



National Transportation Safety Board Aviation Accident Final Report

Location:	Milwaukee, WI	Accident Number:	CHI05FA077
Date & Time:	03/11/2005, 2302 CST	Registration:	N8932C
Aircraft:	Bombardier CL-600-2B19	Aircraft Damage:	Substantial
Defining Event:		Injuries:	12 None

Flight Conducted Under: Part 121: Air Carrier - Scheduled

Analysis

The Part 121 scheduled domestic passenger flight received substantial damage when it veered off the left side of runway 1L during landing. The flight had departed LaGuardia International Airport en route to Milwaukee International Airport (MKE). During climbout through Flight Level 20 (20,000 feet), the No. 1 Hydraulic Low Pressure caution light illuminated. The flight crew ran the Quick Reference Handbook (QRH) checklist for the caution message. The procedures outlined in the QRH instructed the flight crew to: "Land at the nearest suitable airport." The captain informed the airline's maintenance control about the caution message, but he did not inform flight dispatch about the caution message or the need to land at the nearest suitable airport. The flight continued to its destination airport. The flight was cleared to land on runway 1L. The winds were 290 degrees at 10 knots. The captain reported that the landing was normal until the airplane started to veer off the left side of the runway. The post accident inspection of the airplane revealed no preexisting anomalies, other than the loss of the No. 1 Hydraulic system which resulted in the loss of ground spoilers. The NTSB Aircraft Performance Study indicated that the airplane approached runway 1L crossing the threshold at about 2302:16 at a recorded radio altitude of about 50 feet above ground level, with an indicated airspeed of 139 knots (about 136 knots ground speed) and a pitch angle of about 4 degrees nose down. The airplane began to drift right of centerline by about 20 feet, and touchdown occurred at a calculated distance of 2,400 feet beyond the runway threshold in a crab angle of about 5 degrees nose left relative to the ground track, and at a roll angle of about 1 degree left bank angle. The lateral load at touchdown was recorded at -0.2 G's. After touchdown, the airplane's ground track continued to drift right of centerline about 25 feet while the airplane nose remained to the left of the ground track. The airplane's ground track then began to turn left and departed off the side of the runway (veered off the runway) at about 2302:37 and approximately 4,200 feet beyond the threshold. The longitudinal acceleration from point of touchdown to when it veered off the runway was recorded between -0.12 and -0.15 G's. An investigation of airport operations revealed that airport operations did not inspect Runway 1L/19R after a pilot report (PIREP) of NIL braking action by a Beech Jet at 2018. Airport operations did not conduct or provide friction measurement reports and (Notices to Airmen) NOTAMS for Runway 1L/19R between March 10 at 1925 and the time of the accident on March 11 at 2302, when airport conditions were changing with significant snowfall

accumulations. The airport did not conduct a runway inspection or friction report of Runway 1L/19R after the airplane veered off the runway.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the captain's failure to adequately compensate for the crosswind conditions, and his failure to maintain directional control during landing. Contributing factors include the captain's failure to land at the nearest suitable airport after an in-flight mechanical problem, the airport operation's failure to conduct runway friction tests and to issue NOTAMS in accordance with existing regulations, the crosswind, the snow-covered runway, the runway sign, and night conditions.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CLIMB - TO CRUISE

Findings

1. HYDRAULIC SYSTEM - FAILURE
2. FLT CONTROL SYST, WING SPOILER SYSTEM - FAILURE, PARTIAL
3. (F) NOT PERFORMED - PILOT IN COMMAND

Occurrence #2: LOSS OF CONTROL - ON GROUND/WATER
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings

4. (C) COMPENSATION FOR WIND CONDITIONS - INADEQUATE - PILOT IN COMMAND
5. (C) DIRECTIONAL CONTROL - NOT MAINTAINED - PILOT IN COMMAND
6. (F) AIRPORT OPERATIONS - INADEQUATE - AIRPORT PERSONNEL
7. (F) AIRPORT SNOW REMOVAL - INADEQUATE - AIRPORT PERSONNEL
8. (F) WEATHER CONDITION - CROSSWIND
9. (F) LIGHT CONDITION - NIGHT
10. (F) AIRPORT FACILITIES, RUNWAY/LANDING AREA CONDITION - SNOW COVERED

Occurrence #3: ON GROUND/WATER COLLISION WITH OBJECT
Phase of Operation: LANDING - ROLL

Findings

11. (F) OBJECT - AIRPORT SIGN/MARKER
12. TERRAIN CONDITION - ROUGH/UNEVEN
13. TERRAIN CONDITION - SNOWBANK

Factual Information

HISTORY OF FLIGHT

On March 11, 2005, at 2302 central standard time, a Bombardier CL-600-2B19, N8932C, operated by Pinnacle Airlines as "Flagship 2823," received substantial damage when it veered off the left side of runway 1L (9,690 feet by 200 feet, asphalt-concrete, grooved) during landing at the Milwaukee/General Mitchell International Airport (MKE), Milwaukee, Wisconsin. The captain, first officer (FO), flight attendant, and nine passengers received no injuries. The 14 Code of Federal Regulations Part 121 scheduled domestic passenger flight departed LaGuardia International Airport (LGA), New York, New York, at 2137 eastern standard time. Night instrument meteorological conditions prevailed at the time of the accident. The flight was on an IFR flight plan.

The captain reported that the taxi and takeoff portions of the flight were normal. During climbout through Flight Level 20 (20,000 feet), the #1 Hydraulic Low Pressure caution light illuminated. The captain asked the FO to run the Quick Reference Handbook (QRH) checklist for the caution message. Once the checklist was accomplished, the captain sent Pinnacle's Maintenance Operations Center (MOC) an Aircraft Communications And Reporting System (ACARS) message informing the MOC of the caution message. Numerous ACARS messages were sent between the flight crew and the MOC. The QRH indicated that the outboard ground spoilers were not available due to the loss of the #1 hydraulic system, and that a 1.13 landing distance penalty would need to be applied to the landing runway. The captain reported that he decided to continue the flight to MKE after considering MKE's weather and runway length.

MKE Approach Control delayed the flight for about 10 minutes to allow for snow removal operations that were being conducted at the intersection of runway 1L and 25L. The flight crew had obtained Automated Terminal Information System (ATIS) Oscar prior to flying the approach to MKE. The last braking action reported to ATC was from a flight that landed at about 1026, which reported the braking action as FAIR. ATC did not inform the flight crew what the braking action was on runway 1L, and the flight crew did not request the braking action report for the runway. The flight was cleared for the approach after intercepting the localizer for the ILS 1L approach.

The flight was cleared to land on runway 1L. The reported winds were 290 degrees at 10 knots. The pilot reported that the landing approach was flown at $V_{ref} + 5$ and that he planned to touchdown firm due to the runway condition and the loss of the outboard ground spoilers. He reported that the landing was normal until the airplane started to veer off the left side of the runway.

The airplane departed the left side of the runway about 4,600 feet from the approach end of runway 1L. The airplane veered across the grass infield before crossing runway 07R/25L. The airplane traveled through the intersection of taxiways A, E, and T before crossing another snow-covered grass in-field where the aircraft went through a snow bank and onto taxiway B. The airplane stopped near the intersection of taxiway B and M in front of concourse D.

The captain reported that nothing appeared to be wrong with the airplane so the decision was made to taxi to gate E64. The captain reported to ATC that the braking action was "very poor." Then when queried by ATC, the captain reported the braking action was, "Extremely poor. NIL." The flight crew received progressive taxi instructions and taxied to the gate where the

passengers were deplaned via the airstairs instead of the jet bridge.

An examination of the airplane revealed that the forward pressure bulkhead at Fuselage Station 202.75 was compromised. The flaps, the main landing gear doors, the nose landing gear, and various skin panels also were damaged during the accident.

PERSONNEL INFORMATION

The captain was hired by Pinnacle Airlines in July 2002 as a Bombardier CL-600-2B19 copilot and was upgraded to Pilot-in-Command (PIC) in July 2004. He held an airline transport certificate with multiengine land airplane and an airplane instrument rating. He held a first class medical certificate with no limitations. He had about 4,900 hours of total flight time, including about 3,008 hours in multiengine airplanes. He had about 1,763 hours in the Bombardier CL-600-2B19 and had flown about 265 hours in the last 90 days and 85 hours in the last 30 days.

The First Officer (FO) was hired by Pinnacle Airlines in July 2004 as a Bombardier CL-600-2B19 copilot. He held a commercial certificate with single-engine land, multiengine land, and instrument airplane ratings. He held a first class medical certificate. He had about 1,100 hours of total flight time, including about 750 hours in multiengine airplanes. He had about 450 hours in the Bombardier CL-600-2B19 and had flown about 193 hours in the last 90 days and 73 hours in the last 30 days.

AIRCRAFT INFORMATION

The airplane was a twin-engine Bombardier CL-600-2B19, serial number 7932, with a maximum takeoff weight of 53,000 pounds. The engines were General Electric CF-34-3B1 engines that delivered 8,900 pounds of thrust each. The airplane was on a Continuous Airworthiness maintenance program. The last service check was conducted on March 11, 2005.

The procedures outlined in the QRH for a #1 Hydraulic Low Pressure caution light states that if the #1 hydraulic quantity readout is less than 5 percent, or if pressure is less than 1,800 psi, or if the hydraulic pressure is rapidly decreasing, the following procedures apply:

1. Hydraulic Pump 1B ON
2. Hydraulic Pressure and Fluid Quantity MONITOR

If Hydraulic Pressure and Fluid Quantity Not Normal:

3. Hydraulic Pump Switch 1B SELECT TO OFF
4. Inoperative System REVIEW
- * Left and right outboard ground spoilers inoperative.
5. Land at the nearest suitable airport.
6. ANTI SKID Switch LEAVE ARMED
7. FLAPS Selector SET TO 45 DEGREES FOR LANDING
8. Actual Landing Distance INCREASE

Increase as applicable by the following factors:

- a. Without thrust reversers 1.15 percent
- b. With thrust reversers: 1.13 percent

METEOROLOGICAL INFORMATION

At 2252, the surface weather observation at MKE was: Winds 270 at 8; visibility 1 1/4; light snow; 900 scattered; ceiling 1,800 broken; 9,000 overcast; temperature -1; dew point -3; altimeter 29.25

At 2259, the special surface weather observation at MKE was: Winds 290 at 10, gusts 16; visibility 3/4; light snow; ceiling 500 broken; 2,000 broken; 4,700 overcast; temperature -1; dew point -2; altimeter 29.25

At 2309, the special surface weather observation at MKE was: Winds 290 at 12, gusts 17; visibility 2 1/2; runway 1L RVR 2,800 variable 6,000; light snow; few clouds at 400; ceiling 1,000 broken; 7,000 overcast; temperature -1; dew point -2; altimeter 29.25

ATIS Information Oscar provided the following information:

Milwaukee-Mitchell Airport Information Oscar 0352 (2152) Zulu: Winds 260 at 5; visibility 10; 2,400 scattered; ceiling one zero thousand broken; temperature -1; dew point -4; altimeter 29.27; ILS runway 1L approach in use; landing runway 1L; departing runway 1L; transponders required shall be on while operating on runways and taxiways; braking action advisories in effect; all taxiing and departing aircraft remain on ground control frequency until advised; pre-departure clearance available; all other departures contact clearance delivery on 120.8 Advise on initial contact you have information Oscar.

ATIS Information Quebec was current at the time of the accident. It provided the following information:

Milwaukee-Mitchell Airport Information Quebec 0459 (2259) Zulu Special: Winds 290 at 10, gusts 16; visibility 3/4; light snow; ceiling 500 broken; 2,000 broken; 4,700 overcast; temperature -1; dew point -2; altimeter 29.25; ILS runway 1L approach in use; landing runway 1L; departing runway 1L; transponders required shall be on while operating on runways and taxiways; braking action advisories in effect; all taxiing and departing aircraft remain on ground control frequency until advised; pre-departure clearance available; all other departures contact clearance delivery on 120.8 Advise on initial contact you have information Quebec.

MKE airport surveillance videos indicated that a snow squall had passed through the airport area about 10 - 15 minutes prior to the time of the accident. The surveillance cameras indicated that the visibility was limited and the runway environment was not visible on the surveillance video during the snow squall. About 2250, the ATC transcript stated, "The braking action has been all over the board on 1L. Most of the reports have been fair and a lot also were fair, uh good and fair after 25L, landing runway 1L. Of course, that was all before this little last snow squall we're in right now."

AIRPORT INFORMATION

According to the MKE Airport Certification Manual (ACM), the Operations Section (i.e., Airport Operations Manager, Assistant Airport Operations Manager, and Airport Operations

Coordinator) is responsible for the self-inspection program. Airport self-inspections are performed three times daily at MKE, once per shift. In addition to the three typical daily inspections, the ACM states, "Its inspection program includes additional inspections of and subsequent handling of any unusual conditions which might exist on the airport during periods of snow removal, construction, and immediately after any incident or accident." The Airport Operations Coordinator is responsible for taking whatever action deemed necessary to correct the condition, including closing runways.

Airports certificated under 14 CFR Part 139 that are located in areas where snow and icing conditions occur, are required to prepare, maintain, and carry out a Snow and Ice Control Plan. This plan is written by the airport certificate holder and describes how the airport will minimize the effects of winter conditions on operational safety.

The MKE snow removal plan stated the "Airport Operation Coordinator on duty is responsible for conducting all field inspections and will investigate the extent and nature of any condition reported by airlines/FAA that presents a safety hazard."

A Letter of Agreement between the MKE Air Traffic Control Tower (ATCT) and Milwaukee County stated that MKE Airport Operations shall provide MU-value readings, and MKE ATCT "should provide the MU-value measuring vehicle an opportunity to make an uninterrupted runway check to ensure that accurate MU-value reading are obtained." Also, MKE ATCT, "upon receipt of a runway braking action report of "NIL," landings and takeoffs on the respective runway shall be terminated and MKE Airport operations notified."

MKE has five runways. The two runways that were operational on the night of the accident were runways 1L-19R and 7R-25L. Runway 1L-19R (9,690 feet by 200 feet, asphalt-concrete, grooved) has an ILS precision instrument approach. Runway 7R-25L (8,012 feet by 150 feet, concrete) has a non-precision localizer instrument approach. Due to weather conditions, the smaller three runways were closed. Although the prevailing winds on March 11, 2005, were from the west, the runway in use throughout the day and night periods was Runway 1L-19R due to the length of runway and the lower approach minimums provided by the ILS precision instrument approach.

Runway 1L-19R was de-iced the day prior to the accident at approximately 1930. A NOTAM was issued that stated the runway was "deiced 80 feet, and friction was reported at 40+." According to the decelerometer recordings, MU values averaged above 70.

No MU readings were taken on Runway 1L-19R the day of, nor immediately following, the accident. MU readings were taken at about 0130 the day following the accident, after the runway was cleared. No NOTAM was published for Runway 1L-19R until 0139 on the day after the accident. This NOTAM reported patchy 1/2 inch loose snow on runway over patchy thin ice on runway with MU readings of 26, 39, and 46. No deice treatment was reported on this NOTAM.

Airport Operations had completed three self-inspections on March 11, 2005, prior to the accident, but the runway conditions listed for Runway 1L-19R remained the same, although the weather conditions were changing throughout the day.

FAA AC 150/5200-30A, Airport Winter Safety and Operations, states friction tests should be conducted " ... (2) whenever visual runway inspections and/or pilot braking action reports indicate that a runway friction is changing; and (4) at least once during each 8-hour shift while contaminants are present; and (5) immediately following any aircraft incident or accident on

the runway."

The ATCT was landing aircraft on runway 19R prior to 2015. According to ATC communication tapes, at approximately 2018 a Beechjet reported NIL braking action on Runway 1L-19R. Prior to this report, braking action reports ranged from good to poor with many pilots reporting fair.

The MKE Snow Removal Plan stated "a runway will be closed to aircraft landings and departures when a major portion of the runway is covered with ... (4) any amount of ice or snow creating NIL braking action."

According to ATCT communication tapes and the Airport Operations Coordinator, after the Beechjet reported NIL braking action on Runway 19R, the Airport Operations Coordinator requested to change snow removal plans from clearing Runway 7R-25L to clear Runway 1L-19R.

Instead of changing the active runway to Runway 25L after the Beechjet reported NIL braking action on Runway 19R, ATCT switched the active runway to Runway 1L. ATCT requested that Airport Operations continue to clear Runway 7R-25L before clearing Runway 1L-19R. According to the Airport Operations Coordinator, Runway 1L-19R was not closed after the Beechjet report of NIL braking action. According to airport flight logs, there were 59 airplanes that had landed on Runway 1L after the Beechjet report NIL braking action. The pilots of the accident airplane reported braking action as NIL after the airplane veered off the runway.

FLIGHT RECORDERS

Cockpit Voice Recorder (CVR)

The CVR transcript of the communications from 2258:58 to 2302:40, March 11, 2005, is provided below. The following abbreviations were used throughout the transcript:

- a. APR: Transmission from approach control.
- b. CAM: Cockpit area microphone voice or sound source.
- c. HOT: Crewmember hot microphone voice or sound source.
- d. RDO: Radio transmission from N8932C
- e. -1: Voice identified as the captain.
- f. -2: Voice identified as the first officer.

The CVR transcript follows:

2258:58 HOT-2: twenty five on the right.

2258:59 HOT-1: two niner two five. left and center.

2259:08 HOT-1: we're two from the marker.

2259:11 HOT-2: yea. he hasn't cleared us for the approach or anything yet.

2259:16 HOT-1: ask him if he wants to clear us (for the) approach or turn it.

2259:19 RDO-2: and tower approach for Flagship twenty eight twenty three are we cleared for the approach?

2259:24 APR: okay yes you are Flagship twenty eight twenty three you're a mile from CUTMO cleared ILS runway one left approach.

2259:29: RDO-2: all right cleared for the ILS one left Flagship twenty (eight) twenty three.

2259:33 HOT-1: okay glide slope is armed.

2259:34 HOT-2: roger LOC two * swap.

2259:35 HOT-1: gear down. flaps thirty.

2259:37 CAM: [sound similar to gear extension].

2259:37 HOT-1: bug one sixty.

2259:39 APR: and Flag uh Flagship twenty eight twenty three I appreciate your patience you are cleared to land runway one left the wind is ah two niner zero at one zero remain this frequency.

2259:50 RDO-2: all right thank you sir ah cleared to land ah one left Flagship twenty (eight) twenty three.

2259:54 HOT-1: cleared to land.

2259:55 HOT-2: cleared to land.

2259:56 HOT-1: glideslope active.

2259:57 HOT-2: roger.

2259:57 HOT-1: flaps forty five ref plus factor.

2259:58 HOT-2: 'kay.

2259:59 HOT-1: before landing checklist.

2300:01 HOT-2: speed. ah... one thirty four.

2300:14 HOT-2: landing gear down three green.

2300:16 HOT-1: down three green.

2300:16 HOT-2: flaps forty five and indicating. thrust reversers armed. flight attendant notified. before landing check is complete and you are cleared to land.

2300:24 HOT-1: thank you. that's not a good picture.

2300:31 APR: Flagship twenty eight twenty three I'd appreciate a ah braking action report please.

2300:34 RDO-2: twenty * twenty three roger.

2300:55 HOT-1: missed approach set.

2300:58 HOT-2: roger its twenty eight twenty nine. twenty nine, rog.

2301:16 HOT-2: all right I got the approach lights.
2301:18 HOT-1: I got it.
2301:18 HOT-2: I got ah 'kay.
2301:47 HOT-2: all right runway in sight.
2301:58 HOT: [sound similar to autopilot disconnect warning tone].
2302:08 CAM: minimums [mechanical voice].
2302:08 HOT-1: *.
2302:10 HOT-2: say again.
2302:11 HOT-1: lights are bright.
2302:12 HOT-2: yea they are.
2302:14 CAM: one hundred [mechanical voice].
2302:17 CAM: fifty [mechanical voice].
2302:21 CAM: twenty [mechanical voice].
2302:23 CAM: ten [mechanical voice].
2302:29 CAM: [sound similar to wheels rolling on ground].
2302:31 HOT-1: whooo.
2302:33 HOT-2: yea. yea we're slidin'.
2302:34 HOT-2: # _____ dude we're slidin' off.
2302:36 HOT-2: # _____ ah # _____.
2302:40 HOT: [sound similar to impact].
2302:40 End of Transcript

Flight Data Recorder (FDR)

The airplane was equipped with a L-3 Communications Fairchild Model FA2100 128 Word FDR. The recorder was in good condition and the data were extracted normally from the recorder. The FDR recording contained about 120 hours of data. The accident landing was the last flight of the recording and its duration was about 2 hours.

WRECKAGE AND IMPACT INFORMATION

The aircraft received substantial damage to the forward pressure bulkhead structure in the nose wheel well. The bulkhead was fractured in several areas. The fuselage skin was buckled and dented behind the nose gear and on the right and left side of the aircraft in the nose gear area. Investigation from the inside of the aircraft revealed numerous cracked frames and longerons. The nose gear assembly was tilting slightly to the aircraft left and appeared to be twisted to the left. The right nose wheel rim, inboard side, was dented causing the tire to go flat.

The skin around the avionics bay compartment door was torn and peeled back due to striking a runway/taxiway sign. Both left and right main landing gear doors were torn from the aircraft.

Both left and right inboard flaps were buckled due to impact damage.

A Federal Aviation Administration (FAA) airworthiness inspector provided oversight as maintenance, inspection, and engineering personnel from Pinnacle Airlines performed system tests using the Bombardier Maintenance Manual and Service Letter RJ-SL-32-039:

The inspection of the tires, brakes, spoilerons, rudder system, aileron system, thrust reversers, and the nose wheel steering system revealed no anomalies. The inboard ground spoilers worked properly, but the outboard ground spoilers could not be tested due to the #1 hydraulic system failure.

The Maintenance Diagnostic Computer (MDC) was downloaded and indicated two system failures:

1. RDC Failure - The Remote Data Concentrator gathers the raw data inputs from various systems and feeds that information to the Digital Flight Data Recorder (DFDR). The MDC indicated this failure occurred at 0502 GMT, which was the time of the accident.
2. ARP Failure - The MDC showed the Air Reference Panel had failed several times over the last week or so, but apparently the failures were invisible to the flight crew.

The Electronic Control Unit (ECU) was sent to the manufacturer for inspection and downloading of non-volatile memory (NVM). The inspection of the ECU revealed no anomalies associated with the accident event.

TESTS AND RESEARCH

The National Transportation Safety Board (NTSB) conducted an Aircraft Performance Study. The data used in the NTSB study included FDR, Airport Surface Detection Equipment Model X (ASDE-X) ground radar data from MKE, atmospheric data from the Automatic Terminal Information Service (ATIS), and on scene data collected by the investigation team. The study used the available data to calculate the aircraft's ground track and performance that lead to the airplane's departure from the left side of landing runway 1L.

At touchdown, the FDR data showed the airplane was configured with 44 degrees of flaps, and the weight was calculated to be 38,900 pounds. The appropriate reference speed for the given weight was 129 kts indicated airspeed per the airline's flight operations handbook.

The results of the study indicated that the airplane approached runway 1L crossing the threshold at about 2302:16 at a recorded radio altitude of about 50 feet above ground level, with an indicated airspeed of 139 kts (about 136 kts ground speed) and a pitch angle of about 4 degrees nose down. The airplane began to drift right of centerline by about 20 feet and touchdown occurred at a calculated distance of 2,400 feet beyond the runway threshold in a crab angle of about 5 degrees nose left relative to the ground track and at a roll angle of about 1 degree left bank angle. The lateral load at touchdown was recorded as -0.2 G's. After touchdown the airplane's ground track continued to drift right of centerline about 25 feet while the airplane nose remained to the left of the ground track. The airplane's ground track then began to turn left and departed off the side of the runway (veered off the runway) at about 2302:37 and approximately 4,200 feet beyond the threshold. The longitudinal acceleration from point of touchdown to when it veered off the runway was recorded between -0.12 and -0.15 G's.

ADDITIONAL INFORMATION

Pinnacle Airline's Dispatch Procedures

The QRH checklist called for landing at the nearest suitable airport due to the #1 Hydraulic Pressure Caution Light. The flight had numerous airports that were suitable as alternate landing sites, to include, Buffalo, New York, Cleveland, Ohio, and Detroit, Michigan.

The captain communicated to Pinnacle Airline's MOC using ACARS. At 0318Z, he reported, "WE JUST GOT A HYD 1 LO PRESS CAUTION MSG QRH COMPLETED NO QTY OCCURRED 5 MIN "

At 0320Z, MOC responded, "IF YOU HAVE NOT ALREADY DONE SO SWITCH FROM AUTO TO ON"

At, 0320Z, the captain responded, "WE DID"

At 0336Z, the captain typed, "ANYTHING FURTHER"

At 0338, MOC asked, "DID MSG GO OUT WHEN YOU TURNED PUMP TO ON? IF SO WE CAN DEFER THAT"

At 0339Z, the captain responded, "MSG STILL ANNUNCIATED WE ARE AT FL300 PER QRH"

At 0342Z, MOC asked, "WHAT DID YOU SAY YOUR #1 HYD QTY WAS?"

At 0343, the captain responded, "NO FLUID NO QTY READOUT TEMP -3"

At 0344, MOC stated, "JUST WANT TO MAKE SURE I UNDERSTAND CORRECTLY YOUR HYD SYNOPTIC PG. SHOWS #1 EMPTY? OR IS THE DISPLAY MISSING?"

At 0348, the captain responded, "SYNOPTIC PAGE HAS NO QTY READ OUT ED1 ANNUNCIATES HYD 1 LO PRESS CAUT PSI IS ON SYSTEM"

At 0349, MOC responded, "COPY THE HYD LEAK"

There were no other ACARS transmissions between MOC and Flight 2823 that pertained to the #1 Hydraulic Low Pressure caution light. MOC did not provide any guidance to the captain about any actions that the pilot should take in regards to landing at the nearest suitable runway.

Neither the captain nor the MOC informed Pinnacle Airline's flight Dispatch that Flight 2823 was having any difficulties, i.e., the #1 Hydraulic Low Pressure caution light. The captain did send ACARS messages to flight Dispatch thanking Dispatch for helping to get fuel prior to the departure from LGA, but no communication about the in-flight caution message.

Pinnacle Airline's Flight Operations Manual (FOM), Ch 6, p. 7 states that for all irregularities, Dispatch is the initial point of contact. Dispatch will then turn the crew over to MOC or relay the necessary information.

Pinnacle Airline's Flight Crew Operations Manual (FCOM) II, OP 16 states the following:

"Diversion from the approved flight plan may be necessary for reasons of flight safety. The aircraft Captain, when faced with an emergency situation, must decide whether it is prudent to continue to destination or land at another airport. The following is offered as guidance to assist making that decision. In all cases, flight safety is the first consideration.

Landing at the nearest suitable airport, point in time, should be accomplished in the event of:

- Any fire, overheat or smoke indication, which cannot be immediately and positively determined to be eliminated or extinguished.
- One engine remaining.
- Loss of a complete hydraulic system.
- One AC power source remaining (engine or APU generator)
- Any other situation determined by the crew to present significant adverse effect on safety."

On April 11, 2005, Pinnacle Airline's Flight Operations department published an interoffice communications newsletter, NWA Airlink, with the following information concerning Flight Operations Procedures. The part of the article concerning "Communications" stated the following:

"Communication - The first issue that I want to discuss is the need to contact Dispatch over voice communications using the "Batphone" (DTMR Mic) when any irregularity occurs in flight or on the ground that requires extensive communication with Dispatch or Maintenance Control. Even though ACARS is our primary means of communication, irregular operations or issues should be communicated using voice communications for quicker resolution. We are working on providing you with more information on how to contact Dispatch using ARINC in areas that you are currently unable to use the "Batphone."

The FAA, Pinnacle Airlines, Airline Pilots Association (ALPA), and Bombardier Aerospace were parties to the investigation.

Pilot Information

Certificate:	Airline Transport; Commercial	Age:	45, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 None	Last Medical Exam:	10/06/2004
Occupational Pilot:		Last Flight Review or Equivalent:	07/11/2004
Flight Time:	4900 hours (Total, all aircraft), 1763 hours (Total, this make and model), 3525 hours (Pilot In Command, all aircraft), 265 hours (Last 90 days, all aircraft), 85 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Co-Pilot Information

Certificate:	Commercial	Age:	26, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Right
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 None	Last Medical Exam:	06/25/2004
Occupational Pilot:		Last Flight Review or Equivalent:	09/22/2004
Flight Time:	1100 hours (Total, all aircraft), 450 hours (Total, this make and model), 370 hours (Pilot In Command, all aircraft), 190 hours (Last 90 days, all aircraft), 73 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Bombardier	Registration:	N8932C
Model/Series:	CL-600-2B19	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Transport	Serial Number:	7932
Landing Gear Type:	Retractable - Tricycle	Seats:	47
Date/Type of Last Inspection:	03/11/2005, Continuous Airworthiness	Certified Max Gross Wt.:	53000 lbs
Time Since Last Inspection:		Engines:	2 Turbo Fan
Airframe Total Time:		Engine Manufacturer:	General Electric
ELT:	Installed, not activated	Engine Model/Series:	CF-34-3B1
Registered Owner:	Wells Fargo Bank Northwest NA Trustee	Rated Power:	8900 lbs
Operator:	Pinnacle Airlines	Air Carrier Operating Certificate:	Flag carrier (121)
Operator Does Business As:		Operator Designator Code:	REXA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	Condition of Light:	Night
Observation Facility, Elevation:	MKE, 723 ft msl	Observation Time:	1101 CST
Distance from Accident Site:	0 Nautical Miles	Direction from Accident Site:	0°
Lowest Cloud Condition:		Temperature/Dew Point:	-1° C / -2° C
Lowest Ceiling:	Broken / 500 ft agl	Visibility	1.5 Miles
Wind Speed/Gusts, Direction:	11 knots, 290°	Visibility (RVR):	
Altimeter Setting:	29.25 inches Hg	Visibility (RVV):	
Precipitation and Obscuration:			
Departure Point:	New York, NY (LGA)	Type of Flight Plan Filed:	IFR
Destination:	Milwaukee, WI (MKE)	Type of Clearance:	IFR
Departure Time:	2137 EST	Type of Airspace:	Class D

Airport Information

Airport:	Milwaukee/General Mitchell (MKE)	Runway Surface Type:	Concrete
Airport Elevation:	723 ft	Runway Surface Condition:	Ice; Snow--compacted; Snow--wet
Runway Used:	1L	IFR Approach:	ILS
Runway Length/Width:	9690 ft / 200 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	3 None	Aircraft Damage:	Substantial
Passenger Injuries:	9 None	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	12 None	Latitude, Longitude:	42.931667, -87.898056

Administrative Information

Investigator In Charge (IIC):	Jim Silliman	Adopted Date:	01/31/2007
Additional Participating Persons:	Daryl Grubbs; FAA-FSDO; Milwaukee, WI Mike Crook; Pinnacle Airlines, Inc.; Memphis, TN David Fisher; Bombardier Aerospace; Downsview, Ontario, Joe Braken; ALPA; Herndon, VA		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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