



Transportation
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Bureau de la sécurité
des transports
du Canada

Air Transportation Safety Investigation Report A19A0012

LOSS OF CONTROL DURING ROLLOUT

Air Canada
Boeing 767-375, C-FTCA
Halifax/Stanfield International Airport, Nova Scotia
04 March 2019

History of the flight

At 1551¹ on 04 March 2019, the Air Canada Boeing 767-375 aircraft (registration C-FTCA, serial number 24307), operating as flight ACA614, departed Toronto/Lester B. Pearson International Airport (CYYZ), Ontario, for an instrument flight rules flight to Halifax/Stanfield International Airport (CYHZ), Nova Scotia, with 2 flight crew members, 6 cabin crew members and 211 passengers on board.

At approximately 1738, the weather at CYHZ was below approach minimums for the runway in use at the estimated time of arrival, so the aircraft entered a holding pattern to wait for the weather conditions to improve as forecast. At approximately 1814, the weather conditions had improved sufficiently to conduct an approach and the Moncton Area Control Centre (ACC) controller provided vectors for an approach to Runway 32, which the crew accepted.

At 1817:03, as the aircraft was proceeding to Runway 32, the Halifax terminal controller² issued the crew the CYHZ aerodrome special meteorological report (SPECI) from 1809, which indicated visibility 1¼ statute miles (SM) in light freezing drizzle and mist; vertical visibility 200 feet above ground level (AGL); temperature and dew point both -1 °C. The controller added the current winds—

¹ All times are Atlantic Standard Time (Coordinated Universal time minus 4 hours).

² The crew switched to the Halifax terminal controller's frequency at approximately 1816. The Halifax terminal controller works at the Moncton ACC, in New Brunswick, and controls aircraft approaching Halifax/Stanfield International Airport.

wind 350° magnetic (M) at 20 knots, gusting to 30 knots, and the altimeter setting of 29.14 inches of mercury. The terminal controller also offered the crew the option of landing on Runway 23, because it had just become available. Runway 23 is longer than Runway 32, and has a precision approach system with lower approach minimums. However, Runway 23 had a crosswind component of 17 knots gusting to 26 knots, and a tailwind of 10 knots gusting to 15 knots. Because of the longer runway and the precision approach, the crew accepted vectors for the category II precision approach to Runway 23. The crew adjusted the aircraft's instruments to the required settings and briefed the Runway 23 approach.

At 1817:36, the Halifax terminal controller relayed the runway surface condition (RSC) report that was issued at 1808³ for Runway 23 to both the occurrence crew and the crew of an Embraer aircraft that was flying ahead of it. Both crews were planning to land on Runway 23. The RSC for Runway 05/23 indicated a 160-foot centreline, 20% compacted snow, 80% bare and wet, remaining width 70% wet snow 1 inch, 30% bare and wet. Based on this RSC, a Canadian Runway Friction Index was not provided, nor was one required.

The Embraer aircraft landed on Runway 23 at 1822. After providing the crew with instructions to exit the runway onto Taxiway A at the end of the runway, the Halifax tower controller⁴ asked the crew for comments on the approach. The crew replied, "we had the field⁵ at 300 feet; braking action was very poor, actually". Once the aircraft was off the runway, the crew switched to the Halifax ground controller's frequency and reported that the runway was "very, very icy; it's basically a skating rink".

At 1824:22, the Halifax tower controller relayed the braking action report to the crew of a DHC-8 aircraft that was on approach for Runway 32, stating that the Embraer crew reported, "lights in sight at 300 [feet] AGL on that approach, and braking action was poor on Runway 23."

At 1824:50, the Halifax tower controller called the Halifax Terminal controller to say that, "[the pilot of the Embraer aircraft] says the runway is a skating rink. He barely got stopped by the end of the runway and turned on [Taxiway] A". After the Halifax terminal controller asked for more information on the conditions, the Halifax tower controller replied, "lights in sight at 300 feet above the ground."

At 1825:15, the Halifax terminal controller contacted the occurrence flight crew to provide the Embraer's pilot weather report (PIREP), stating, "we had [the Embraer] roll out on 23, and he said it was very slippery. He barely got stopped towards the end of it. As far as visibility he saw things at 300 feet above the ground." The crew responded, "thanks for the heads up."

At 1826:00, the DHC-8 aircraft landed on Runway 32.

At 1826:54, the crew of the occurrence aircraft switched to the Halifax tower controller's frequency, and was provided information for the planned landing on Runway 23. The Halifax tower controller asked the crew if it had received the comments from the Embraer that had just landed, and the crew responded in the affirmative.

At 1827, the DHC-8's crew was asked for comments on the approach. The crew reported, in part, that braking was good for them but they could see how it was slippery.

³ Due to the delay in processing, the RSC report was published with a time stamp of 1809.

⁴ The Halifax tower controller works out of the Halifax/Stanfield International Airport location and controls aircraft landing and departing from that location.

⁵ When pilots report that they "have the field", it means the point at which they are first able to see the runway environment (e.g., the runway lights).

At 1828, the occurrence flight was cleared to land on Runway 23. As part of the clearance, the Halifax tower controller informed the crew that the wind was 350°M at 24 knots, gusting to 31 knots, and instructed it to exit onto Taxiway A, at the end of the runway.

The aircraft landed within the first third of the runway at an airspeed of about 140 knots. After touchdown, the crew used full reverse and auto-braking on the first portion of the runway as they had understood from communications with air traffic control that it was the end portion of the runway that was slippery. As the aircraft slowed and the crew reduced reverse thrust, the braking action was noted to become nil. When the aircraft slowed through about 15 knots, the aircraft began to slide. The captain attempted asymmetrical reverse thrust to correct weathervaning⁶ due to a loss of steering authority. The crosswind pushed the aircraft sideways, causing the nose wheel to roll into the snow off the right edge of the runway. This caused the forward motion of the aircraft to be translated into a slow sideways drift and clockwise rotation on the icy runway. Pushed by the crosswind, the aircraft rotated 180°, coming to rest facing the opposite direction, with all the wheels on the paved portion of the runway. At 1831, the crew called the Halifax tower controller to report that the aircraft was stopped on the runway, facing the wrong way (figures 1 and 2). The crew also asked the controller to not allow any aircraft to land on the runway.

At 1835, the Halifax tower controller informed the crew that Runway 23 was closed.

No injuries were reported. There was no damage to the aircraft. The passengers were shuttled to the terminal on airport park and ride buses, and the aircraft was towed to the gate after release by the TSB.

At approximately 1838, an Airbus 320 aircraft landed on Runway 32, but was unable to taxi off the runway because of the ice that covered the runway and taxiway. The aircraft remained stopped on the runway until sand and chemicals were applied. Runway 32 was closed until 2027. Runway 23 was reopened once the aircraft was towed off the runway.

⁶ "Weathervaning" is the tendency of an aircraft to turn into the relative wind (Source: U.S. Department of Transportation, Federal Aviation Administration, *Airplane Flying Handbook*, FAA-H-8083-38 [2016], p. G-20).

Figure 1. Airport diagram with arrow depicting direction of landing, with inset image showing orientation of the aircraft when it came to rest (Source: Google Earth, with TSB annotations)

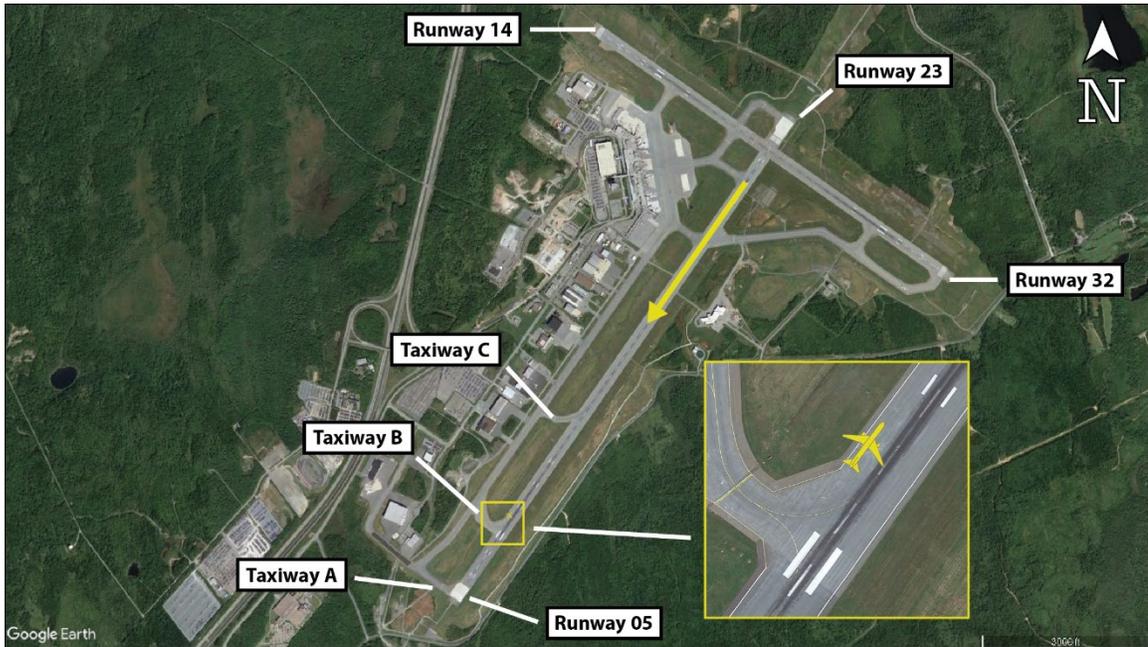


Figure 2. Occurrence aircraft after coming to a stop (Source: TSB)



Weather information

An aerodrome forecast (TAF) for CYHZ was issued at 1432 on 04 March 2019 and was valid for 24 hours, starting at 1400. The TAF indicated that from 1600, the winds would be 360° true (T) at 15 knots; visibility would be 1½ SM in light drizzle and mist; and the ceiling would be overcast at 400 feet AGL. The TAF also included a temporary condition from 1600 to 1900 of visibility 3 SM in light rain and mist, with an overcast ceiling at 800 feet AGL.

The actual weather at CYHZ at 1800, as reported in the aerodrome routine meteorological report (METAR), was as follows: winds 320° T at 19 knots; visibility ¼ SM with a runway visual range (RVR) on Runway 23 of 3500 feet in light drizzle and fog; vertical visibility 100 feet AGL; and temperature and dew point both 0 °C.

At 1809, a SPECI was issued for CYHZ indicating wind 320° T at 24 knots, gusting to 29 knots; visibility 1¼ SM with an RVR on Runway 23 of 3000 feet, variable to more than 6000 feet in light freezing drizzle and mist; overcast ceiling at 200 feet AGL; and temperature and dew point –1 °C.

At 1829, a SPECI was issued indicating wind 330° T at 24 knots, gusting to 31 knots; visibility 2 SM in light freezing drizzle and mist; overcast ceiling at 400 feet AGL; and temperature and dew point both –2 °C.

At 1834, a SPECI was issued indicating wind 320° T at 22 knots, gusting to 31 knots; visibility 2 SM in light freezing drizzle and mist; overcast ceiling at 200 feet AGL; and temperature and dew point both –3 °C.

Approach and landing planning

Once the weather had improved sufficiently to conduct an approach at CYHZ, the crew involved in the occurrence would have experienced a higher workload during the approach and landing phases of the flight. The crew had just exited a holding pattern, and was expecting to land on Runway 32; however, the landing runway changed to Runway 23. This change required an adjustment to the instrument settings and a new approach briefing.

Braking action phraseology

Standard phraseology for braking action is “good,” “medium,” “poor,” or “nil.”⁷ The Embraer crew reported a braking action of “very poor” to the Halifax tower controller immediately after landing. While taxiing, the crew used plain language to describe the condition of the runway in its communication with the Halifax ground controller.

This plain language description was relayed between the Halifax tower and Halifax terminal controllers, and consequently passed on to the crew involved in the occurrence. Even though NAV CANADA permits the use of plain language without altering the sense of the message in any way,⁸ the words “very poor” were not relayed to the crew.

Before landing, the crew involved in the occurrence had been informed that the runway was very slippery, and that an aircraft that had just landed was barely able to stop by the end of the runway. Therefore, the crew prepared to apply aggressive deceleration early in the landing roll, by using reverse thrust and autobraking, to minimize exposure to the end portion of the runway, which they understood to be very slippery. The aircraft lost deceleration as it passed Taxiway C. As the aircraft was nearing Taxiway B, it was blown sideways on the icy runway, and control of the aircraft was lost.

Halifax airport ground maintenance crew

The airfield maintenance crew at CYHZ is managed by an airfield maintenance supervisor (AMS), who coordinates the removal of contaminants and other crew activities. Airfield maintenance staff work 12-hour shifts. The first shift is scheduled from 0630 to 1830 and the second shift is from 1830 to 0630. Approaching the end of each shift, there is a period of time when the departing crew is

⁷ Transport Canada, Civil Aviation Safety Alert (CASA) No. 2018-08: *Operations with Aeroplanes Utilizing TALPA-Based Performance Information to Calculate Landing Distance*, Issue 01 (effective 29 September 2018), available at <http://www.tc.gc.ca/eng/civilaviation/opssvs/managementservices-referencecentre-2306.html> (last accessed 17 June 2019).

⁸ NAV CANADA, *Manual of Air Traffic Services – Tower – Appendix: Communication* (26 June 2018).

preparing the equipment for use by the next crew. During this changeover period, the airfield may be unattended for up to 30 minutes.

On 04 March 2019, it snowed in the morning; the snow changed to freezing rain, which changed into rain in the afternoon, and the temperature was expected to drop below freezing in the evening. A second airfield maintenance crew was called in to assist, given the challenging weather. By the early afternoon, the crews had established a 120-foot centreline with a 70% bare and damp condition on Runway 32 and had begun working on Runway 23.

Runway 23 was closed by NOTAM⁹ until approximately 1900 for snow removal. Snow removal activities were done in anticipation that weather conditions forecast for later that day would favour Runway 23 for landing. The AMS issued an RSC report at 1730 that included an indication of windrows of snow on either side of the runway.

The airport duty manager (ADM) reviewed the RSC report and communicated to the AMS that the windrows of snow would have to be removed before the runway could be reopened to aircraft. The airfield maintenance crew continued the snow-clearing operation, and at approximately 1807 the windrows had been cleared from Runway 23. The AMS issued another RSC report at 1808, removing the windrows comment, and increasing the available runway width from 140 feet to 160 feet. The runway was then opened for use. No other runway inspection was performed on Runway 23 before issuing the RSC report at 1808.

At about the same time, the entire airfield maintenance crew that had been working the day shift was returning to the maintenance building to prepare the vehicles for the night shift.

Runway weather information system

CYHZ is equipped with a runway weather information system. The system in use at the time of the occurrence consisted of 6 sensors—3 in each runway—imbedded in the runway centreline. These sensors would relay atmospheric conditions in real time to computer screens in the AMS office in the airside services building. This information is also displayed on screens in the ADM's office. The information was also available on the AMS's portable electronic device; however, the device needed to be manually refreshed for the AMS to obtain the most current conditions.

At 1807, the runway weather information system's status changed from "Wet" to "Ice Warning". A status of "Wet" means there is a "[c]ontinuous film of moisture on the pavement sensor with temperature above freezing (32°F or 0°C)."¹⁰ A status of "Ice Warning" means there is a "[c]ontinuous film of ice and water mixture at or below freezing (32°F / 0°C) with insufficient chemical to keep the mixture from freezing."¹¹

During this time, the ADM was not available to monitor the conditions, and the AMS was returning from the airfield, issuing the 1808 RSC, and preparing for shift change. As a result, the change in the system status that occurred at 1807 went unnoticed.

⁹ A NOTAM (notice to airmen) is an alert filed with an aviation authority to alert pilots to potential hazards.

¹⁰ Montana Department of Transportation RWIS, "SCAN Glossary," available from <http://rwis.mdt.mt.gov/scanweb/> (last accessed 25 September 2019).

¹¹ Ibid.

Safety actions taken

The Halifax International Airport Authority has implemented a mandatory briefing checklist effective for the next winter season to ensure that the outgoing AMS properly briefs the incoming AMS during shift changeovers in inclement weather.

A default weather forecast and observation website has been selected and made available to the field supervisors via a cellular-enabled tablet mounted in the AMS's vehicle to ensure all supervisors are using a common weather provider.

A next-generation runway weather information system was installed in July 2019, which doubles the number of sensors on the field. As well, the system is designed to automatically refresh on the AMS's portable electronic device.

Air Canada is installing upgrades to its runway condition reporting system, which include options to ensure automatic updates of runway condition.

Starting in the fall of 2019, the Moncton ACC and the Halifax tower will conduct annual winter operation briefings to refresh controllers on winter airport operations.

Safety messages

To ensure the accuracy of RSC reports, it is important that a comprehensive runway inspection be performed before a report is issued, especially in times of changing weather.

Monitoring the airfield at all times is important, particularly during rapidly changing weather, when runway surface conditions can deteriorate quickly.

The use of standard phraseology between pilots and air traffic controllers may help reduce the likelihood of misunderstanding the degree to which a runway may be contaminated.

This report concludes the Transportation Safety Board of Canada's investigation into this occurrence. The Board authorized the release of this report on 02 October 2019. It was officially released on 09 October 2019.

Visit the Transportation Safety Board of Canada's website (www.tsb.gc.ca) for information about the TSB and its products and services. You will also find the Watchlist, which identifies the key safety issues that need to be addressed to make Canada's transportation system even safer. In each case, the TSB has found that actions taken to date are inadequate, and that industry and regulators need to take additional concrete measures to eliminate the risks.

ABOUT THIS INVESTIGATION REPORT

This report is the result of an investigation into a class 4 occurrence. For more information, see the Occurrence Classification Policy at www.tsb.gc.ca

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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