

Missed Assessment

Tired pilots neglected to perform a required review before landing.

BY MARK LACAGNINA

A landing distance assessment based on the rapidly deteriorating weather and runway conditions at Cherry Capital Airport in Traverse City, Michigan, U.S., would have shown the Pinnacle Airlines flight crew that diversion to an alternate airport was necessary. But the crew neglected to perform the assessment and pressed ahead.

No one was hurt in the resulting runway overrun shortly after midnight on April 12, 2007, but the airplane, a Bombardier CRJ200LR, was substantially damaged.

In its final report, the U.S. National Transportation Safety Board (NTSB) said that the

probable cause of the accident was “the pilots’ decision to land ... without performing a landing distance assessment, which was required by company policy.” The report said that the omission “likely reflected the effects of fatigue produced by a long, demanding duty day.”

The pilots were flying their fifth, and final, leg on the first day of a scheduled four-day trip. The captain, 27, was a flight instructor and contract pilot before being hired by Pinnacle in May 2001. He was upgraded to captain in April 2004 and to line check airman in August 2006. He had 5,600 flight hours, including 4,200 hours in CRJs, with 2,500 hours as captain.



“Company pilots who had flown with the captain described him as professional, knowledgeable, approachable and polite,” the report said. “The accident first officer described the captain as a good pilot with strong teaching abilities and a willingness to help.”

The captain normally commuted from his home near Pensacola, Florida, to the airline’s base in Memphis, Tennessee. “When he was home, his sleep could be interrupted because he tried to provide relief for his wife during the night by responding when his [six-month-old] son awakened,” the report said.

The first officer was gaining initial operating experience under the captain’s supervision. The captain had tried to find another check airman to do this because he and the first officer were friends. “However, no other check airman was available,” the report said. “The captain stated that he attempted to perform the [supervision] with the same strictness he would for any other candidate.”

The first officer, 28, was a flight instructor and charter pilot before being hired by Pinnacle in January 2007. He completed ground training and a proficiency check in March. He had 2,600 flight hours, including 22 hours in CRJs.

“The first officer was described favorably by two company simulator instructors as a pleasant person and dedicated student with flying skills commensurate with his flight time,” the report said. “The accident captain described the first officer as progressing normally toward [initial operating experience] approval, with above-average airplane-handling skills but below-average skills on airplane systems and company procedures.”

Long Day

Both pilots were in Minneapolis the night before the accident. The captain awoke at 0700 local time, and the first officer awoke at 0630. They reported for duty at 0900 and performed round-trip flights to Cleveland and to Des Moines, Iowa. Both pilots had lunch between the round-trip flights, but neither had dinner before the flight to Traverse City.

The CRJ, operated as Flight 4712, was scheduled to depart from Minneapolis at 2030. “However, when the pilots arrived at the gate for the accident flight, the gate agent advised them that the flight-release paperwork was not available and that the flight might be canceled,” the report said.

Heavy snow, with accumulations of 6 to 8 in (15 to 20 cm), and strong winds were forecast for the northern Great Lakes region. The forecast for Traverse City included winds from 080 degrees at 19 kt, gusting to 30 kt, 2 mi (3,200 m) visibility in blowing snow and an overcast ceiling at 2,500 ft, with temporary conditions of 3/4 mi (1,200 m) visibility and a 500-ft overcast.

The forecast visibility apparently necessitated planning for a landing on Runway 28, the only runway at Traverse City served by an instrument landing system (ILS). About eight minutes before the scheduled departure time, a dispatcher told the captain that the flight could not be dispatched because the tailwind component would exceed the CRJ’s 10-kt limitation.

Poor visibility in blowing snow and radio frequency congestion delayed rescuers from finding the accident site.



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“However, about 22 minutes later, the dispatcher advised the captain that the flight could be dispatched because a new forecast predicted a smaller tailwind component,” the report said. The new forecast called for winds from 050 degrees at 10 kt, gusting to 18 kt, 4 mi (6.4 km) visibility in light, blowing snow and a 2,500-ft overcast, with temporary conditions of 1 mi (1,600 m) visibility and a 1,000-ft overcast.

The CRJ departed from Minneapolis at 2153 with 49 passengers and three crewmembers. The captain was the pilot flying. The departure and en route phases of the flight were routine, but several statements recorded by the cockpit voice recorder (CVR) indicated that the pilots were tired. For example, the captain said, “Aw, I’m tired, dude, just [expletive] worn out.” Likewise, the first officer said, “Jeez, I’m tired.”

“The captain told investigators that when they were en route to [Traverse City], he realized that it had been a long day and that he was more tired than he had realized before the flight departed,” the report said. “The first officer stated that he was a little tired during the accident flight but felt OK.”

Snow Squall

The CRJ was on initial descent when a Minneapolis Center controller told the crew that his radar display was showing returns consistent with a snow squall at Traverse City. The airport traffic control tower had closed at 2200. The automated surface observing system (ASOS) broadcast at 0010 advised that surface winds at the airport were from 040 degrees at 7 kt and visibility was 1 1/2 mi (2,400 m) in light snow. This was the last ASOS broadcast that the crew listened to.

After confirming that the crew had the current weather conditions at the airport, the controller issued radar vectors for the ILS approach to Runway 28, which is 6,501 ft (1,982 m) long and 150 ft (46 m) wide, and has a 1,000-ft (305-m) runway end safety area.

Weather conditions began to deteriorate rapidly as the CRJ neared the airport. At 0025, the ASOS recorded 1/2 mi (800 m) visibility in moderate snow and 400 ft vertical visibility. Although the crew did not obtain this information, “ground

operations personnel provided the pilots with updated weather and runway surface condition information on several occasions as the airplane neared the airport,” the report said.

The airport operations supervisor told the pilots that there were “multiple pieces of [snow-removal] equipment on Runway 28” and that the measured friction coefficient on Runway 28 was “40 plus” with thin, wet snow over patchy, thin ice. Runway friction coefficient — or Mu — values range from 0 to 100, with values of 40 and less indicating reduced aircraft wheel-braking performance and directional control.

At 0032, the airport operations supervisor said that all the snow-removal equipment was off the runway but that snow was “coming down

Snow was piling up rapidly on Runway 28, the threshold of which is at the top of the photo, and braking action was reported as nil.

Bombardier CRJ200LR



The first in Bombardier’s line of Canadair Regional Jets, the CRJ100 began service in 1992 and shares the engineering designation CL600-2B19 with the Challenger business jet, on which its design was based. Increases in maximum takeoff weights and fuel capacities resulted in the extended-range (ER) and long-range (LR) versions.

The CRJ200 versions were introduced in 2002 with the same airframe, accommodating 50 passenger seats, and with upgraded General Electric CF34-3B1 engines, flat-rated at 9,220 lb (41 kN) thrust.

The accident airplane, shown above, is a CRJ200LR. Maximum weights are 53,000 lb (24,041 kg) for takeoff and 47,000 lb (21,319 kg) for landing. Normal cruise speed is 0.74 Mach, and maximum range is 1,700 nm (3,148 km).

Source: *Jane’s All the World’s Aircraft*



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pretty good.” The captain told the first officer that this comment likely meant that “we probably won’t see the runway, so be ready for the missed [approach].”

The airport snow plan required runways to be cleared when snow accumulated more than 1/2 in. At 0036, the airport operations supervisor radioed, “I need to know if [you] guys are going to be landing soon, because ... this is filling in pretty quick down here.” The captain replied that they were intercepting the final approach course inbound and would be landing in about five minutes.

‘Braking Action Nil’

At 0038, the airport operations supervisor said, “I’m going to call braking action nil now, because it’s filling in real hard.” He told investigators that this braking action report was based on tests he had performed with a ground vehicle on Runway 28.

However, the report said that the pilots, who were monitoring both the airport operations radio frequency and

the center frequency, did not hear the braking action report because the airport operations supervisor’s transmission was partially blocked by a heading change issued by the controller.

According to ASOS information recorded at 0040, visibility had decreased to 1/4 mi (400 m) in heavy snow. About this time, the captain announced on the common traffic advisory frequency that they were inbound from the final approach fix and told the airport operations supervisor that they were two minutes from landing.

The airport operations supervisor replied, “We’re all clear of the runway for you, and, again, braking action is probably nil on the runway.”

Pinnacle prohibited its pilots from landing after receiving a nil braking action report, but the term “probably nil” was not definitive and was not standard phraseology for reporting braking action, the report said.

The captain requested clarification: “Are you saying it’s nil?”

The airport operations supervisor’s reply was more ambiguous than his “probably nil” report: “Haven’t been out there to do a field report, and it’s been five, 10 minutes, so I don’t know what it’s doing now.”

The captain replied, “OK,” and then told the first officer, “He’s not reporting it nil, he’s like saying it’s nil.”

The captain then asked the airport operations supervisor for an estimate of the depth of the runway contamination. “I’d say it’s probably close to half an inch now,” he replied. The captain said, “OK, that’s not bad, thank you,” and then told the first officer, “We’re allowed three inches. If it looks ugly when we’re coming in, I’ll go around. ... Half an inch is nothing.” Nevertheless, the captain continued to discuss missed approach details with the first officer and said that a diversion to Detroit might be necessary.

The CRJ was nearing decision height at 0042 when the captain told the first officer that he had the runway in sight. Flight data recorder (FDR)

data indicated that the airplane crossed the runway threshold at 148 kt — 6 kt above the calculated landing reference speed — and touched down at 123 kt, with a 3-kt tailwind component, about 2,400 ft (732 m) from the threshold.

“The FDR data showed that the brakes were applied and the spoilers deployed immediately after the airplane touched down, and that the thrust reversers were fully deployed within four seconds after touchdown,” the report said.

However, the slippery runway and the crosswind contributed to directional-control difficulties when reverse thrust was selected, and the crew deployed and stowed the thrust reversers twice before the CRJ overran the runway at 45 kt. The nosegear separated, and the airplane came to a stop about 100 ft [30 m] beyond the end of the runway.

“The pilots promptly evaluated the condition of the airplane,” the report said. “The captain examined the cabin and checked for passenger/flight attendant injuries while the first officer inspected the outside of the airplane.” Based on their observations, the captain decided to keep the passengers aboard the airplane until vehicles arrived to transport them to the terminal.

‘Four Times Worse’

A performance study indicated that the CRJ’s braking ability on the contaminated runway was “more than four times worse than that of a normal dry runway [and that the airplane] would have required an additional 1,146 ft [349 m] of unobstructed runway to stop,” the report said. A runway friction coefficient of 17 was measured soon after the accident.¹

Four months earlier, Pinnacle had implemented an operations specification requiring flight crews to conduct a landing distance assessment “as close as practicable to the time of arrival consistent

with the ability to obtain the most current meteorological and runway conditions considering pilot workload and traffic surveillance but no later than the commencement of the approach procedure or visual approach pattern.” It also required that the calculated landing distance “be increased by at least an additional 15 percent for all runway conditions.”

The report said that the operations specification was consistent with a safety alert for operators (SAFO 06012) published by the U.S. Federal Aviation Administration (FAA) in response to an NTSB recommendation generated by the investigation of the Southwest Airlines Boeing 737 overrun in Chicago in December 2005 (*ASW*, 2/08, p. 28).

“The pilots had adequate information available to indicate that the runway was contaminated and that a landing distance assessment was required,” the report said.

The captain told investigators that he had reviewed Pinnacle’s landing distance assessment procedures with the first officer during a previous flight but did not perform an assessment before landing at Traverse City. “He stated that he had landed on snowy runways many times and that he believed the runway conditions were OK based on the contamination depth,” the report said. “The captain estimated that ... the airplane could be stopped using about 3,500 to 4,500 ft [1,067 to 1,372 m] of the available 6,501-ft-long runway.”

Nevertheless, the contaminated-runway landing distance charts in the CRJ flight manual showed that the available runway length was inadequate using prescribed landing technique, including touchdown within 1,500 ft (457 ft) of the threshold and proper use of reverse thrust and wheel brakes.

“This accident reinforces the need for pilots to perform landing distance assessments before every landing,” the

report said. “The assessment is critical when runway conditions may have changed over the length of the flight, as was the case at [Traverse City].”

In its discussion of the role likely played by fatigue in the CRJ pilots neglecting to perform a landing distance assessment, the report said, “The accident occurred well after midnight at the end of a demanding day during which the pilots had flown 8.35 hours, made five landings, been on duty more than 14 hours, and had been awake more than 16 hours.” An additional fatigue-inducing factor for the captain was significantly increased workload because of his responsibilities as a check airman.

“Existing FAA pilot flight and duty time regulations permitted the long and demanding day experienced by the accident pilots,” the report said.

Among the actions taken by Pinnacle after the accident were to increase pilot training on landing distance assessments and to revise guidance regarding go-arounds. The airline previously had recommended a go-around if a touchdown could not be made within 3,000 ft (914 m) of the runway threshold or the first third of the runway. This was revised to recommend a go-around if a touchdown cannot be made within 1,500 ft of the threshold. ➔

This article is based on NTSB Accident Report NTSB/AAR-08/02: *Runway Overrun During Landing; Pinnacle Airlines Flight 4712; Bombardier/Canadair Regional Jet CL600-2B19, N8905F; Traverse City, Michigan; April 12, 2007.*

Note

1. After the accident, the Traverse City airport operator revised its snow plan to require that runways be closed to air carrier operations when friction coefficient values of 27 or less are measured, or when nil braking action is reported by pilots or ground operations personnel.