



## AIR LINE PILOTS ASSOCIATION, INTERNATIONAL

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December 2, 2008

Mr. William English  
Investigator in Charge  
National Transportation Safety Board  
490 L'Enfant Plaza, SW  
Washington, DC 20594

Reference: Air Wisconsin Flight 758A, **DCA08FA018**

Dear Mr. English:

In accordance with the Board's rules, the Air Line Pilots Association, International (ALPA) submits the attached comments and conclusions concerning the hard landing and subsequent left main landing gear collapse by a CRJ-200 operating as Air Wisconsin Flight 758A. This accident occurred on December 16, 2007, during landing at Theodore Francis Green State Airport in Providence, RI.

The attached submission contains ALPA's analysis of the facts surrounding the accident based upon the information obtained from the NTSB's investigation. ALPA's Safety Recommendations are included and are based upon these facts. Other safety concerns were also identified during this investigation and are discussed in the attached report.

ALPA appreciates the opportunity to have participated as a party to the investigation, and hopes that the attached conclusions and safety recommendations will be of assistance as the NTSB concludes its investigation.

Sincerely,

Captain Molly Boss  
ALPA Coordinator



SUBMISSION OF THE  
AIR LINE PILOTS ASSOCIATION  
TO THE  
NATIONAL TRANSPORTATION SAFETY BOARD  
REGARDING THE ACCIDENT INVOLVING  
AIR WISCONSIN FLIGHT 758A

Providence, RI

December 16, 2007

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## **I. SUMMARY**

On December 16, 2007, at 1645 EST<sup>1</sup>, a Bombardier CRJ-200 (CL600-2B19), registration N470ZW, serial number 7927, operated by Air Wisconsin Airlines as Flight 758A, departed runway 5 after a hard landing at the Theodore Francis Green State Airport, Providence, RI (PVD). An orderly deplanement was accomplished upon the arrival of ARFF<sup>2</sup>. Buses were used to transport the passengers to the terminal. None of the 3 crewmembers and 31 passengers were injured. However, the aircraft sustained substantial damage.

Analysis by the Air Line Pilots Association, International (ALPA) revealed that there were crew actions, corporate culture issues, and problems with FAA oversight, all of which were significant factors in this accident. The crew were both described during the Operations Interviews as above average, so the focus of our analysis becomes not “who,” but “why.” Why did this crew perform the way they did, what influenced their performance, and was fatigue a contributing factor? More importantly, what can be done to mitigate these influences to avoid another similar event?

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<sup>1</sup> Eastern Standard Time

<sup>2</sup> Aircraft Rescue and Fire Fighting

## II. HISTORY OF FLIGHT

Air Wisconsin Flight 758A departed Philadelphia International Airport (PHL) at 1553 EST. The FO<sup>3</sup>, who had recently become employed by Air Wisconsin Airlines and had just completed his IOE<sup>4</sup> in the CRJ-200, was the PF<sup>5</sup>. The accident flight was the fourth leg for the crew that day; the Captain flew the first two flights and the FO flew the remaining two. The Captain had observed the FO fly the previous flight from Richmond (RIC) to PHL and had expressed no concerns with the FO flying the flight from PHL to PVD.

The crew departed PHL uneventfully from runway 27L. Due to the short distance of the flight coupled with an approximately 100 knot tailwind, the flight was fast paced and very busy. The crew flew the flight at a cruise altitude of FL210 and was limited to 300 KIAS<sup>6</sup> due to an MEL<sup>7</sup> restriction for the APU<sup>8</sup> intake door being secured open. ATC<sup>9</sup> gave the crew two re-routes, which also reduced the flight time.

According to the crew in their post-accident interviews, they felt rushed during the descent, but by using the flight spoilers the FO was able to descend to 2000 feet MSL<sup>10</sup> and slow below the maximum flap extension speed of 215 KIAS to extend the flaps to 20 degrees. The flight was cleared for the ILS<sup>11</sup> runway 5 approach at PVD. The aircraft was stabilized on the approach path until approximately 2 miles from the threshold. At 700 feet MSL, the FO disconnected the autopilot, followed shortly by disengaging the FD<sup>12</sup>. As required by company policy, the FO announced that he was turning off the autopilot. However, he did not verbalize that he had turned off the FD (which was not a required call-out).

The aircraft drifted left of the approach course and became high on the glideslope. At approximately 300 feet MSL, the flight crew saw the approach lights at about the 2 o'clock position. With the aircraft left of course and high, the Captain took the controls from the FO and manually maneuvered the aircraft in an attempt to get back on course. After the Captain assumed control of the aircraft, the FO said in his post-accident interview that he thought he heard the Captain say cut the power, but no such comment is evident on the CVR<sup>13</sup> transcript. At approximately 100 feet MSL, DFDR<sup>14</sup> data indicates that the aircraft was in a 22 degree banked right turn, at 133 KIAS, and descending at 2000 feet per minute.

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<sup>3</sup> First Officer

<sup>4</sup> Initial Operating Experience

<sup>5</sup> Pilot Flying

<sup>6</sup> Knots Indicated Air Speed

<sup>7</sup> Minimum Equipment List

<sup>8</sup> Auxiliary Power Unit

<sup>9</sup> Air Traffic Control

<sup>10</sup> Mean Sea Level

<sup>11</sup> Instrument Landing System

<sup>12</sup> Flight Director

<sup>13</sup> Cockpit Voice Recorder

<sup>14</sup> Digital Flight Data Recorder

In the last 3.5 seconds prior to touchdown, while the pitch attitude of the aircraft increased from 7 degrees nose down to 4.5 degrees nose up, the airspeed began to decay. Just prior to touchdown the crew received an EGPWS<sup>15</sup> aural warning “Sink Rate, Whoop Whoop, Pull-Up” along with stick shaker activation. Also before touchdown the Captain realized that they were slow and advanced the thrust levers, but with the thrust levers already at idle the engines did not respond until after touchdown. The aircraft touched down 1000 to 1200 feet from the threshold in an 8 degree left bank. The left main landing gear collapsed and the aircraft exited the left side of the runway coming to rest 3700 feet from the threshold on a magnetic heading of approximately 320 degrees.

Once the aircraft came to a stop, the Captain used the PA<sup>16</sup> system to ask the passengers to remain seated while the FO requested ATC to “roll the trucks”. Following the PA, the Captain called the Flight Attendant via the interphone to ascertain if there were any injuries or fire, and there were neither. Once ARFF and the buses arrived the passengers exited the aircraft via the main cabin door.

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<sup>15</sup> Enhanced Ground Proximity Warning System

<sup>16</sup> Public Address

### **III. ANALYSIS OF FLIGHT CREW ACTIONS**

To fully understand the flight crew actions and decisions, we must look at the knowledge and information they possessed within the environment in which they were operating. This information shaped their decision-making process.

#### **The Captain**

The Captain had been a pilot for Air Wisconsin Airlines for over 4 years and had been a captain on the CRJ-200 for 2 years. He had acquired 5500 hours of total flight time, 2300 hours in the CRJ-200, and 1000 hours as a PIC on the CRJ-200. The night before the accident the Captain said that he got 6 hours of sleep and felt fully rested. The day of the accident the Captain reported for work at 0840 for the first day of a 2-day trip which was scheduled for 6 legs.

#### **The First Officer**

The FO had been a pilot for Air Wisconsin Airlines for just under 5 months and had no previous jet experience. He had acquired 2000 hours of total time; 600 hours were in multi-engine aircraft, with only 150 hours of jet time, all of which was in the CRJ-200. The night before the accident the FO said that he got 8 hours of sleep and felt rested. The day of the accident the FO reported for work at 0840 for the first day of a 2-day trip which was scheduled for 6 legs.

#### **Previous Flights**

The accident crew flew 4 of their 6 scheduled legs, Norfolk (ORF)-PHL-RIC-PHL-PVD, all of which were in IMC<sup>17</sup> and required instrument approaches. The Captain flew the first two legs, while the FO flew the next two. The Captain observed the FO fly an ILS approach into PHL with the weather almost at minimums.

#### **Accident Flight**

The FO flew the accident flight from PHL-PVD, which was scheduled for 33 minutes of flying from takeoff to touchdown. The flight was immediately in IMC conditions after departure from PHL and they had a very strong tailwind for the entire flight. The crew said that they felt rushed due to the short duration of the flight and the Captain said that “he felt a little decline in his performance...” To add to the brevity of the flight, ATC gave the flight crew two re-routes, one direct to the Hampton VOR and the second direct to the KENTE intersection, which shortened the distance of their flight. The Captain obtained the ATIS<sup>18</sup> from the ACARS<sup>19</sup> but did not write it down. In addition, the FO did an abbreviated approach brief while a full briefing was required per SOP<sup>20</sup>.

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<sup>17</sup> Instrument Meteorological Conditions

<sup>18</sup> Automatic Terminal Information System

<sup>19</sup> Aircraft Communications Addressing and Reporting System

<sup>20</sup> Standard Operating Procedures

Once cleared by ATC for the instrument approach, the FO configured the aircraft appropriately and the autopilot captured and tracked the approach path. At 700 feet MSL, the FO disengaged the autopilot and said, “autopilot’s comin’ off” while the Air Wisconsin SOP requires an “autopilot off” callout just prior to autopilot disengagement. Next the FO turned off the FD, which as he stated in his Operations Group interview was in order to “declutter” the PFD<sup>21</sup>. Prior to the accident Air Wisconsin Airline’s FOM<sup>22</sup> did not require the use of the FD, but subsequent to the accident the FOM has been amended to require the use of the FD and autopilot, if available, when flying approaches with weather below a 1,000’ ceiling or 3 miles visibility.

The aircraft began to drift left of the localizer course and began to go above the glideslope. The Captain did not make any deviation call-outs as required, nor did the crew execute a go-around when the approach deteriorated beyond stabilized approach parameters. Once the flight crew visually acquired the airport environment the Captain took control of the aircraft. The FO thought he heard the Captain say cut the power, so the FO reduced the thrust levers to flight idle and the Captain did not realize the thrust lever position until just prior to touchdown. The Captain maneuvered the aircraft, exceeding several stabilized approach criteria metrics, in an attempt to get the aircraft back on the approach path. Just before touchdown, the Captain realized the aircraft was getting slow and advanced the thrust levers, but the aircraft touched down before the engines were able to spool-up.

## **Analysis**

Pilots, like all professionals, want to perform at the highest standard possible. However, when internal and external factors influence the pilot’s decision-making process, this degradation in human performance must be identified. Although both crew members indicated they began the day feeling rested, in this accident the flight crew’s decision-making ability was degraded possibly by fatigue and it was not until after the aircraft stopped that the Captain stated “my bad man I shoulda gone around.” Additionally, the FO stated in his interview he considered going missed but never verbalized it. Based on crew interviews, there do not appear to be any CRM issues on the flights prior to the accident flight. However, the lack of a proper approach briefing and the later stages of the approach itself during the accident flight demonstrate a breakdown in CRM. These issues include the fact that neither pilot vocalized their apparent concerns with continuing the approach, even when the approach became severely unstabilized.

Although this had not been a long day in the sense of total time on duty, the crew had flown four legs, all of which were in IMC. The Captain said that “[e]very leg was stressful...” and “[h]e felt a little fatigue.” While we typically expect fatigue in crews that have been on duty for more than 12 hours, fatigue can be insidious and the operations performed can have just as much of an effect on fatigue as duty day. The Captain had flown four legs, all in IMC, all with instrument approaches, with a relatively inexperienced FO.

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<sup>21</sup> Primary Flight Display

<sup>22</sup> Flight Operations Manual



To recognize the factors that influenced the FO we must understand his training and previous experience. The CRJ-200 was the first jet that he had flown and he had 1850 hours in general aviation aircraft with reciprocating engines. Reciprocating engines respond immediately to throttle changes, even when at idle, while turbofan engines require a significant spool-up time when at idle.

Another issue is the FO's use of automation. While each pilot should be able to hand-fly an instrument approach to minimums, typically current airline guidance is to keep the autopilot and FD engaged until the flight crew visually acquires the airport or a go-around is required. The reason for this is with the autopilot and FD on, the PF is able to monitor the approach much better than with the autopilot off. When the autopilot is off the PF is still able to look at the PFD and fly the FD but must increase their scan, which increases their workload. With both the autopilot and FD off in IMC conditions the workload becomes very high since the PF must expand his scan to incorporate those items that are normally displayed by the FD. This is especially challenging for new pilots to ensure that they do not get overwhelmed with the pace and amount of information presented in a glass cockpit.

The short duration of the flight exacerbated all of these factors and was a critical component of the crew's failure to appropriately brief the approach. While pilots typically ask for and accept route shortcuts, pilots must also balance the flight time remaining with the tasks that must be performed. Failure to accomplish required briefings and checklists encourages an atmosphere of non-compliance with SOPs and it is incumbent upon both pilots to ensure that these items are accomplished.

## **IV. AIR WISCONSIN AIRLINES OPERATIONS**

### **ACARS Information Sharing Between PNF<sup>23</sup> and PF**

While Air Wisconsin Airlines has an exceptional safety record and has incorporated several proactive safety programs including FOQA<sup>24</sup>, ASAP<sup>25</sup>, and the Line Observation Program, there are areas which have been identified as in need of improvement. To their credit, Air Wisconsin Airlines has made numerous changes to their manuals as a result of the accident, but ALPA feels additional changes are still necessary.

The weather and landing distance assessments are accomplished by the PNF prior to the approach briefing and set-up. Even prior to the accident Air Wisconsin Airlines was working on adding the required landing distance as an element of the approach briefing and it has since been completed. The PNF is the pilot that must accomplish these tasks and the PF is dedicated to flying the aircraft without distractions. Therefore the PNF should specifically brief the PF on these critical items of ATIS elements and required landing distance. Anecdotal evidence suggests that the PF is not necessarily being informed of this critical information, especially when the Captain is the PNF. The Air Wisconsin Airlines Flight Training Manual includes an example of an approach briefing. That example briefing does not include any mention of the required landing distance or available runway length and condition.

### **Captain Upgrade Training and Flight Crew CRM<sup>26</sup> Training**

While Air Wisconsin Airlines' CRM training provides a start towards crews' better understanding of CRM, it is very apparent that there are still underlying CRM deficiencies which need to be addressed. According to Air Wisconsin Airlines' own personnel based on their post-accident interviews, the CRM training provided to new-hire pilots and upgrade applicants is entry-level and basic. An expanded program to address the following topics in greater detail would significantly enhance the training experience:

- CRM Training
  - FO assertiveness and advocacy
  - Scenario-based discussions of specific prior incidents encountered on-line
  - Crew, departure and approach briefings to include data and information generated by PNF (sharing of information between pilots)
  - Dependence on ACARS/automation and awareness of data isolation of PF
  - Re-emphasize to all flight crew members the importance of voicing concerns, especially with regards to unstabilized approaches and to execute a go-around when required by SOPs or anytime they feel the approach is unsafe

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<sup>23</sup> Pilot Not Flying

<sup>24</sup> Flight Operations Quality Assurance

<sup>25</sup> Aviation Safety Action Program

<sup>26</sup> Crew Resource Management

- Upgrade Training
  - Command ability and leadership
  - Decision making and judgment regarding FO as PF
  - Transfer of control (taking the aircraft when in an undesired state)
  - Re-emphasize Captain's responsibilities as referenced in the Air Wisconsin Airlines FOM with specific reference to Section 7 Paragraph 5.1 and 5.2

### **Air Wisconsin Airlines' Corporate Safety Culture**

As required by 14 CFR 119.65, all Part 121 operators must have a Director of Safety. Air Wisconsin Airlines employs a Managing Director of Safety and Operations Surveillance whose job description, according to the FOM, in part holds him responsible for “meeting the highest levels of operational safety” as he fulfills the FAA mandated role of Director of Safety. The Air Wisconsin Airlines FOM goes on to state the Managing Director of Safety and Operations Surveillance is held accountable for such programs as FOQA, ASAP, and the Line Observation Program. However, as discovered during the course of the post-accident flight department management interviews, responsibility for these programs actually rests with other management personnel. Additionally, not a single member of the Air Wisconsin Airlines Safety Department is solely dedicated to flight safety.

Historically, internal review of incidents at Air Wisconsin Airlines has shown evidence that unstabilized approaches were a problem long before this accident. However, the power and influence of the Managing Director of Safety and Operations Surveillance position was never applied towards addressing the issue of unstabilized approaches. Instead, this problem was left to be solved individually through separate efforts by each of the various internal program leads. The unstabilized approach problem in fact remains unresolved as this undesired state of flight continues to be the highest generator of events at Air Wisconsin Airlines.

Ideally, having a qualified and trained individual in a position dedicated to flight safety would possibly alleviate some of the flight safety issues facing Air Wisconsin Airlines. Currently many responsibilities of the Managing Director of Safety and Operations Surveillance position are being delegated to other positions with little or no participation, action or response from senior safety management. Examples include: ASAP was managed by the ORF Pilot Manager, FOQA by the Fleet Manager/ Director of Flight Training, and the Line Observation Program by the Lead Line Observation Pilot. A lack of internal oversight and accountability exists with senior safety management remaining uninvolved and uninformed with specific flight safety issues. Flight safety requires an active and participatory top-down culture which should not be superficially delegated to middle management or program leads.

## V. FAA Oversight of Air Wisconsin Airlines

While Air Wisconsin Airlines is ultimately responsible for regulatory compliance, the FAA as the regulatory body must provide oversight to observe operations and become familiar with the operations and manuals. During the course of this investigation, it became apparent that the personnel assigned to oversee Air Wisconsin Airlines did not have the breadth of knowledge concerning Air Wisconsin Airlines' operation and training that one would expect of the individuals responsible for ensuring regulatory compliance.

One of the primary concerns is that of logistics; FAA personnel are based in Chicago-O'Hare while the airlines' headquarters are in Appleton, Wisconsin and all the flying is on the East Coast. The FAA APM<sup>27</sup> for the CRJ-200 at Air Wisconsin Airlines said during his interview that he is only able to monitor half of the check airman each year and delegates the other half to a management pilot at Air Wisconsin Airlines. He commented that logistically it is too hard for him, the APM, to do it all. In addition, the POI<sup>28</sup> said during his interview with the Operations Group that providing oversight of Air Wisconsin is a logistical nightmare.

During the course of the investigation, specifically through the interviews with the FAA personnel, it became apparent that the FAA was not intimately familiar with Air Wisconsin's procedures and training. The FAA APM stated during his interview that Air Wisconsin has always required the use of autopilot and FD during IMC, a statement which is incorrect. He incorrectly elaborated that if a pilot attempted a precision approach without the flight director that it would be a violation and that the company does not authorize raw data approaches in IMC. The APM also said during his interview that if power is advanced on the CRJ it pitches up like any other airplane; which again is not aerodynamically correct due to the aft-mounted engines. He also stated that he does not know the exact number of simulator sessions provided to a new hire. The APM for a carrier with only one aircraft type should be very familiar with the company's procedures, training and aircraft characteristics. These comments demonstrate a lack of knowledge not only of the basic flight characteristics of the aircraft flown by the airline but also of the company's operations and training.

In addition to the APM's lack of familiarity with Air Wisconsin Airlines' operations is the POI's confusion regarding company policies. The POI stated he did not know if Air Wisconsin pilots were authorized to make raw data approaches to the same minimums regarding decision height and visibility as with the FD engaged, which they are allowed to do. The POI also incorrectly believed FOs had 100-foot higher approach minimums until they had 100 hours in the airplane, which is a restriction placed on the Captain during his initial 100 hours in the airplane, not the FO.

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<sup>27</sup> Aircrew Program Manager

<sup>28</sup> Principal Operations Inspector

## VI. FINDINGS

1. The FAA office responsible for the oversight of Air Wisconsin Airlines being in Chicago makes it very difficult to oversee the operations which occur primarily on the East Coast.
2. The FAA personnel overseeing Air Wisconsin Airlines' operations were not as familiar with the procedures, training and the aircraft as was required.
3. Air Wisconsin Airlines does not have any dedicated flight safety personnel and all of their pro-active safety programs are managed by management pilots.
4. The pilots were properly certificated and qualified under federal regulations and Air Wisconsin Airlines training requirements.
5. The investigation revealed no evidence of any failure or anomaly of the airplane's powerplants, structures, or systems that would have adversely affected the airplane's performance during the accident landing.
6. The flight crew did not conduct a proper approach briefing.
7. The number of flights, coupled with the weather and lack of experience on the part of the First Officer may have contributed to the Captain's feelings of fatigue.
8. The Captain did not realize the First Officer disengaged the flight director after autopilot disengagement.
9. The pilots did not execute a go-around when the approach went outside of the stabilized approach criteria specified in both the Air Wisconsin Airlines Flight Operations Manual and Flight Crew Manual.
10. The Captain took control of the aircraft once the runway became visible and they were high and left of course.
11. The First Officer thought he heard the Captain ask for the thrust levers to be brought back to idle.
12. The First Officer retarded the thrust levers to idle at approximately 200' MSL.
13. The Captain failed to notice that the First Officer had reduced the thrust levers to idle until very short final.
14. Because of the reduced thrust setting, an increasing sink rate developed.
15. When the Captain realized that the thrust levers were at idle, there was not enough time prior to touchdown for the engines to spool-up and arrest the sink rate.
16. The aircraft touched down in an 8 degree left bank with a vertical acceleration of 3.25 G's<sup>29</sup>.
17. Shortly after touchdown the left main landing gear separated from the support trunnion and collapsed rearward, damaging the trunnion, aft main wing spar, aft gear support "false spar", wing skin, and flap, resulting in substantial damage.
18. The aircraft departed the runway approximately 3200 feet from the threshold and came to rest about 300 feet off the runway side in a grass and snow covered area about 3,700 feet from the threshold, on a magnetic bearing of about 320 degrees.
19. Once the aircraft stopped the crew communicated with the Flight Attendant to ascertain any injuries or fire and with Air Traffic Control to request the Aircraft Rescue and Fire Fighting vehicles be dispatched to their location.
20. Once the Aircraft Rescue and Fire Fighting vehicles and buses arrived the crew de-planed the passengers via the main cabin door.

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<sup>29</sup> Force of Gravity (G)

## **VII. SAFETY RECOMMENDATIONS**

As a result of this investigation, the Air Line Pilots Association, International suggests the following recommendations:

### **To the Federal Aviation Administration**

1. Relocate Air Carrier certificates to FAA offices that are logistically compatible with the specific carrier's areas of operation and training facilities.
2. Require air carrier inspectors to review existing ground training programs of their turbojet certificate holders to ensure that these programs include significant information that is peculiar to the operation of turbojet aircraft.
3. Ensure the inspectors assigned are knowledgeable and familiar with the operations and aircraft operated by the certificate holder.

### **To Air Wisconsin Airlines**

1. Add a dedicated flight safety individual who is responsible for coordinating the various safety programs including: ASAP, FOQA, DSAP, MSAP, Line Observation Program.
2. Expand CRM training to include:
  - a. First Officer assertiveness and advocacy
  - b. Scenario-based discussions of specific prior incidents encountered on-line
  - c. Crew, departure and approach briefings to include data and information generated by PNF (sharing of information between pilots)
  - d. Dependence on ACARS/automation and awareness of data isolation of PF
  - e. Re-emphasize to all flight crew members the importance of voicing concerns, especially with regards to unstabilized approaches and to execute a go-around when required by SOPs or anytime they feel the approach is unsafe
3. Expand Captain Upgrade training to include:
  - a. Command ability and leadership
  - b. Decision making and judgment regarding FO as PF
  - c. Transfer of control (taking the aircraft when in an undesired state)
  - d. Re-emphasize Captain's responsibilities as referenced in the Air Wisconsin Airlines FOM with specific reference to Section 7 Paragraph 5.1 and 5.2