

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

May 6, 2005

Human Performance

Human Performance Investigator's Factual Report

A. ACCIDENT

Operator: Pinnacle Airlines, Inc., DBA Northwest Air Link
Location: West of Jefferson City Airport, Jefferson City, MO
Date: October 14, 2004
Time: 2215 central daylight time¹
Aircraft: Bombardier CL-600-2B19, N8396A
NTSB Number: DCA05MA003

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¹ All times are central daylight time based on a 24-hour clock, unless otherwise noted.

D. SUMMARY

On October 14, 2004, about 2215 central daylight time (cdt), N8396A, a Bombardier CL-600-2B19 operating as Pinnacle Airlines flight 3701 (d.b.a. Northwest Airlink) crashed in a residential area in Jefferson City, Missouri, about 2.5 miles south of the Jefferson City airport (KJEF). Impact forces and a post-crash fire destroyed the airplane. The two crewmembers were fatally injured. The flight was a repositioning flight from Little Rock, Arkansas (KLIT) to Minneapolis-St. Paul, Minnesota (KMSP). There were no passengers on board. There were no injuries on the ground.

E. DETAILS OF THE INVESTIGATION

The Operations / Human Performance Group convened at the Jefferson City Police Headquarters, Jefferson City, Missouri, on October 15, 2004, to begin the field phase of the accident investigation. Multiple interviews were conducted and records reviewed. Before concluding the initial field phase of the investigation, the group traveled to Memphis, TN, to interview Pinnacle Airlines personnel, FAA personnel, and review records. The field phase of the investigation concluded on October 22, 2004. Additional interviews of FAA and Pinnacle Airlines personnel were conducted during the week from November 30, 2004 to December 3, 2004. Additional interviews of Pinnacle Airlines pilots, company officials, and FAA representatives were conducted by telephone in December 2004 and January 2005. For additional details on the group's activities and factual information collected see the Operations/Human Performance Group Chairman's Factual Report dated January 18, 2005.

F. FACTUAL INFORMATION

1 Personnel Information²

1.1 Flight Crew

1.1.1 The Captain

The captain, age 31, held a first class medical certificate issued July 22, 2004, with the limitation "Holder must wear corrective lenses."³ The captain reported 6,750 hours total pilot time with 400 accumulated in the past 6 months on the medical application. A search of records at the National Driver Register found no history of driver's license revocation or suspension.⁴

The captain graduated high school in the spring of 1990. From August 1990 to May 1995 the captain attended Embry-Riddle Aeronautical University in FL and graduated with a bachelor of science degree in aeronautical science. According to an application for employment dated September 16, 2002, he worked briefly in a non-aviation job from March to May 1996. The application listed the following aviation positions held: glider tow pilot for Island Soaring in Maine, from May 1996 to August 1996; flight instructor for Embry-Riddle Aeronautical University from August 1996 to October 1999⁵; first officer at Trans States Airlines from January 1999 to May 2000⁶; and captain at Gulfstream International Airlines, Inc. in FL, from June 2000 to September 2002.⁷

The captain's resume in his personnel file stated total flight time of 5,685 hours, including 1,724 hours as pilot-in-command under 14 CFR Part 121 operations.⁸ The resume listed "FAA High Altitude Physiological Training" as one of the items under the heading Certificates & Ratings.

² For additional information about the flight crew see the Operations/Human Performance Group Chairman's Factual Report.

³ The medical record listed the pilot's distant vision as 20/200 corrected to 20/20 in each eye and combined, and his near vision as 20/25 corrected to 20/20 in each eye and combined.

⁴ Application for employment at Pinnacle Airlines listed the following driving violations: failure to obey traffic device 10/27/99, Not carrying insurance card 2/9/01; broken headlight 2/6/02.

⁵ The captain's resume listed duties in this position as ground and flight instruction of private pilots through flight instructors in a Part 141 environment, check ride pilot for all certified courses and phase checks, and team safety leader whom investigated all incidents and accidents.

⁶ The resume stated the captain flew the BAE Jetstream 4101 out of JFK to numerous cities throughout the eastern United States. The captain answered "yes, my first attempt at MEI and at TSA my initial checkride" to a question asking had he ever failed a checkride on the Pinnacle Airlines employment application. On form dated September 16, 2002, to the question "have you ever been asked to resign or been fired from a job?" the captain answered "At TSA I took bad advice from my base manager and requested my 2 weeks of vacation. During which time I was hired by Gulfstream. We had strike vote at TSA and management was looking for reasons to fire anyone."

⁷ The resume stated the captain flew the Beech 1900 out of Key West to FL cities, Bahamas, and Cuba.

⁸ The resume listed 912 hours second-in-command under 14 CFR Part 121, and 2,638 hours in twin turboprop operations.

Instructors and checkairmen who had flown with the captain had generally favorable comments about his abilities as a pilot. For example, an instructor involved in the captain's upgrade training stated that the captain was a good pilot, who was prepared for training, had above average systems knowledge, and demonstrated good command judgment and command authority during training. A checkairman who flew with the captain on the line during his operational evaluation in August 2004 described the flights as unremarkable, and said the captain was well prepared and someone who exercised good judgment and showed deliberate and thoughtful actions. However, not all comments about the captain's upgrade training were positive. An instructor who did part of the captain's upgrade training⁹ stated that the biggest weakness he observed was the captain's critical decision-making and judgment. He observed problems that involved decision-making and judgment in accomplishing checklist items, specifically mixing-up checklist items and pilot-flying and pilot-not-flying duties. He said that the captain did not have problems making decisions like diverting, determining how the airplane was to be flown, or issuing commands.

Other Pinnacle Airlines pilots who had flown with the captain had favorable comments. Most described the captain as a professional who operated in the airplane in a standard manner like other captains, demonstrated good CRM skills, and was easy to get along with. For example, a captain who'd flown with the accident captain before his upgrade training said that the captain's upgrade to captain was not unexpected. One first officer, who knew the captain at Gulfstream International Airlines described the captain as the best stick and rudder pilot he had ever flown with. Another first officer who flew 4 legs with the captain two weeks before the accident stated that all flights were flown in accordance with company profiles, including a repositioning flight from Ottawa Canada to DTW with only the flight attendant on board. The first officer stated that there was no discussion about going to FL410 during the repositioning flight. A first officer who flew with the captain on October 7-8, stated that the flights were conducted in a standard manner with standard checklist usage and no deviations from the Flight Crew Operating Manual Volume 2. The captain was described by several pilots as "laid back" with a good sense of humor. One who flew with the captain on October 9-10 stated that the captain talked quite a bit in-flight during the two-day trip and said that it seemed like the captain did not like the cockpit to stay too quiet. Two pilots interviewed said his greatest strength was being someone who you could feel comfortable with and who was not intimidating. Still another first officer said the captain set a tone in the cockpit that made him feel comfortable in bringing concerns to the captain's attention. According to all pilots interviewed during the investigation, the captain had never discussed going to FL410.

The Pinnacle Airlines CRJ procedures coordinator who had gone out with the captain once or twice stated he was pretty outgoing and liked to have a lot of fun. The Director of the Corporate Education Center had first met the captain when both worked at Gulfstream International Airlines. He described the captain as an "easy going laid back guy."

⁹ Simulator session #5. See Operations / Human Performance Group Chairman's Factual Report for additional information.

The captain's widow stated that he had experienced only one emergency in his flying career. While flying for Gulfstream Airlines, the gear did not extend and the flight crew had to use the emergency extension procedures. The widow also stated that the captain had received a letter of commendation for one of his landings under challenging crosswind conditions from the president of the company while at Gulfstream.

The captain was described by his widow as being in very good health and someone who took care of his body and exercised regularly. He was a nonsmoker who would drink alcohol occasionally when out with friends. He did not take prescription or nonprescription medications other than occasional ibuprofen and daily vitamins. He had not been sick in the days before the accident. A Pinnacle Airlines first officer who had known the captain at Gulfstream International Airlines said the captain was a good father, attentive to his children, and happy about the upcoming birth. He said the captain did not appear to be a risk taker.

The captain was married and lived with his two daughters and wife in the Detroit area. His wife was 7 months pregnant at the time of the accident.

His widow stated that there was no evidence indicating that the captain had flown with the first officer before the accident flight.

1.1.1.1 Activity Lookback / 72-Hour History

According to the captain's widow, the captain would generally wake at 0745 and go to bed no later than 1100 when on reserve and not flying. He was off duty in the 3 days before the accident. On the evening of 10/13 he went to a movie with his wife. On 10/14 he visited a park with his family, then went out shopping, and out for lunch. He was notified of the ferry flight assignment in the afternoon. The captain departed DTW at 1919 as a deadheading crewmember and arrived in LIT at 2036 local.

1.1.2 The First Officer

The first officer, age 23, held a first class medical certificate issued January 14, 2004, with the limitation "must wear corrective lenses."¹⁰ He reported 565 hours total pilot time with 200 accumulated in the past 6 months on the application. A search of records at the National Driver Register found no history of driver's license revocation or suspension.¹¹

¹⁰ The medical record listed the pilot's distant vision as 20/40 corrected to 20/20 in each eye and combined, and his near vision as 20/40 corrected to 20/20 in each eye and combined.

¹¹ Application for employment at Pinnacle Airlines listed the following driving violations: speeding 11/28/99, 5/19/01, 6/3/01.

The first officer graduated high school in 1999.¹² According to application for employment dated February 19, 2004, he attended Broward Community College in FL from May, 2001 to December 2003 and completed an associate of science degree in professional pilot technology. In October 2002, the first officer started training at Gulfstream Academy of Aeronautics. He subsequently became a first officer on a BE-1900 for Gulfstream International Airlines.¹³

A Pinnacle Airlines Pilot Information Sheet dated 4/26/04 listed the first officer's total flight time as 539, including 140 PIC, 299 turboprop,¹⁴ 63 actual instrument, 152 simulated instrument, and 60 night.

His personnel file contained favorable letters of recommendation from Gulfstream International Airlines pilots. For example, a captain who had trained and flown with him wrote in a letter of recommendation dated 10 August 2003, "[the first officer] displays capable skills in maneuvering the aircraft smoothly and safely. [the first officer] also exhibits excellent situational awareness and decision-making ability... [the first officer] always strives to do his best for the company and its passengers while maintaining the highest degree of safety. When combining these character traits with his strict adherence to company procedures, his emphasis on crew resource management, and his strong communication skills, [the first officer] emerges as a well-rounded pilot suited for any airline."

A Pinnacle Airlines simulator instructor described the first officer as a good pilot with a positive attitude and someone who would have made a good captain in the future. He said the first officer was a pilot who had a friendly style in the cockpit but was also disciplined. A simulator checkairman who conducted the first officer's simulator check ride said he was a good pilot and a confident first officer. He said the first officer did a good job on his check ride and made only minor mistakes which were not uncommon for first officers to make. One checkairman who flew with the first officer during operational evaluation remembered the first officer as one of the better first officer's he had observed.

Captains who had flown with the first officer described him as a good and confident pilot who was good with the radios and with checklists and easy to get along with. He was described as someone who would freely ask questions if he didn't understand something; and although he was not quiet and reserved on the flight deck he was not overly talkative either. Most captains noted no lack of knowledge or ability. However, a couple of captains who had flown with the first officer remembered that he had demonstrated some minor difficulties programming the FMS, but they said that was not unusual for a new first officer. One captain who flew with the first officer on October 6 said that it was a normal flight and the first officer was excited about flying. He volunteered to the captain that this was his 3rd flight from DTW and he was unfamiliar with DTW operations because most of his flights up to that point had originated elsewhere. The captain said the first officer was somewhat talkative at cruise and they

¹² He worked for a brief period in non-aviation jobs including ground supervisor and arborist for a tree trimming service, and civil engineer co-op.

¹³ See Operations/Human Performance Group Chairman's Factual Report for additional information.

¹⁴ Turboprop hours accumulated during the 12 months preceding the date on the information sheet.

talked about a pickup truck that the first officer had recently purchased. A captain who flew with the first officer on October 11-12 described him as an average first officer. He said the first officer had no problems with checklist flows or FMS programming and that communications with ATC were good. He said the first officer had flown the airplane very well up to 10,000 feet on one leg. He characterized the first officer as polite and stated that at cruise they discussed the first officer's new truck, girlfriend, and his cat.

The first officer was described by his father to be someone in good health who exercised regularly. He was a nonsmoker who was reported to use alcohol occasionally during the first day or two of a work break. He was not taking any medications. He had an apartment he shared with pilots from another airline in the DTW area. He was described as having a positive attitude, motivated, and happy to be at Pinnacle Airlines. According to interviews, the first officer had not discussed curiosity or interest about going to FL410.

His father reported that the first officer had not previously flown with the accident captain.

1.1.2.1 Activity Lookback / 72-Hour History

The first officer was off duty from October 8-10 and visited his family in Texas the weekend before the accident and all his activities were routine. He traveled back to DTW on Monday, October 11, for his reserve duty assignment. He flew a trip October 11-12 and then was on reserve Wednesday the 13th. On 14 October, he departed DTW at 1919 as a deadheading crewmember and arrived in LIT at 2036.

2. Medical and Pathological Information

Tissue specimens from the captain and first officer tested negative for ethanol and a wide range of drugs, including major drugs of abuse.

3. Repositioning Flights

Pinnacle Airlines pilots and management personnel were asked about repositioning flights. Of the pilots who reported serving as crewmembers during repositioning flights, none reported going to FL410 during those flights or having discussions with other crewmembers during the flight about going to that altitude. The Chief Pilot, CRJ Program Manager, the Vice President of Safety and Regulatory Compliance, and Vice President of Operations, stated that they were not aware of any reports of pilots deviating from standard operating procedures during repositioning flights.¹⁵ The CRJ Program Manager, stated that he believed that the crews operate the same way during repositioning flights as they would on any other operation.

Chapter 4 of the Pinnacle Airlines Flight Operations Manual (section 4.38.0), "Non Revenue Flights" outlined that flights could be operated under the provisions of 14 CFR Part 91 when common carriage was not involved and the flight was not being operated as a regularly scheduled flight. Section 4.38.2 addressed the types of Part 91 flights and stated, "The provisions of Pinnacle Airlines MEL/CDL and the applicable sections of this manual will apply to all Pinnacle Airlines operations whether conducted under Part 91 or 121." Section 4.38.3 stated, "Flight Plans for these flights will be filed by Dispatch or the Pilot-in-Command. Dispatch will provide flight following services to all Part 91 operations."

Managers were asked how they ensure that crews were operating according to standard operating procedures (SOP) during repositioning flights. The CRJ Program Manager stated, "I'm not so sure how we can get any data on [crew conduct during repositioning flights] because we don't typically jump seat on repositioning flights." He further stated that when pilots were flying the airplane without passengers or flight attendants on board, operations would be conducted in accordance with SOP because they have good pilots at Pinnacle. The Chief Pilot stated, "same way I do any flight being conducted to SOP. We look at reports. We look at the numbers, you know, did they leave on time, did they not leave on time, and if anybody is on the jump seat doing a check. That's the only way I know of any flight I have is being conducted per SOP." He said that reports of deviations from SOP during a repositioning flight, such as seat swapping, would hopefully come out on either a flight safety report or a crew communications report.

¹⁵ Chief Pilot stated that he had heard rumors after the accident that there was a "410" club. He said pilots talking about these rumors indicated that they went there during a repositioning flight.

4. Communications With ATC During Emergency

Pinnacle Airlines personnel were asked about crew communications with air traffic control (ATC) during emergency situations, such as an engine failure.

Pilots stated that they had received guidance on declaring an emergency during training. For example, a first officer stated that based on his training, he would declare an emergency any time the safe outcome of the flight was in question. He recalled being told in training that an engine failure was automatically an emergency, however, he did not recall being told this specifically. A ground school instructor at Pinnacle was not aware if communications with ATC during emergency situations was a topic discussed during ground school. However, a simulator instructor pilot stated that when he trained pilots on ATC communications during emergencies, he recommended not overloading ATC with too much unneeded information, such as details specific to the aircraft system involved, because the controller may not have relevant knowledge of those things. He said he instructed pilots to declare an emergency and ask ATC for the specific assistance they would need to conduct the operation. A checkairman and APD stated that during an emergency situation, pilots were expected to declare an emergency and when able to take the time to talk to ATC, they should tell them what was wrong and what kind of assistance was needed. A checkairman stated that during emergency conditions, a pilot should be specific with ATC insofar as the nature of the situation and his intentions. Another checkairman told pilots to take care of any emergency first; and then to notify the entire crew of the emergency, followed by notifying ATC and dispatch.

When asked to explain how they would communicate with ATC during an emergency, one first officer said he would take care of the problem on board the aircraft first, and then he'd notify ATC (depending on how much time was available). The first officer added that if it was a catastrophic failure, he would let ATC know about it but not in too much detail. He added that he would "definitely tell them about a dual engine failure." Pilots were asked what actions they would take in the event of an engine failure regarding communications with ATC. One first officer said that (under most circumstances) he would use the quick reference handbook after an engine failure under and follow its instructions. He said that if it was an engine fire, he would perform the memory items and then declare an emergency with ATC and ask for vectors to the nearest airport.

Pilots stated that there was no "stigma" associated with declaring an emergency. During ground school, pilots were told to take care of the problem first and then notify ATC. One captain stated that he could not recall management ever questioning a pilot who declared emergency. The Vice President of Operations stated that pilots might not declare an emergency because they might be too busy. He added, "you aviate first, then you worry about communication."

5. Leadership Training

Pinnacle Airlines provided upgrading captains with a 2-hour leadership training module as part of the 8-day upgrade syllabus. According to company personnel, this training covered leadership authority, responsibility, and different types of leadership styles.

In July of 2004, a meeting was held involving FAA and Pinnacle personnel to discuss the high captain upgrade first-time failure rate.¹⁶ The FAA POI asked the Director of the Corporate Education Center to look at the upgrade failures to identify a common thread and find ways to reduce the failure rate. According to Pinnacle Airlines personnel, review of data indicated that leadership and judgment were among the most cited reasons for upgrade failure. The POI described the findings as showing that failures were predominantly because of deficiencies in "captain thinking skills" rather than stick and rudder skills. As a result of these findings, Pinnacle management decided to put more emphasis on a leadership program for its upgrading captains. A Professional Simulator Instructor in conjunction with the Professional Development Program Manager at Pinnacle Airlines were tasked with developing the new 8-hour course to be included as part of the upgrade curriculum. The course included modules on leadership/authority/responsibility, briefing and debriefing scenarios, decision making process, line experiences, decision-making during a crisis, dry run LOFT scenarios, and risk management/resource utilization. The FAA observed the program in November 2004 and the 8-hour module was to be incorporated into the upgrade training in December 2004.

The Manager of FOQA stated that one difference between captains and first officers was with their decision-making based on judgment. He added that if there was a weakness in captains it was in leadership skills. One captain, who was hired in 1997 and reported 6,500 hours total flight time including 3,000 in the CRJ as PIC, stated that there were a lot of inexperienced captains at Pinnacle who did not know how to be a captain. He said that captains with little or no 14 CFR Part 121 operations experience would benefit from a leadership course. The Director of Flight Operations stated that he felt that some type of management training for captains would help them with their decisions.

¹⁶ The POI stated that in July 2004 it was running about 22 percent. He said in September 2004, it was about 18 percent which he said was "still way high." Pinnacle Airlines target was 10 percent. See section 8 of this report for additional information about the upgrade failure rate.

6. Stick Pusher Training

The CRJ Program Manager discussed training relevant to the stick pusher. He said the stall protection system is addressed in both ground and simulator training. He estimated about 25 minutes were spent on approach to stall maneuvers during simulator training. During simulator training, pilots were also given an aborted takeoff scenario resulting from a faulty stick shaker. The CRJ Program Manager said that the approach to stall scenarios presented in the simulator didn't normally progress beyond the stick shaker to pusher onset. He added that it wasn't unique to Pinnacle Airlines training, but that in his experience, it was an industry practice that stall training was not taken to pusher activation. He said that there was a chance that a pilot may experience the pusher during this training if they over-corrected in response to the stick shaker. According to the CRJ Program Manager, Pinnacle Airlines instructed pilots that upon pusher activation to work with the pusher to decrease the angle of attack and then gradually return to the starting altitude for the maneuver. He said that pilots were not instructed to override the pusher during these maneuvers. He stated that in addition to exposure to the pusher during training, pilots tested it each day during their preflight checks of the stall protection system.

The Pinnacle Airlines Canadair Regional Jet Flight Crew Operating Manual – Volume 1 (revision 1 – January 2003) page 10-21, discussed the stall protection system: "... As a high AOA is approached, continuous ignition is activated. If the AOA continues to increase, the stick shakers are activated and the autopilot is disengaged. If the AOA still continues to increase, the stick pusher mechanism is activated, STALL lights on the glareshield panel flash red, and the warbler sounds. ..."

7. Crew Resource Management (CRM) Training

Pinnacle Airlines provided CRM training to pilots in either an 8-hour course for initial new hires, or a 2-hour course for recurrent and upgrade training.

The CRJ Procedures Coordinator described changes in the CRM training at Pinnacle. He said that 4 years ago when he went through indoctrination training the course was not very interactive and felt it did not prepare crews well. There was also an issue that some of the instructors were not adhering to the course syllabus or required time. As a result, the Procedures Coordinator and another instructor reviewed the CRM course content and updated the materials, courseware, and instructor guide. The new CRM course was expanded to 8-hours and it was in place at the time both accident crewmembers went through training. It covered resource management, human factors, communication, workload management, team building, and technical proficiency. Accident events and scenarios were also discussed. The course was presented using lecture augmented by PowerPoint slides, scenario-based questions, handouts, and videos.

In addition, company management, instructors, and pilots indicated that CRM concepts were reinforced and evaluated throughout simulator training. For example,

coordination with the other pilot and assertiveness were stressed and instructors discussed crew performance indicators during debriefs. A checkairman stated that he evaluates CRM during type-rating check rides but acknowledged that it was somewhat subjective. He looked at how the crew handles emergency scenarios and checklist procedures as indications of their CRM skills. However, he had not given an unsatisfactory grade on a checkride for just poor CRM skills because it would have likely been associated with deficiencies on technical areas, such as, not adhering to company procedures.

A captain who had not had any formal CRM training before joining Pinnacle Airlines thought the CRM course was effective and he found it informative. The Director of Flight Operations said he had seen good use of CRM when he flew the line. He further stated that the keys used to measure CRM effectiveness were teams working together, workload management, communications and good situational awareness.

The Manager of FOQA stated that the CRM training provided first officers with the tools they needed to challenge captains if warranted. The FOQA manager stated that whether or not a first officer would challenge a captain depended on how the cockpit was actually being managed.

The Director of Flight Operations could not say if the CRM program adequately prepared a first officer to challenge a captain. He had not seen any problems with a first officer challenging a captain and had not seen an atmosphere that would prevent it. One first officer said that he felt the class prepared him well to challenge a captain if necessary. A simulator checkairman rated CRM in first officers who he observed as 7 on a scale from 1 to 10 (10 being the best). However, he said that when first officers first fly on the line their confidence level could be better with respect to speaking up, especially when they have to fly with a senior captain. He said that he believed it was a pilot's personality and CRM training them that helped to determine whether a first officer would speak up to a captain or not.

Chapter 4, section 4.32 of the Pinnacle Airlines Flight Operations Manual outlined CRM and defined the crew performance indicators (communication, team building, workload management, technical proficiency).

8. Flight Operations Department Monthly Report

A monthly report was produced by the flight operations department that contained a financial review, budget review, examination of strategic cost controls, and a monthly performance review, for the work units within the flight operations department.¹⁷ Among the items presented under the category of strategic cost controls tabulations were training production and success rates. The October 2004 Flight Operations Department Monthly Report was examined. The following was noted:

Number of Pilots in Training

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
New Hires	19	20	38	20	58	60	36	24	48	48
Upgrade	8	6	12	20	30	20	24	16	12	16

New Hire Training Success Rate (percent)¹⁸

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
First-time	100	95	97	100	93	100	97	93	94	96

Upgrade Training Success Rate (percent)¹⁹

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
First-time	75	100	92	85	77	60	83	80	100	63

Operating Experience Average Hours

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
First Officer ²⁰	25.8	25.9	30.3	29.5	29.4	31.7	28.8	30.4	26.2	28.0
Captain Upgrade ²¹	30.4	30.1	22.2	22.8	21.5	20.2	17.4	19.4	18.3	19.0

¹⁷ Training, flight operations, SOC, aircraft operating, and tech pubs.

¹⁸ Target was 90 percent.

¹⁹ Target was 90 percent.

²⁰ Target operational experience hours for first officers was 25.

²¹ From January through March, target operational experience hours for captain upgrade were 25. In April target hours for captain upgrade operational experience were reduced to 15.

Submitted by:

Evan A. Byrne
Human Performance Investigator

Date