

Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

**AVIATION INVESTIGATION REPORT
A03A0002**



COLLISION WITH WINDROW

**LABRADOR AIRWAYS LTD.
BEECH 1900D C-GLHO
ST. JOHN'S INTERNATIONAL AIRPORT
NEWFOUNDLAND AND LABRADOR
11 JANUARY 2003**

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

A Beech 1900D aircraft, C-GLHO, serial number UE-266, operating as Lab Air 8333, was taxiing on Runway 02/20 when the aircraft struck a two-foot-high windrow which lay across the runway just to the north of taxiway Charlie. There were no injuries to the 10 passengers and two crew members. The aircraft sustained substantial damage. The accident occurred at 0844 Newfoundland standard time.

Ce rapport est également disponible en français.

Other Factual Information

St. John's Airport is a certified, controlled airport. The airport has three runways - 11/29, 16/34, and 20/02, and all three runways are used throughout the year. Snow removal and winter runway maintenance priorities are established in the St. John's Airport Winter Maintenance plan. Because of its Category II instrument approach capability, and unless wind conditions clearly favour Runway 16/34, snow clearing efforts are initially focussed on preparing Runway 11 and the associated runways and taxiways that are necessary for access. The various airport surfaces are designated under one of three priorities for snow clearing (see Figure 1). Priority 3 surfaces are cleared last. Runway 02, north of taxiway Charlie to the entrance to taxiway Bravo, is designated as a priority 3 surface when either Runway 11/29 or 16/34 is active.

The St. John's Airport Winter Maintenance plan also includes criteria for the closing of an active runway because of contamination. One of these criteria is that an active runway should be closed if there are windrows in excess of 12 inches high. The plan, however, does not contain instructions for the closing of non-active runways such as the portion of Runway 20/02 north of Charlie taxiway, or other low priority surfaces. Windrows in priority 3 regions, such as the one north of taxiway Charlie, are not normally encountered by taxiing aircraft, and are not usually reported to the ground controller, nor indicated on the runway surface condition (RSC) reports. The normal practice at the airport is for snow removal crews to advise the ground controller of windrow hazards when they hear a taxi clearance, or a request for taxi, through an area with a windrow. Canadian Aviation Regulation CAR 302.07 - Obligations of the Operator [Airport], (2) (b), requires that the airport operator provide the air traffic control unit with immediate notice of the existence of any obstruction or hazardous condition affecting aviation safety at the airport.

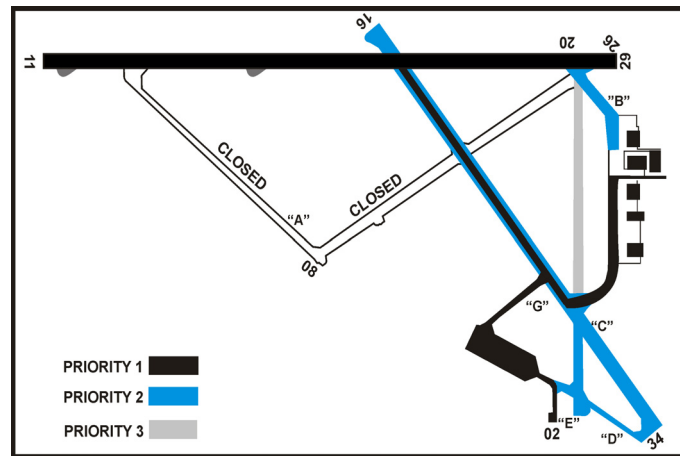


Figure 1. Snow Clearing Priorities with Runway 11/29 Active

The weather during the night before the accident was varied. Prior to 0530 Newfoundland standard time (NST)¹, light snow had been falling, and the wind was from the east. Initial airfield maintenance activities were therefore focussed on clearing snow from Runway 11 and the related taxiways. It could not be determined precisely when, or by whom, the windrow was created; however it is during this initial period that the windrow to the north of Charlie taxiway was created by plowing activities. By 0550, a 100-foot-wide centreline on Runway 11/29 had been prepared, and the runway friction index was measured at .30, indicating generally good friction. By 0600, the snow had changed to ice pellets, and between 0600 and 0630, freezing drizzle started falling at the airport. Runway 11 became ice covered, and, as a result, an Air Canada Airbus, Flight 601, slid on the slippery runway surface while backtracking and was not able to

¹ All times are Newfoundland standard time (Coordinated Universal Time [UTC] minus three and one-half hours) unless otherwise noted.

stop before encountering the runway end. Flight 601 radioed the tower at 0634, informing them that they were at the runway edge and were unable to manoeuvre from that position.

The night shift supervisor (lead-hand) and various airfield maintenance vehicles proceeded to Flight 601's position. At 0640, the tower reported that the wind had shifted, and was now from 170 degrees at 10 to 15 knots, clearly favouring Runway 16. The lead-hand and the field maintenance crew were now preoccupied with two tasks: extricating Flight 601, and preparing and inspecting Runway 16 for use. By about 0755, Flight 601 had been towed from its position at the runway end by a company tug and was then inspected by company maintenance personnel.

At 0752, a weather special was released showing that the freezing drizzle had stopped, and the winds were now from the south at six knots. At 0757, the crew of the Beech 1900D taxied the aircraft from apron two, via taxiway Charlie, Runway 34, Runway 20/02, and taxiway Foxtrot onto Apron 1. Here, the aircraft was shut down and prepared for the upcoming Lab Air 8333 flight.

Around 0815, the day lead-hand proceeded onto the airfield to relieve the night lead-hand. Normally, one of the first actions of an oncoming lead-hand is to inspect the entire airfield by vehicle. However, in this instance, the oncoming lead-hand proceeded directly to Runway 11/29 to meet with the night lead-hand and lend assistance with Flight 601. The customary airfield survey was not completed. The wind had now shifted to 240 magnetic at 10 to 15 knots, and it was decided to switch to Runway 29. Airfield maintenance sanded the runway and the threshold of Runway 29. The night lead-hand completed an inspection of Runway 29, then departed the airfield at about 0822. Flight 601 started engines, backtracked down Runway 29, and was cleared for take-off from Runway 29 at 0840.

At 0841, Lab Air Flight 8333 was cleared to taxi via Foxtrot, Runway 02, and to hold short of Runway 29 (see Figure 2). An analysis of the flight data recorder (FDR) information showed that the aircraft was travelling at about eight knots and was accelerating when it rolled out on the runway, heading on Runway 02. As the aircraft approached the intersection of runways 02 and 34 there were several snow removal vehicles on Runway 34 east of the intersection. After confirming that the vehicles were holding short, the crew proceeded through the intersection, initiating the "instruments" portion of the taxi check nine seconds prior to striking the windrow. According to the operator's standard operating procedures for the instrument cross-check, the captain (pilot flying), must look inside the cockpit to call out indications from the aircraft's flight instruments. Meanwhile, the first officer (pilot not flying) is supposed to also monitor the instruments and when found correct will respond "Checked and Set Left/Right."

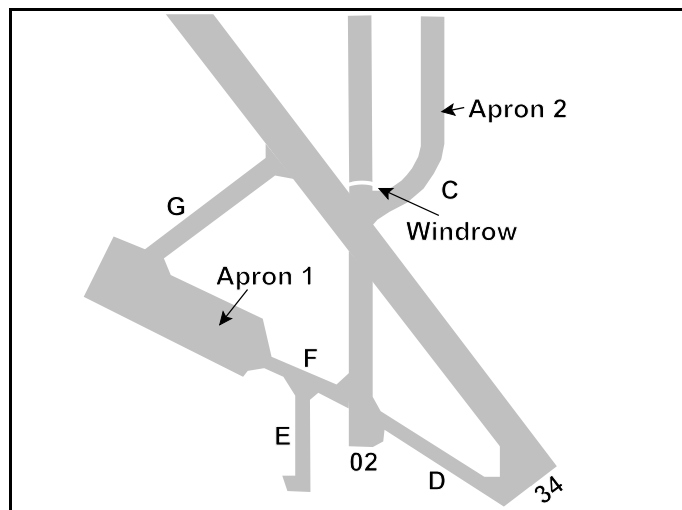


Figure 2 - Taxi Routing

As the crew were conducting this check, the windrow was spotted. The aircraft was now 3.5 seconds and 146 feet² from the windrow and travelling at 24 knots. The captain attempted to stop with wheel braking, approximately two seconds later and 60 feet short of the windrow. When the wheel brakes were applied, the aircraft started to skid on the slippery runway surface. The captain attempted to apply reverse thrust, but there was insufficient time for it to be selected before the nosewheel struck the windrow, at 23.5 knots. The propellers struck the windrow next, followed one quarter of a second later by the main gear, which struck the windrow at approximately 20 knots.

The lowest point of the propeller tip path on the Beech 1900D is 14.07 inches from the ground. When the propeller blades struck the two-foot-high windrow, all four blades from the right engine and one blade from the left engine broke off near the hub. The blades from the right engine struck the starboard aircraft fuselage at the forward passenger cabin window. This window shattered and the window fragments and frame were thrown forcibly into the cabin. A mother and her infant, who were seated immediately next to the window, narrowly escaped injury. The crew stopped the aircraft 175 feet past the windrow, secured the engines, shut off the electrical power, and escorted the passengers from the aircraft. The ground controller noticed the passengers deplaning and activated the crash alarm.

The weather at the time of the accident was as follows: wind 230° true at 10, gusting to 15, knots and visibility four statute miles in light drizzle and mist. Light conditions were described as being flat: there were no shadows thrown by objects on the ground.

Runway 02, from Charlie taxiway to Runway 29, had not been traversed by any vehicle prior to the accident. The runway had not been cleared during the previous night, and there were no RSC reports produced for the runway. As the location of the windrow north of Charlie taxiway was well to the north of Runway 16/34, the windrow did not appear on any of the RSC reports produced that night. After the accident, Runway 20/02 north of the windrow was found to be covered with a combination of ice and patches of thin snow.

The aircraft was fitted with both a cockpit voice recorder (CVR) and an FDR. Both operated normally. The information from these units, as well as from air traffic control (ATC) and airport authority recordings, was useful in analysing events related to the accident.

The aircraft emergency checklist contains a procedure for propeller collisions on the ground. The checklist states:

“Propeller Collisions during Ground Operation

During collisions, the higher the propeller RPM, the greater the risk of propeller blades, or portions of the blades, separating from the propeller hub causing damage to the fuselage and physical harm to the passengers.

² The resolution of the data on the FDR was insufficient to determine the exact times when the impact events occurred. Therefore, the events have an error tolerance of approximately $\pm \frac{1}{4}$ second. The distance referenced is from the nosewheel to the windrow.

If maximum braking and maximum reverse are insufficient, and a ground collision is imminent:

1. *Power Levers GROUND FINE OR CUT OFF*
2. *Condition Levers FUEL CUTOFF"*

Analysis

Several factors combined to allow this large windrow to remain unreported. Neither lead-hand nor the ground controller were made aware of the creation of the windrow because of the practice of not reporting windrows on other than active runways. The location of the windrow was in an area that was not used by either ground vehicles or aircraft until Runway 29 became active, and it was outside of the areas inspected by the night lead-hand during his shift. The night shift had a significantly increased workload because of the freezing drizzle, the stranded Airbus, and the frequent runway changes. These factors likely diverted attention away from ensuring that the taxi route north of Charlie intersection was usable when Runway 29 became active. The shift change for the snow removal crews coincided with the towing of the Airbus, the runway change, and the issuing of the taxi clearance to Lab Air 8333. The windrow was the result of snow plowing activities, and it is likely that whoever had knowledge of the windrow had departed the field prior to the taxi clearance being issued and would not have been available to warn of the existence of the windrow. The oncoming lead-hand did not perform the customary field survey and inspection because of the pressing need to prepare Runway 29 and move the stranded Airbus. A field inspection would have allowed for detection of the windrow and for action to remove it or communicate its presence to the ground controller.

Runway 02 north of Charlie is a low-priority surface, and was not used prior to Lab Air 8333 by either vehicles or aircraft. The surface had not been cleared, was not usable, and was not necessary, yet it remained open. The St. John's Airport winter maintenance plan does not contain guidance to field maintenance personnel for the closure and subsequent re-opening of these non-essential surfaces.

The crew's previous safe transit through the intersection and the lack of any warning of obstructions along their taxi route resulted in them proceeding with their normal taxi routine, and without extra vigilance for taxi hazards such as windrows. The flat-light conditions and the white background of the uncleared portions of the airfield also caused the windrow to blend into the background, making it less conspicuous from a distance. Approaching the intersection, the crew's attention was diverted by the presence of snow removal vehicles on Runway 16/34 which were approaching their location. During the subsequent taxi check, the first officer was reading the checklist and the captain's attention was focussed inside the cockpit, as he was verifying his flight instruments. These actions and the inconspicuousness of the windrow prevented the crew from seeing the windrow earlier.

The taxi speed of the aircraft and the icy condition of the runway hindered the stopping of the aircraft, and consequently did not allow time for the captain to apply reverse thrust, or to consider initiating the "*Propeller Collisions during Ground Operation*" checklist. Had the taxi speed of the aircraft been less, more time would have been available for the crew to recognize and react to the windrow. With more time to react, it is possible that the crew could have stopped the aircraft prior to the collision, or that the "*Propeller Collisions during Ground Operation*" check could have been completed, lessening the risk of aircraft damage and physical harm to the passengers.

The following TSB Engineering Branch report was completed:

LP001/03 FDR and CVR Analysis

Findings as to Causes and Contributing Factors

1. The aircraft was damaged when it collided with a windrow laying across its taxi path.
2. Runway 02 north of Charlie taxiway was left open throughout the period of snow removal even though it was not usable and was not required.
3. The taxi speed of the aircraft did not allow the crew sufficient time to respond once they saw the windrow, increasing the risk of collision, damage, and physical harm to the passengers.
4. The lighting conditions at the time made the windrow difficult to see.
5. The existence of the windrow, the result of snow plowing activities, had not been reported to either the night lead-hand, the ground controller, the oncoming lead-hand, or the crew of Lab Air 8333.
6. The stranded Airbus, the high airfield maintenance workload and the shift change combined to circumvent the normal procedures that would have ensured that the windrow was reported.

Finding as to Risk

1. The St. John's Airport Winter Maintenance Plan does not require the reporting of windrows on non-active runways.
2. The St. John's Airport Winter Maintenance Plan does not contain instructions for the closure and reopening of low priority airfield surfaces.

Safety Action

The St. John's Airport Authority has issued a memorandum which allows the lead hand to close Runway 02/20 when conditions require.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 21 August 2003.