recovered revealed no deficiencies that could have hindered control of the aircraft, and no pre-impact failures or malfunctions. Examination of the flight controls determined that the flaps were up at the time of impact.

The engine was partly separated from the fuselage. As a result it was not affected by the fire. Teardown of the engine and ancillary controls revealed no pre-impact deficiencies that could have prevented it from operating normally.

The propeller blades were bent backward. They showed nicks on the leading edges and chord-wise scrapes. The marks on the ground indicated that the engine was running at 2200 rpm at least.

The instruments found at the accident site were sent to the TSB Laboratory. The altimeter was set to 29.90 inches of mercury. The airspeed indicator, vertical speed indicator, exhaust gas temperature indicator, turn coordinator, radio compass, attitude gyro and suction gauge provided no reliable information as to their readings at the time of impact.

The engine tachometer showed marks on the dial between 1800 rpm and 1900 rpm. It could not be determined at what point in the impact sequence these marks were made.

The Cessna 172 L has a spring-loaded toggle flap switch. The pilot pushes towards the UP position to raise the flaps and towards the DOWN position to lower them. It was designed to return automatically to the centre (null) position. The toggle switch was centred. Examination of this switch revealed that the lower and upper springs were broken. It was also established that the switch worked properly when placed in one of the three possible positions. No instructions are provided in the aircraft maintenance or flight manual explaining how to use it. No deficiencies related to the switch were found in the aircraft logs.

Low-altitude flight

Flying at low altitude can be dangerous: the field of view is more limited and the background landscape can conceal obstructions if it does not provide sufficient contrast. In this occurrence, the low-altitude flight was made over a non built-up area and, in large part, over water. Just before ground impact, the aircraft overflew a small wooded area at low altitude then descended to just above a cultivated field.

Section 602.14 of the *Canadian Aviation Regulations* (CARs) about low-altitude flight states, with regards to flight over a non built-up area:

> Except where conducting a take-off, approach or landing or where permitted under section 602.15, no person shall operate an aircraft [...] at a distance less than 500 feet from any person, vessel, vehicle or structure.

TSB Laboratory Reports

The following laboratory reports were completed.

LP 068/2010 – Engine & Propeller Examination
LP 075/2010 – Instrument Examination

Analysis

The accident occurred because the aircraft, while flying just above the ground, struck a mound 8 feet in height. Due to a lack of evidence, the investigation was unable to determine why the pilot stopped the climb after the touch-and-go landing and continued flying at low altitude. Nor could it be determined why the aircraft descended to a few feet above terrain which was unsuitable for landing, just before the initial impact.

Two hypotheses may explain why the pilot made a low-altitude flight which resulted in a collision with the terrain.

Technical Deficiency with the Aircraft

It is possible that, after encountering mechanical trouble, the pilot was attempting to make an emergency landing when the aircraft struck the mound. The elements that support this hypothesis are:

- the pilot was not known to fly at low altitude;
- the marks on the engine tachometer dial indicate that the engine was running between 1800 rpm and 1900 rpm at the time of impact, which is below the normal cruise power level;
- the pilot sent an unintelligible radio message shortly before the collision.

However, no mechanical deficiency which could have caused the engine to lose power or the aircraft to become uncontrollable in flight were noted or discovered prior to the flight or on examination of the aircraft. In fact, damage to the propeller indicates that the engine was producing power at the time of impact.

Based on the damage to the aircraft, the impact marks on the mound and the trajectory of the debris trail, the Cessna was configured for cruise flight and the pilot had control of the aircraft until the time of impact. The aircraft was flying at over 57 mph [3] at the time of initial impact, the aircraft did not stall. The marks on the engine tachometer were made when the engine rpm decreased as a result of the propeller striking the ground.

Pleasure Flight Just Above Ground Without Intent to Land

The aircraft occupants intended to land at L'Isle-aux-Grues airport for sightseeing. To that end, the pilot had rented the aircraft for 2 hours (from 1400 to 1600). But because the aircraft did not take off from Quebec City until 1447, it was impossible to make the stopover as planned and return on time. In fact, the pilot had less than 10 minutes to spend in the area before departing on the return leg. It is possible the pilot decided to overfly the island to give his passengers a view of the landscape from the air in lieu of stopping over; a low-altitude flight would have provided an exceptional view. None of these hypotheses could be proven with a degree of certainty.

It is likely the pilot was looking straight ahead while descending over the field. By extension, the pilot likely did not see the mound when the aircraft flared to level flight.

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[3] Flaps-up stall speed.

Finding As To Causes and Contributing Factors

1. For undetermined reasons, the aircraft was flying low, just above the ground, when it struck an 8-foot mound in a field and crashed.

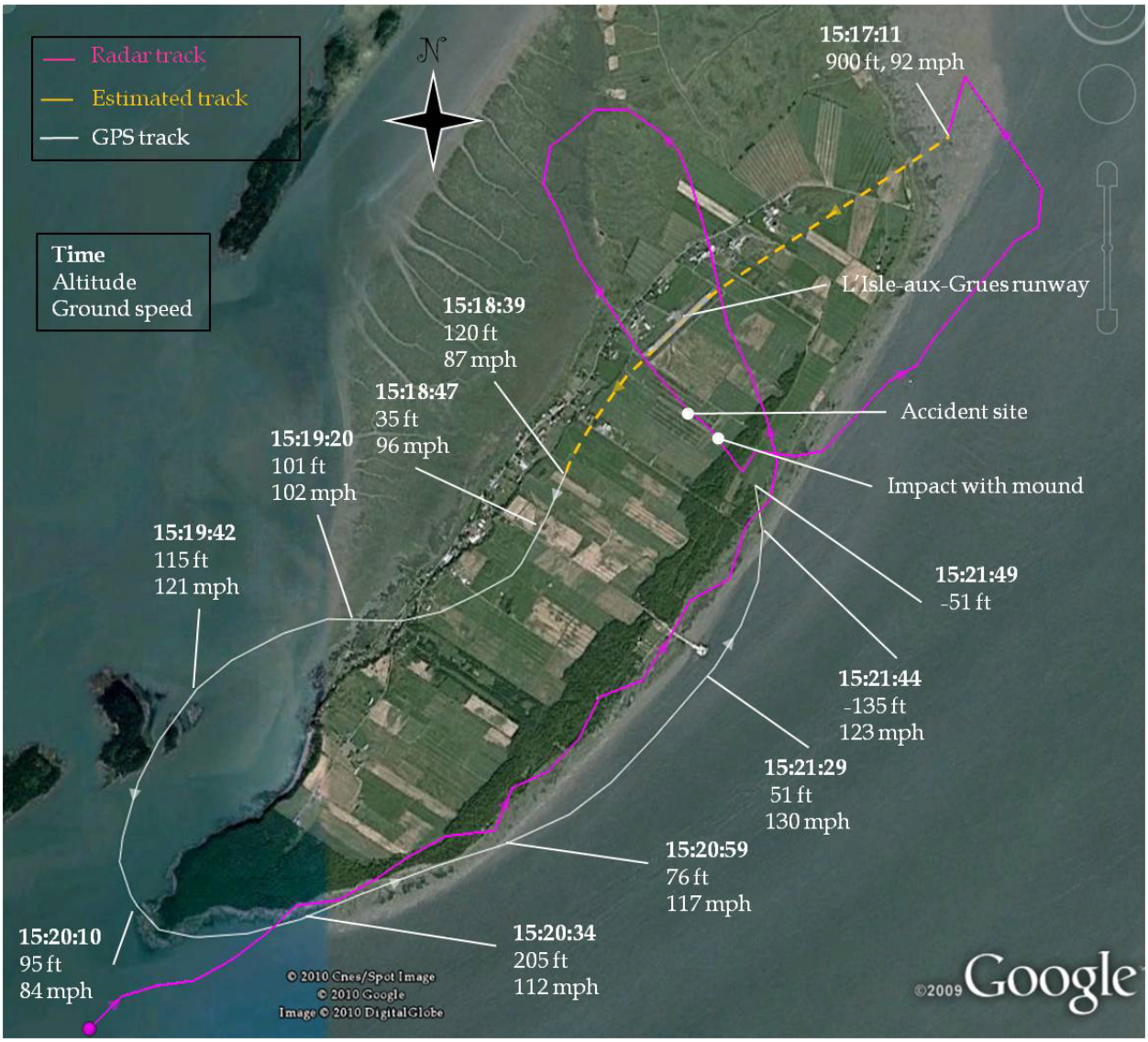
Other Finding

2. Examination of the toggle flap switch revealed that the lower and upper springs were broken. It was also determined that the switch worked properly when placed in one of the three possible positions.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 20 April 2011.

Visit the Transportation Safety Board's website (www.bst-tsb.gc.ca) for information about the Transportation Safety Board and its products and services. There you will also find links to other safety organizations and related sites.

Annex A – Track based on GPS and radar



Note: Altitude is measured in feet above sea level; ground speed is measured in miles per hour; times are Eastern Daylight Time.