

Transportation Safety Board
of Canada



Bureau de la sécurité des transports
du Canada

AVIATION INVESTIGATION REPORT

A04Q0049



RUNWAY EXCURSION

MYRAND AVIATION INC.

BEECHCRAFT A100 C-FMAI

CHIBOUGAMAU/CHAPAIS AIRPORT, QUEBEC

19 APRIL 2004

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.

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Summary

The Beechcraft A100, registration C-FMAI, operated by Myrand Aviation Inc., was on a chartered instrument flight rules flight from Québec/Jean Lesage International Airport, Quebec, to Chibougamau/Chapais Airport, Quebec, with two pilots and three passengers on board. The co-pilot was at the controls and was flying a non-precision approach for Runway 05. The pilot-in-command took the controls less than one mile from the runway threshold and saw the runway when they were over the threshold. At approximately 1018 eastern daylight time, the wheels touched down approximately 1500 feet from the end of Runway 05. The pilot-in-command realized that the remaining landing distance was insufficient. He told the co-pilot to retract the flaps and applied full power, but did not reveal his intentions. The co-pilot cut power, selected reverse pitch and applied full braking. The aircraft continued rolling through the runway end, sank into the gravel and snow, and stopped abruptly about 500 feet past the runway end. The aircraft was severely damaged. None of the occupants were injured.

Ce rapport est également disponible en français.

Other Factual Information

The flight crew was certified and qualified for the flight in accordance with existing regulations. The pilot-in-command had 11 338 flying hours, including about 11 000 hours of instrument flight. He was qualified on the Beechcraft A100 and had over 2600 hours on type. He was pilot, chief pilot, company president and owner, and maintenance coordinator. As president, he controlled the company hiring and dismissal policies and was in charge of training pilots and applying flight procedures. The co-pilot had 1176 flying hours, including about 500 hours of instrument flight. He was qualified on the Beechcraft A100 and had about 400 hours on type.

The aircraft was certified, equipped and maintained in accordance with existing regulations and approved procedures. There was no evidence found of any airframe failure or system malfunction during the flight. When the aircraft rolled through the runway end, the landing gear was down and the flaps were retracted. The weight and centre of gravity were within the prescribed limits.

The aircraft was equipped with a cockpit voice recorder (CVR), model Universal CVR 30-B, serial number 1135. This model is a semi-conductor recorder with four continuous-loop channels, which records all voice messages sent or received by the crew in the last 30 minutes. The CVR was removed from the aircraft and sent to the TSB Engineering Laboratory for analysis. The information and conversations retrieved provided a record of the events that occurred during the last 30 minutes of flight before the occurrence.

At the time of the occurrence, Myrand Aviation Inc. was operating a fleet of three aircraft: a Cessna Citation, a Beechcraft A100 and a Cessna 402. On 13 April 1999, a Cessna 335 belonging to the company crashed on a missed approach at Gaspé Airport, Quebec (TSB report No. A99Q0062). There were four fatalities.

Prior to departing from Québec, the pilot-in-command inquired about the weather at his destination. The terminal aerodrome forecast (TAF) for Chibougamau/Chapais Airport issued at 1137 Coordinated Universal Time (UTC), valid for the period 1200 to 2400 UTC, was as follows: winds 180 degrees at 10 knots, visibility over 6 miles in light rain showers with ceiling 400 feet and, temporarily from 1200 to 2100 UTC, ceiling 200 feet broken and 2000 feet overcast. While the aircraft was en route, a special weather observation made at 1316 UTC, or 0916 eastern daylight time,¹ was sent to the crew. It was as follows: winds 180 degrees true at 9 knots, visibility 4 miles in light rain and fog, scattered cloud at 500 feet and ceiling 1700 feet. Between 0916 and the time of the accident, which occurred at 1018, there were two more special observations besides the aviation routine weather report (METAR) at 1400 UTC for the Chibougamau/Chapais Airport. These last three observations indicated deteriorating weather conditions. However, they were not provided to the flight crew and were not requested by them. The last observation, which was made at 1400 UTC, was as follows: winds 180 degrees true at 6 knots, visibility 2 ½ miles in light rain and mist, ceiling measured 400 feet overcast.

¹ All times are eastern daylight time (Coordinated Universal Time minus four hours) unless otherwise indicated.

At approximately 0950, when the aircraft was about 60 miles southeast of the Chibougamau/Chapais Airport, the descent was initiated. At the time, the aircraft was in uncontrolled airspace and radio communications were on the frequency 126.7 MHz. About 50 miles southeast of the airport, the flight crew estimated beacon CHIBOO in 18 minutes for an approach for Runway 23, which would be about 6 minutes after the arrival of another aircraft, a Beechcraft 100 inbound from the west. The pilots of the two aircraft established two-way communications to coordinate their intentions. C-FMAI advised that it would fly a holding pattern to let the other aircraft land. However, the altitude at which the holding pattern would be flown was not mentioned. Furthermore, the holding pattern was not flown as defined in the *Instrument Procedures Manual* (TP 2076). The pattern was flown to the northeast of approach fix OMOLI on an outbound track; it should have been flown to the southwest of the approach fix on an inbound track.

The Chibougamau/Chapais Airport is located in class G airspace and air traffic control (ATC) does not have the authority or responsibility to control the traffic there. ATC units do provide flight information and alert services. When aircraft operate near an uncontrolled airport or in class G airspace, pilots must broadcast their intentions on the mandatory frequency (MF). In this occurrence, the pilots of both aircraft used frequency 122.0 MHz, the MF for Chibougamau/Chapais, when closer to the airport. They broadcast their intentions and some position reports during the approach, including on final approach.

Section 602.96 (3)(b) of the *Canadian Aviation Regulations* (CARs) requires that the pilot-in-command of an aircraft operating at or in the vicinity of an aerodrome conform to or avoid the pattern of traffic formed by other aircraft in operation. However, the CARs are not explicit as to how aircraft are to avoid the pattern of traffic, either in terms of altitude or distance. Also, the CARs do not indicate whether the missed approach segment must be considered part of the pattern of traffic. Section 602.96 (2)(a) of the CARs indicates that, before taking off from, landing or otherwise operating an aircraft at an aerodrome, the pilot-in-command of the aircraft shall be satisfied that there is no likelihood of collision with another aircraft or a vehicle.

In accordance with the CARs, the pilot-in-command of C-FMAI decided to avoid the other aircraft by heading for OMOLI, the intermediate approach fix for Runway 05, to fly a holding pattern and let the other aircraft land. The pilot-in-command also decided to fly the non-directional beacon/distance measuring equipment (NDB/DME) approach for Runway 05 instead of an approach for Runway 23. C-FMAI flew over OMOLI at an approximate altitude of 3000 feet above sea level (asl), which could have contributed to a loss of separation or even a collision in the event that the other aircraft, which was approaching in the opposite direction, executed a missed approach that required it to climb to 3200 feet on a heading of 237 degrees, which is in the general direction of OMOLI, before heading for beacon MT.

After the other aircraft reported on final, the flight crew of C-FMAI exited the holding pattern and advised that it was initiating the approach. The co-pilot was still at the controls. No instructions for an approach or missed approach were reviewed by the pilot-in-command with the co-pilot as indicated in the company standard operating procedures (SOPs) manual. When C-FMAI was established on final approach for Runway 05, the other aircraft advised that it was executing a missed approach. The crew of C-FMAI was surprised but still continued with the approach. Examination of the radar recordings revealed that the two aircraft crossed at 1015:27 in opposite directions with a distance of 2.1 nm and vertical separation of 1000 feet.

Less than one mile from the runway threshold, the pilot-in-command took the controls. Visual contact with the runway was established when the aircraft was over the threshold of Runway 05. The radar data indicate that, at that time, the aircraft was at an altitude of 1700 feet asl, or 432 feet above ground level (agl). He asked the co-pilot to fully extend the flaps and continued the descent. The pilot-in-command had been planning to execute a missed approach if the aircraft did not touch down abeam the taxiway located about 1800 feet from the end of Runway 05. However, he did not tell the co-pilot what he intended to do. The aircraft touched down approximately 1500 feet from the end of Runway 05. A special observation was made at the same time, indicating winds 180 degrees true at 6 knots, visibility 1 ½ miles in light rain and mist, ceiling measured 300 feet overcast, visibility varying from 1 to 2 miles and ceiling from 200 to 400 feet. At the time of the accident, the runway was wet. The amount of water on the runway and the James Brake Index could not be determined.

The minimum descent altitude (MDA) published for the NDB/DME approach for Runway 05 is established at 1800 feet asl, or 532 feet agl and visibility 1 ¾ miles. Even though the ceiling was below the minimum published for an instrument approach during the approach, there were no regulations prohibiting the flight crew from executing the approach. With regard to landing, the existing regulations prohibit the pilot of an aircraft on an instrument approach from continuing the descent below the MDA if he or she has not established and maintained the visual reference required to carry out a safe landing. In that case, he must execute a missed approach.

After the aircraft touched down, the pilot-in-command realized that the remaining runway distance was insufficient to bring the aircraft to a stop and asked the co-pilot to retract the flaps. The pilot-in-command applied full power for a take-off; however, he did not convey his intentions to the co-pilot. Seeing that the pilot-in-command did not have his hands on the power levers, the co-pilot thought that the pilot-in-command made an error by pushing forward the power levers instead of the propeller pitch controls. He immediately retarded the power levers, selected reverse pitch and applied maximum braking. The pilot-in-command was surprised at the actions of the co-pilot and let the aircraft lose speed, roll through the end of the runway and come to rest in the dirt and snow about 500 feet past the runway end.

Analysis

The primary role of a crew is to effectively control the risks relating to a flight. In this occurrence, a series of decisions made by the crew contributed to gradually increase the risk to which the flight was exposed until the aircraft was finally placed in a position where it was impossible to re-establish flight safety. Therefore, this analysis will focus on those decisions and how they were able to circumvent the defences in place to reduce the risk related to the operation.

Crew coordination and SOPs are the defence tools most readily available for controlling threats, errors and undesirable conditions. In this occurrence, the crew was confronted with two primary threats. The first was traffic arriving at the uncontrolled airport, almost at the same time, and the second was weather conditions that were below the prescribed minima. The accident was not a result of these threats, but rather the failure of the crew to control the threats effectively and the errors made in managing these threats.

The traffic threat arose when the other aircraft arrived at the airport a few minutes before C-FMAI. Initially, the threat was managed effectively by the exchange of information between the pilots of the two aircraft, in which it was agreed that C-FMAI would fly a holding pattern over the intermediate approach fix for Runway 05. By flying a holding pattern at OMOLI, the flight crew members of C-FMAI believed that they were clear of the other aircraft. However, the crew had not taken into consideration the path or the altitude that the other aircraft would be flying if it executed a missed approach. Even though the CARs require that the pilot-in-command ensure proper separation with other aircraft, the regulations are not explicit as to how the aircraft are to avoid the pattern of traffic, either in terms of altitude or distance. When the aircraft flew the holding pattern to the northeast of OMOLI at a lower altitude than the missed approach altitude for Runway 23, the separation between both aircraft was no longer ensured, thereby increasing the risk of collision. Furthermore, contrary to regulations, the flight crew left the holding pattern to fly an approach opposite to the other aircraft before even confirming that it had landed. This also increased the risk of collision because the two aircraft were flying converging paths in cloud, and neither one could see the other.

Not being aware that the weather had deteriorated, the crew of C-FMAI probably believed that the other aircraft would land without difficulty and there would be no conflict. As for the decision to fly an approach for Runway 05 instead of for Runway 23, its motivation may have been to save time. That decision increased the risk to which the flight was exposed by landing with a tailwind component on a wet runway, in addition to placing it on an opposing path to the other traffic approaching for Runway 23.

Although the flight crew did not know that weather conditions had deteriorated, it could have expected it because the TAF received prior to departure indicated that the ceiling could lower temporarily to 200 feet. The three weather observations preceding the accident were below the prescribed minima, and the other aircraft had to execute a missed approach. Moreover, the radar data indicated an altitude of 1700 feet at the runway threshold. It is therefore more than likely that the flight crew of C-FMAI had to descend below the MDA to establish visual contact with the runway. The crew took few measures to control the threat represented by the weather, primarily because there was no approach briefing, contrary to company SOPs. This error in procedure, which was not detected by either pilot, eliminated an opportunity for the crew to clarify the approach and the roles of each crew member in the event of a missed approach.

The pilot-in-command did not see the runway environment until he was over the threshold at an altitude that reduced considerably the landing distance available for a safe landing. Also, the tailwind component and the wet surface increased the landing roll distance. Although he had decided to execute a missed approach if the aircraft was not on the ground before the taxiway, leaving approximately 1800 feet of runway, the pilot-in-command did not convey his action plan to the co-pilot. The decision to continue the landing led the aircraft to touch down when the remaining runway distance was insufficient for a safe landing.

Realizing the situation they were in, the pilot-in-command decided to execute a missed approach without telling the co-pilot. The co-pilot believed that the landing would be completed but the pilot-in-command intended to take off. Not having received a call from the pilot-in-command indicating his intention to go around and not seeing the hand of the pilot-in-

command on the power levers, the co-pilot believed that the pilot-in-command had pushed forward the wrong levers and took action to stop the aircraft. However, the remaining runway distance was insufficient and the aircraft made a runway excursion.

The pilot-in-command held several management positions within the company and controlled the pilot hiring and dismissal policies. This situation, combined with the level of experience of the co-pilot compared with that of the pilot-in-command, had an impact on crew cohesiveness.

The following laboratory report was completed:

LP 052/2004 – GPS Analysis

Findings as to Causes and Contributing Factors

1. The aircraft was positioned over the runway threshold at an altitude that did not allow a landing at the beginning of the runway, and this, combined with a tailwind component and the wet runway surface, resulted in a runway excursion.
2. Failure to follow standard operating procedures and a lack of crew coordination contributed to confusion on landing, which prevented the crew from aborting the landing and executing a missed approach.
3. The pilot-in-command held several management positions within the company and controlled the pilot hiring and dismissal policies. This situation, combined with the level of experience of the co-pilot compared with that of the pilot-in-command, had an impact on crew cohesiveness.

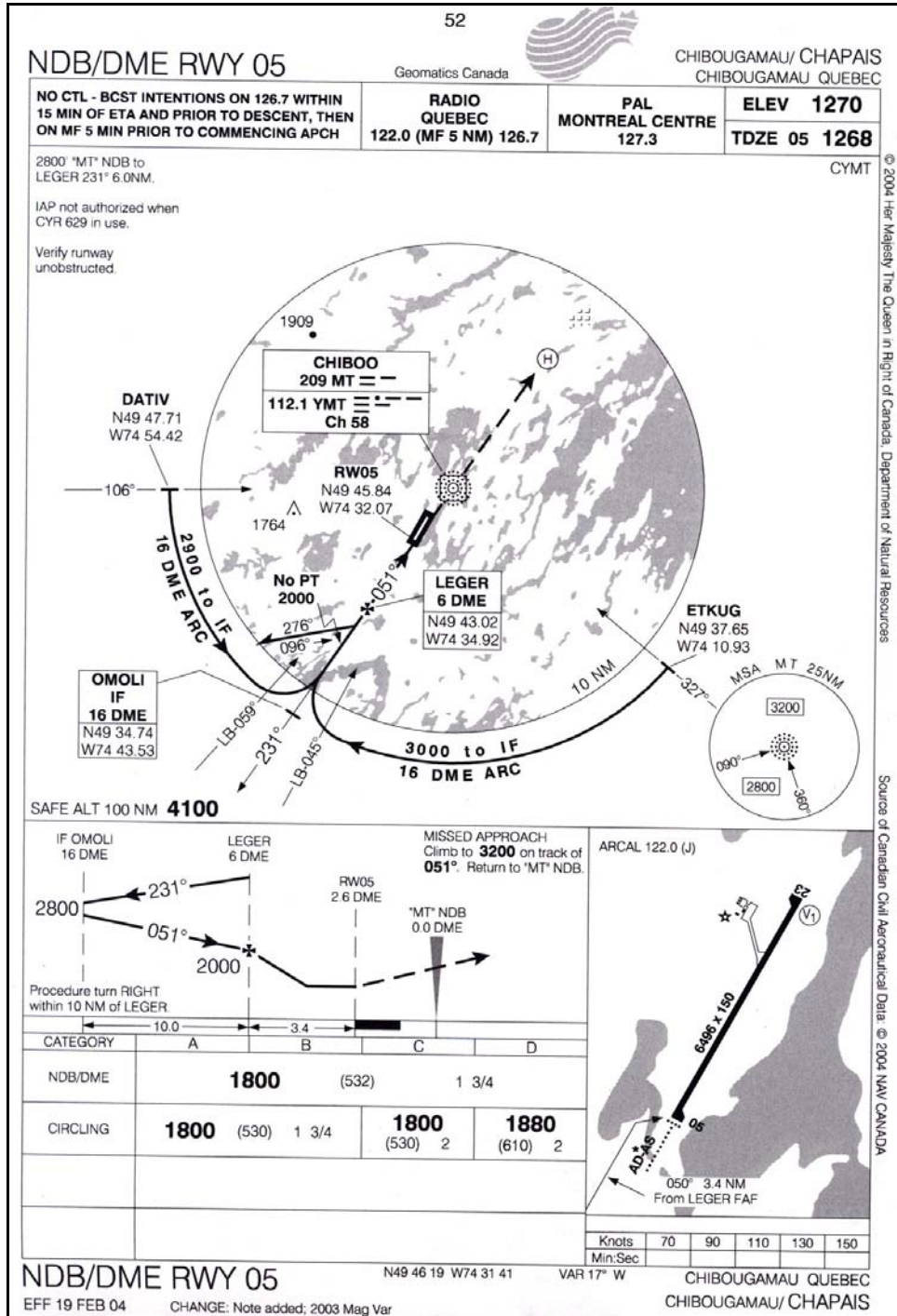
Findings as to Risk

1. The pilot-in-command of C-FMAI decided to execute an approach for Runway 05 without first ensuring that there would be no possible risk of collision with the other aircraft.
2. The regulatory requirement to conform to or avoid the traffic pattern formed by other aircraft is not explicit as to how the traffic pattern should be avoided, in terms of either altitude or distance, which can result in risks of collision.
3. The regulations do not indicate whether the missed approach segment should be considered part of the traffic pattern; this situation can lead pilots operating in uncontrolled airspace to believe that they are avoiding another aircraft executing an instrument approach when in reality a risk of collision exists.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 17 October 2005.

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Appendix A – NDB/DME Approach for Runway 05



Appendix B – NDB/DME Approach for Runway 23

