NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

February 28, 2007

Addendum 1 to Group Chairman's Factual Report

OPERATIONS

DCA06MA064

A. ACCIDENT

Operator:	Comair, Inc. dba Comair Airlines dba Delta Connection
Location:	Blue Grass Airport, Lexington, Kentucky
Date:	August 27, 2006
Time:	0607 eastern daylight time[1]
Airplane:	Bombardier CL-600-2B19 (CRJ-100), Registration Number: N431CA, Serial # 7472

ADDENDUM

Post-accident, the Safety Board investigated an incident at Seattle-Tacoma International Airport (SEA), Seattle, Washington where a Part 121 airliner departed on a different runway from the runway it was cleared to takeoff from.

Post-accident, the Safety Board investigated two incidents where a tower controller at Blue Grass airport (LEX), Lexington Kentucky thought that airplanes were planning to depart on runway 26 when they had been assigned runway 22 for departure. In both cases the controller radioed the pilots and advised them that they were on runway 26.

Summaries of the interviews of the pilots of all three incidents are included below:

October 30, 2006, Incident at SEA

Interview: Captain on SEA incident
Date: November 3, 2006
Location: Phone interview
Time: 1200 EST

[1] All times are eastern daylight time (edt) based on a 24-hour clock, unless otherwise noted. Actual time of accident is approximate, determined by the Flight Data Recorder (FDR) and Air Traffic Control (ATC) transcripts.

Present: David Tew, Evan Byrne, NTSB
Interview: Captain on SEA incident

During the interview, the captain stated the following information:

He had about 10,000 total flight hours. He had about 7,000 of pilot-in-command (PIC) flight time. His 18-year career had been on the B-737-200 except for a few months flying the B-727. He had no previous accidents or incidents or violations.

The event flight was part of a two-day trip. On day one, he deadheaded as a passenger to SEA. The event flight occurred on the first day flying [second day] of the 2-day trip. He got into SEA about 1715. He and the F/O went to an early dinner and returned to the hotel about 1900 Pacific Standard Time (PST)[2]. He was in the hotel from 1900 on and went to sleep about 2200. He set his alarm for 0610. He said he had a good rest. He had no health problems. He was not taking any medications.

The scheduled departure time was 0828.

The airplane had no maintenance problems and no minimum equipment (MEL) items.

He had flown with the F/O when he conducted part of his operating experience (OE) training. They flew a two-day trip together that had about eight legs. The F/O was still in his early stages of OE so he did not sign him off. The F/O was progressing normally. He did not notice any problems of significance with the F/O.

He was an instructor evaluator (IE). He also gave checkrides to instructors.

He said the F/O was performing normally during the flight.

They had a small delay due to a cargo issue. After the loading was completed, he looked at the yellow load sheet and found that one of the pallets was loaded incorrectly. The number on one pallet disagreed with what was indicated on the load sheet. They tried to radio operations but never were able to talk them, so they communicated with Dispatch. It took time for Dispatch to get back to them with a decision. It was decided to keep the pallet in place and change the load data. He corrected their paperwork to reflect the change. As a result of that change, the airplane was within weight and balance limits for departure but they had some follow-on issues they had to work on during taxi. They were having difficulty talking to operations on the usual radio frequency. They switched frequencies and had just as many problems. The ramp supervisor notified Dispatch that we were trying to make contact with them. Dispatch informed us that we had too much fuel to land. Dispatch requested we either return to the gate and defuel or burn the extra fuel enroute to Juneau, Alaska. The captain agreed to burn the extra fuel and said that required an amended release. The amended release changed the takeoff numbers so

[2] Pacific Standard Time (PST) All times are Pacific Standard Time (PST) based on a 24-hour clock, unless otherwise noted.

everything was "pushed" a little bit. It was probably a seven-minute delay in pushing back from the gate. The captain said he was trying to handle the communications about the fuel/weight issue until they started taxiing. Once the taxi started, the F/O worked the issue but passed the radios back to the captain when Dispatch wanted to talk with him about the fuel situation.

The F/O received their clearance early on. They pushed back from the gate and started the engines. The F/O then called for permission to taxi. The ground controller responded and said to hold our position for a B-757 passing off our right side. We were then advised to follow the B-757 to runway 34R at Quebec[3].

The ATIS [4] was information "G" and said departures were using the full length of runway 34R and also departing on runway 34R at Quebec. The captain read the information from the ATIS data card that they kept.

They pushed from gate C14 and it was not a long taxi. The captain said because of the anticipated delay receiving an amended release, he taxied very slowly and got "pretty far" behind the B-757. One concern, as they were taxiing was that ground control might ask them to speed up the taxi since were going so slowly.

The captain said they actually started the whole required taxi sequence when they were still at the gate. He told the F/O that it would be a rather quick taxi and they knew the takeoff weight was 120,000 lbs. He had the F/O check the takeoff data for runway 34R using either a full-length departure or a departure from Quebec. The F/O checked the manual and said they could do the takeoff from Quebec. Then they checked the noise abatement procedure. It gave improved climb speeds so they wrote those speeds down and set the speeds on their bugs.

They had everything they needed for a takeoff brief so, during the delay at the gate, they did the takeoff brief, instrument brief, and departure brief. The only things they needed to do when they got the final numbers were to set the trim and enter the zero fuel weight into the PDCS[5].

During the taxi behind the B-757, they received a call from Dispatch and had a conversation about the additional fuel. The dispatcher told him to expect an amended release. They did as much of the taxi checklist as they could up to where they needed the final numbers. They received the amended release, he called for flaps 2, and the briefs were completed.

The captain said he purposely stayed on the ground frequency and taxied slow because the F/O was new. He said the F/O was going to be the flying pilot and he wanted the F/O to switch to the tower frequency when he was ready and comfortable.

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[3] Quebec was the name of a taxiway that connected to the active runway. Some takeoffs were started at that point on the runway instead of using the entire length of the runway.
[4] ATIS – Automatic Terminal Information Service.
[5] PDCS – Performance Data Computer System

He said a captain should be focused on taxiing the airplane and so the F/O was the one working the numbers.

As they were taxiing, they watched the B-757 depart from runway 34R at the Quebec intersection. The captain told the F/O that he would preselect the tower frequency when they got to Quebec taxiway. But when he was coming to a slow taxi at Quebec taxiway and selected tower frequency, the tower controller was already on the frequency giving them clearance. The captain said he never had an opportunity to check in on the frequency as the tower controller was already calling them. The captain said they heard a "clipped" or partial radio transmission that was the controller saying position and hold on the runway. It did not dawn on him that it was a different runway. He repeated back what he heard which was position and hold for 34R. He said I read back exactly what I heard. I probably said 34C, but in my mind, I said 34R. They had briefed, planned, anticipated, and expected runway 34R. So, that was the plan and that is what he did.

He taxied into position on runway 34R. He asked the F/O if he was doing ok. The F/O said he just finished up. We set the trim. We finished up the taxi checklist and then went into the takeoff checklist. We were finishing the takeoff checklist when we received a clearance for departure. The captain said he was sure the tower controller said runway 34C and he read back what he heard, but he was thinking runway 34R. After the takeoff checklist was done, the F/O had a bit of time so he started briefing the noise abatement takeoff profile for himself. The captain said the F/O was doing a fine job.

He was sure he said the same runway that the tower said when they were on the taxiway, but he missed it twice. The captain said his flying was pretty much limited to the arctic and he had not been to SEA for a long time. It was the first time he had been to SEA since they renamed the runways. The captain heard the tower controller say that there was an airplane on short final and he interrupted the F/O's briefing and they went into a "let's get going mode."

The tower controller did not say anything to them about being on the wrong runway.

When we were at Quebec taxiway, they were parallel to the runway. There was a big U turn to make onto the runway. We were finishing up the checklists and briefing while making the big U turn. We were not in position on the runway for very long. He said he was not sure they ever set the brake in position. They received the takeoff clearance and were told there was an airplane on short final as they were taxiing onto the centerline of the runway.

We were slowing to a stop when we received the takeoff clearance. In that big U turn, they had time to finish up the takeoff checklist and rebrief their intentions with respect to the profile. As they lined up on the runway, the captain said he turned on the autothrottles and the flight director. As soon as he lined up on the runway, the captain's military training required him to do a compass check so he checked the compass. The captain transferred control of the airplane to the F/O.

It was a normal takeoff and normal acceleration. The F/O did beautiful job with the departure profile. During the takeoff roll, the tower controller did not say anything about being on the wrong runway.

After takeoff, the tower controller said, between you and me, the runway was changed, you were actually cleared for takeoff on runway 34C, have a nice day. The captain said he thought that would never happen as SEA was a big airport and a lot of people were listening. He said he thought everyone in the world already knows now.

After the tower controller told them that they had departed the wrong runway, the captain and the F/O did not initially discuss anything as they had business at hand. They waited until they were at cruise altitude and everything was squared away. They did fuel paperwork, reported the times, and did an engine monitoring report before they talked about what had happened back in SEA.

The captain said that when the controller informed them they had departed the wrong runway, his and the F/O's mouths "dropped" and he was "incredulous" that he could have done it. He had been thinking about it for the last 4 days.

In the company flight manual, they had a requirement to ensure that the aircraft was aligned with the centerline of the departing runway. The company provided training techniques to ensure that. One technique was to double-check the RMI[6] heading with the runway heading and the captain said he did that on every takeoff. They could set the heading bugs on the specific runway but could also use the heading bug as an indicator to indicate turns. They were required to have the airport diagram chart out during taxi. They could use that chart to verify the runway magnetic heading.

As a matter of course, they read back every clearance they received. They read back runway number when they were cleared onto the runway and also when they were cleared for takeoff. Everybody did that. It was in the manual to read back the runway number when receiving clearance instructions.

The fuel discrepancy concerned 200 lbs, which was not a significant amount of fuel. The pallets were in order but he did not know why the pallet number was not correct. Usually the cargo pallets were specific to the airport they were going to. Maybe they had the right pallet but just the wrong number transposed on the paperwork.

In his 18 years flying into and out of SEA, he had flown off all the runways at SEA. The only runway number that was not familiar to him was 34C. He had taken off on the runways when they were numbered 34L/R[7].

[6] RMI – radio magnetic indicator
[7] Runway 34L had recently been changed to 34C as the airport was building a new 34L runway.

The loading issue was resolved before they began to taxi. The amended release came during the taxi. As they taxied, he talked to dispatch on the radio about amending the release.

They had briefed runway 34R while they were sitting at the gate. Everything was set up for departure from runway34R at Quebec. The ATIS information said the takeoff runway was 34R.

He said the F/O had been a captain before and he had no doubt that the F/O would have spoken up if needed.

He said that if he could do the flight over again, he would select the SEA tower frequency at a normal position, which would be a reasonable distance from taxiway Quebec if there were no traffic. Because the F/O was new, he delayed changing to the tower frequency because he wanted the F/O to change the frequency to gain experience. He wanted the F/O to go at his own pace and to check in when he was ready.

Interview: F/O SEA incident
Date: November 2, 2006
Location: Phone interview
Time: 1310 EST
Present: David Tew, Evan Byrne, NTSB

During the interview, the F/O stated the following information:

He had been employed at the airline since March 2006. He finished his operating experience (OE) in July/August, 2006. He had been operating on the line for two months. He worked for several operators prior to being hired. He spent thirteen years in the US Army as a technical inspector on helicopters.

He had about 4,000 hours total flight time, including about 2,630 hours total pilot-in-command (PIC) hours. He had about 2,300 hours PIC in turbine airplanes. He had about 175-200 flight hours in the B737.

On the morning of the incident, the F/O awoke before his alarm clock rang. He had a "really good sleep". He went to bed around 2015 Pacific Standard Time (PST)[8] and awoke around 0550 or so and called scheduling. He was taking no medications and had not used any caffeine, as he was a "juice guy". He was in good health. Nothing affected his performance other than the workload.

The incident flight was the first flight of the day and it departed about 0828. He deadheaded down to SEA from Ted Stevens Anchorage International Airport (ANC) the

[8] Pacific Standard Time (PST) - All times in this interview are Pacific Standard Time (PST) based on a 24-hour clock, unless otherwise noted.

night before and arrived at 1700. He called crew scheduling about 0555-0600 on the morning of the event. He checked in with crew scheduling as he wanted to go eat breakfast and have a shower without worrying about missing the normal check-in. He left the hotel about 0700 in the van.

He had previously flown with the captain during his OE. The captain was one of his instructors for a one-day trip that included 5 legs.

They arrived at the airport about 0720. He thought they departed on time at 0828, but possibly was two minutes late.

He did the preflight, which was a normal F/O responsibility. He did the Before Start, Prior to Push, and Cleared to Start checklists. He did not notice any mechanical problems during his preflight. There were no minimum equipment items (MEL) on the airplane

They normally performed a taxi briefing and did perform one that day. Their taxi brief included specific runway information. During the takeoff briefing, they briefed a takeoff on runway 34R and discussed: noise abatement procedures, procedures if there was a problem after takeoff including a return to runway 34R, scanning of instruments, departure and climb procedures and the fact the airplane was heavy. The takeoff and climb performance was calculated for runway 34R.

They received a clearance via ACARS and it did not give a departure runway. A departure runway would not normally be on a clearance from ACARS.

They called ramp control for push back clearance from gate C-14. Ramp control gave pushback clearance and clearance to start engines.

It was an uneventful pushback. They completed the After Start checklist. They called for a taxi clearance. He recalled the clearance was to follow the B-757 jet off to our right to runway 34R at Quebec.

He had been into Seattle-Tacoma International Airport (SEA), Seattle, Washington before at night. This was his first time in SEA with the new runway change from runways 34L and 34R to runways 34R and runway 34C. They had received memos talking about the runway name and the new Jeppesen chart also had the change. His Jeppesen chart was on the clipboard next to his window. His Jeppesen departure chart was on his yoke. The captain had his airport diagram out also, and he believed it was on his clipboard.

It was a relatively short taxi. He said the pace of events that day was pretty much the same pace he encountered during OE and was the same pace they would normally do things.

He was asked about traffic flow and replied it was moderate to heavy. He said it looked like a normal day and they briefed to follow the B-757 during the taxi out. They were not "slammed" up behind the B-757 during the taxi because they had slowed down a bit during their taxi, which created space. The time interval between the B-757 takeoff and our takeoff was about three minutes. He recalled seeing the B-757 taking off and remembered pushing his stopwatch after he saw it takeoff. They took off right after the B-757.

After they got clearance to taxi to 34R at Quebec following the B-757, the captain called for flaps, and the F/O performed his pre-takeoff duties. He seated the flight attendants (F/A), then received an ACARS message which was an amended release asking the captain to burn an extra 200 pounds of fuel in the air before landing in Juneau, Alaska. He wrote down the release information on the flight paperwork. He noticed the B-757 jet takeoff on runway 34R. As they were rounding the turn onto taxiway Quebec, they received another message from dispatch with the numbers for takeoff. The captain monitored him as he was putting the numbers into the Performance Data Computer System (PDCS) which gave them airplane weight, airplane fuel, altitude capability, and the thrust settings. Cards were used to determine the takeoff speeds. Normally it was the F/O's job to change frequencies, but the F/O said he was really busy as they were turning onto taxiway Quebec and the captain tuned the radio to the tower frequency and heard a "second" call after he had switched from ground to tower. The captain responded to this second call about taxiing and holding short of runway 34C. This was the first time he heard of a runway 34C takeoff. When asked how he knew it was a second call, the F/O said he knew it was the second call because he had a chance to listen to the air traffic control (ATC) tape. He thought the captain responded, "taxi into position and hold on 34C". When they were finished with the numbers, the captain called for the taxi checklist. They performed the taxi checklist and finished it at the same time that tower cleared them for takeoff on runway 34C. They completed the taxi checklist just prior to entering or on the hold short line for runway 34R and the captain immediately called for the takeoff checklist. They were in continuous motion. The F/O said he was "smoking", "was working it", "was moving", "and was "hustling". The tower controller released them for takeoff on runway 34C. The captain responded to the tower controller's release for takeoff.

He thought the landing traffic was about four to six miles out and was going to runway 34C. He could not physically see the landing traffic, but thought ATC said the traffic was on a four mile final. He said he had no clue why the takeoff runway was changed to 34C. The captain was operating the radio. The tower controller said cleared for takeoff 34C. The controller said company traffic was on a four mile final and said expedite your takeoff. He was not sure if the captain responded to the expedite message.

The F/O said he completed the takeoff checklist as they straightened up on the runway and he then turned to the captain and asked if they were cleared for takeoff. The captain responded "yes" and transferred control of the airplane to the F/O. The F/O performed the takeoff, as it was his leg. He did not see the runway numbers in front of him because it was an intersection takeoff.

The F/O said he was out of the loop because he was busy. He said that should have been his first indication that he should have said hey, can we slow down. Everything was rushed. He missed the ATC calls.

There were procedures taught during training for identifying runways for takeoff. He knows that they were supposed to read back the runway to tower when tower called for hold short or gave taxi clearance to a runway. They were supposed to always read back the runway number. Obviously, you have signs by the runways to look at and numbers on the runway. Their heading bugs were usually set to the runway that they were taking off on. He was not sure whether that was a company procedure or not.

The captain was operating the radios and acknowledged two tower-made radio calls. The F/O did not recall what the captain specifically said, but he did remember the two calls each had to do with runway 34C.

After the captain lined up the airplane on the centerline of the runway, he gave me control. I said I have the controls. I raised the throttles up and increased the engine power toward max power for takeoff. I called "stable". The F/O said he pressed the autothrottle (A/T) button. He called for the captain to set max power and glanced at the engine pressure ratio (epr). The captain called max power set. The airplane was centered on the runway during the takeoff roll and went right down the line. During the takeoff, he noticed there were a few birds. They were accelerating down the runway and the airspeed indications were alive on both sides. There were callouts of 80 knots, V1, Vr. I rotated the airplane and there was callout of V2. When there was a positive rate on the ivsi[9], I called for the gear up and climbed out. At 2,000 feet, engine power was reduced to noise abatement power. Then the tower controller said "between you and me you departed on 34R not 34C". The tower controller said, "don't worry about it" and told them to contact departure. The captain responded and contacted departure control.

I said "what" and looked right at the captain. The captain was baffled too. We talked about it when we were leveled at altitude. I asked the captain what happened. We discussed the events that transpired. About halfway between Seattle, Washington and Juneau, Alaska, we received an ACARS message to contact the flight operations duty officer (FODO) when we landed in Juneau.

The rest of the flight was uneventful. It was a clear VFR[10] day.

There were no communications from the tower during the takeoff. The tower controller did not rescind the clearance to takeoff or say abort. They could have turned off the runway in a heartbeat.

He had no previous accidents or incidents. He had no previous violations.

[9] IVSI – Instantaneous Vertical Speed Indicator
[10] VFR – visual flight rules

He was asked what would he do differently. He said he would stop everything. His CRM training was that once you start feeling out of the loop you needed to stop and regroup. He should have picked up on that and done that. That was a hole in the cheese. Once they got the second ACARS message with the numbers, he would say to the captain they needed to slow down as he was out of the loop. He would say give me a chance to catch up with you. The F/O said he did not hear the ATC transmission,

Dispatch had asked if it was okay to show an additional 200 lbs. of fuel burn and the captain agreed. The first ACARS message was the amended release adding the additional fuel burn. The second ACARS message was the actual numbers for takeoff.

The F/O said he realized he was wrong and would like to turn back time. He would slow the process down so that when he received the first indication that he had come out of the loop, he would halt what was going on. He did not catch what tower said and did not catch the clearances to runway 34C. He said he would say let's slow down and let me get the big picture.

He felt rushed due to the window that ATC gave them. He was doing his job to the best of his ability in the conditions that he was given.

The captain never said hurry up but he could tell could tell he wanted to go. He did not want the captain to be waiting on him.

He was asked if he felt that he would have been able to slow things down and challenge the captain. He responded "yes" and said he had no problem telling the captain that they needed to slow down. His training backed that up. The company had a really good CRM program and the program said if you're not feeling comfortable you don't go. He had no problem telling the captain.

November 9, 2006 – Incident at LEX

Interview: **PA-32 Piper Lance pilot – LEX incident**
Date: **November 24, 2006**
Time: **1300 EST**[11]
Location: **Telephone interview**
Present: **Evan Byrne, Dave Tew, NTSB**

The pilot was a charter pilot. He had approximately 25,000 hours total flight time and had been flying charter for about 30 years. He was flying a PA-32R Piper Lance on November 9, 2006.

On November 9, 2006, he flew a Part 135 freight flight from Logan/ Cass County Airport (GGP), Logansport, Indiana to Shelby Municipal Airport (EHO), Shelby, North Carolina arriving about 2200. Fuel wasn't available at EHO so he decided to land for fuel at Blue

[11] EST – eastern standard time – all times are est unless otherwise noted.

Grass Airport (LEX), Lexington, Kentucky on his Part 91 trip back to GGP. Referring to his logbook, he said he was only on the ground in LEX about 12 minutes and then taxied out to runway 22 for takeoff. It was night VMC conditions. He said in a single engine airplane it can be a little confusing taxiing out from the fixed based operator (FBO) to the runway because of the large air carrier ramp area and the tunnel vision provided by only one landing light. He said he had his taxi chart out and was using it during the taxi. After clearing the air carrier ramp, he was using taxiway A to runway 22 and he recalled the taxiway looking like it did on his chart. He added that the taxiway was blocked off beyond runway 26 a month earlier.

The air carrier side of the taxiway from the FBO to runway 22 did not have blue edge lights because of the ramp. He said runway 22 was very well lit up and the other runway was dark. He knew that he would be taxiing by runway 26 at some point. He said that when approaching runway 22, he stopped about 50 yards short of the runway as it was hard to see the hold short line painted on the taxiway and he needed to do his runup. He said he stopped a lot shorter than normal - but he could plainly see down the taxiway in front of him and runway 22 was lit up. He said when he completed his runup, he called tower to report he was ready and the tower surprised him saying that he was on runway 26. He said the controller sounded a little alarmed, and was quick coming back with the statement that he was on runway 26 and to taxi onto runway 22.

He said he was familiar with LEX having been in there an average of 6 times a year. He had last been into LEX about a week or two before that night and remembered seeing the lighted X closure sign for runway 26. On November 9, 2006, he assumed that runway 26 was still closed. He said his airplane's heading was about due north when he was stopped and called ready for departure. He said his airplane was aligned with the taxiway to runway 22 at all times and never turned onto runway 26. He did not see the painted runway numbers for runway 26. He said his log showed he started the engine in LEX about 2352 and he estimated that it took him 5 minutes to taxi, do the runup and call for takeoff. He was not sure if he saw a vertical lighted sign for runway 22 or a flashing amber light. He was not sure what was there at the time. He stated that he did see yellow hold short lines painted across the taxiway; and that at no time was he confused over which runway he was planning on taking off on. He said runway 22 was clearly lighted, visible to him, and he was planning on taking off from it. He said the fact he had held so far away from the runway 22 hold short line, apparently stopping right on 26 itself to do his runup was likely what gave the controller the mistaken impression that he was planning on taking off on 26.

January 1, 2007, Incident at LEX

Interview: Learjet First Officer – LEX incident
Date: January 12, 2007

Location: **Telephone Interview**
Time: **1000 EST**[12]
Present: **David Tew, William Bramble, NTSB; Don Rickerhauser**

During the interview, the F/O stated the following information:

He had approximately 3,800 hrs total flight time, 2,300 hours as pilot-in-command (PIC), and 1,000 hours in Learjets.

The flight out of LEX occurred on January 1, 2007. It was the flight crew's fourth leg of the day. They had begun the day at 0830 at Chicago Midway International Airport (MDW), Chicago, Illinois. They departed MDW at 0925, ferried the airplane to Spirit of St Louis Airport (SUS), St. Louis, Missouri. They flew from SUS to Louis Armstrong New Orleans International Airport (MSY), New Orleans, Louisiana. They then flew to Blue Grass Airport (LEX), Lexington, Kentucky arriving there at 1947. At LEX, they disembarked a passenger and were on the ground at about 45 minutes before departing to return to SUS.

The F/O had been to LEX before, at least 3, maybe 4 times. The captain told him he had been there previously too. At LEX, they parked at TAC Air. The F/O called for the taxi clearance. The tower instructed them to "taxi to 22." He did not recall anything unexpected about the taxi instruction.

Asked whether he used the airport diagram while taxiing, the F/O said he had the airport diagram out in front of him and that "we do a taxi briefing before we come out of the chocks. We discussed our routing, discussed our taxi clearance, went over our routing, and where we were going. That was done after the After Start checklist. We did the checklist, and then got our clearance." The F/O stated that they also set the heading bug to 220, the heading for the departure runway that had been assigned to them.

After they received their taxi clearance to runway 22, they discussed their taxi routing, and commenced the taxi. Before they even got to the taxiway next to runway 26, they had completed their Taxi checklist. The Taxi checklist consisted of only 3 items.

The F/O stated that as they were approaching runway 26, the tower cleared them for takeoff on runway 22, and they then came up over a hill.

Asked to describe the location of the hill, the F/O said that as they came up on the approach end of runway 26, they could not see runway 22 until they got right on top of the runway 26 painted numbers. He added, "It can be vague."

Asked to clarify whether he was saying that one could hardly see runway 22 when holding short of 26, the F/O said he did not remember seeing runway 22 until he was on top of runway 26. He added, "I knew where it was because I was familiar with the

[12] All times are eastern standard time (EST) unless otherwise noted.

airport and had the diagram in front of me, but I could not see the approach lighting for runway 22 until we got on top of runway 26. You had to look over to the right."

The F/O was asked if it was a pretty straight course to taxi from taxiway A to runway 22. He stated, "You have to angle to the right to get to 22." Asked when they started to angle to the right, he said, "You can do it just before you get on top of the runway itself, but it's definitely angled to the right." He stated that as they came up on the runway, the captain was momentarily looking ahead to runway 22, and that was when the tower came on and said they were headed to runway 26. The F/O said it seemed the tower thought there was some kind of confusion, but there was none. The F/O stated that they did not have the takeoff checklist completed, the thrust levers set, or the trims set for takeoff. He stated that they set the trim during the before takeoff check.

Asked when they normally did the before takeoff checks, the F/O said they did the takeoff items when they are lined up on the departure runway. The pilot not flying (PNF) would query the pilot flying (PF) and make sure all the takeoff checks were completed, and then they would launch. The F/O said the captain never called for the takeoff checklist while they were crossing runway 26, but he called for the takeoff checklist on runway 22.

When asked whether the captain taxied straight across runway 26, the F/O said, "He momentarily was looking for the taxiway straight ahead, and when I pointed, he turned to the right." Asked whether they ever turned onto runway 26, the F/O said no.

When the tower controller transmitted, he stated, "That's runway 26." The F/O said he assumed the controller thought there was some confusion and that they were lining up on runway 26. The F/O stated, "We never turned onto runway 26 for departure."

Asked to describe the sequence of events from the time they crossed the hold short line for runway 26 until they reached the hold short line for runway 22, the F/O said that while they were in the general aviation area at TAC Air, they completed their After Start checklist and briefed the taxi routing. They had completed the Taxi checklist before they got off taxiway C. After taxiway C, they turned right on taxiway A, and they were approaching runway 26. He stated that they did not talk much after discussing their taxi routing. They were aware of the 2006 accident at LEX, so they were fully focused on the task at hand. As they approached runway 26, the tower cleared them for takeoff. As they crossed runway 26, the captain momentarily thought runway 22 was straight ahead. The F/O pointed out that runway 22 was to the right. They turned to the right, taxied to runway 22, completed their Before Takeoff checklist, took off and completed their flight.

Asked to review the turns they made to cross runway 26, the F/O said they had to turn off taxiway A onto runway 26, and then turn right onto taxiway A7. Asked whether they had to turn left to cross 26, then turn right onto A7, the F/O said, "Yes, they're not giant turns, but you have to slightly angle." Asked how far they progressed across runway 26 before angling to the right, the F/O said, "I don't recall it being any far amount. It was just a momentary thing where he was going straight ahead with his left angled direction."

The F/O stated that they were just touching the runway 26 numbers when they angled to the right. He did not recall being way out on the runway before he realized it was to the right. There was never any confusion thinking runway 26 was runway 22, because they had just briefed it numerous times. Asked whether they had paused on runway 26 while the captain had sorted it out, the F/O said, there was a momentary pause, but not for a significant amount of time. He said, "We continued on 26, I pointed to the right. The tower said that's 26." Asked whether the tower had transmitted before or after the pause, the F/O said, "At the exact moment I was pointing to the right was right at the pause. But it wasn't a full pause. It wasn't a minute pause or a 30-second pause. I believe we were still rolling, we were still in motion."

Asked whether the tower had volunteered their takeoff clearance or they had asked for it, the F/O said, "I think they just gave it to us before we approached runway 26, and I put in my email that maybe they shouldn't do that."

The F/O was asked if he remembered seeing the runway sign for runway 26. He said he did not remember seeing it. Asked if he remembered seeing the runway 26 numbers on the pavement, he said yes. Asked whether the runway 26 numbers were easy to see, he said yes. Asked whether they looked faded, he said, "No, everything looked pretty clear. It was good VMC[13] conditions that night. I don't remember anything looking used or old."

Asked to describe his discussion with the captain about the previous LEX accident, the F/O said that when they were at MDW, and even the day before when they were looking at their trip the next day, they were very aware of it. He stated that he had even gotten the airport diagram out on the ground at MSY, and on the way to LEX. He stated that the occurrence of the previous accident at LEX was "Not something we take lightly," adding, "We've flown in there quite a bit."

Asked to describe what they discussed about the previous accident, the F/O said they had discussed what they read on the Internet and saw on the news about the guys being on minimum rest, and departing the wrong runway. They had talked about the actual airport diagram. They never really talked about it in terms of blame or fault, they were just kind of unsure how it could have happened.

The F/O was asked if he had gained any insights about how it could have happened since he had recently flown out of LEX. He stated, "I think the tower giving you a takeoff clearance before crossing 26, and not being able to see the taxiway to 22. I think there were just a multitude of items and a couple of screw-ups that led to that, and the minimum rest, and just going through the motions. I'm assuming that's how it happened. I don't know the details. From my point of view, the taxiway to 22 was hard to see until you got onto 26. The tower giving us takeoff clearance before we got to 22 kind of caught me off my guard."

[13] VMC – visual meteorological conditions

Asked whether he found the intersection between taxiways A, A7 and runway 26 confusing, the F/O said he did not because they had briefed it so much, but he could see how it could be confusing, especially in low visibility, bad weather conditions. He added, "That hill, at night, if you're sitting in the cockpit, everything's kind of hidden and everything is lit up at the same intensity. The captain and I didn't find it confusing, but it could be confusing."

The F/O was asked how high the Lear 45 cockpit was above the ground. He said it was about 4 or 5 feet from the ground to pilots' seat bottoms. He estimated eye view at about 8 feet.

The day before the incident, the flight crew had taken a commercial airline flight from William P. Hobby Airport (HOU), Houston, Texas to MDW in the afternoon. Two days before the incident they were completely off-duty. Three days before they had ferried a new airplane from the Lear factory in Wichita, Kansas to HOU.

After arriving at MDW the day before the incident, the flight crew had gone straight to the hotel. The F/O said he received at least 8 hours sleep the night before. He said there was always a chance they could get called out for earlier flights, so he tried to go to bed early. He went to bed around 2100-2130.

Asked whether it was dark when they were taxiing out to depart LEX, the F/O said yes. Asked whether he could see clearly, he said yes.

The F/O was asked, "When you taxied up to and across runway 26, were the runway lights on 26?" He replied, "Yes." Asked to describe the intensity of the runway lights, the F/O said, "I recall everything being high, including taxi lights to 22."

The F/O was asked whether he could think of any other airports with potentially confusing intersections similar to the one at LEX. He stated that he knew there were some out there, but he could not think of one off the top of his head. Asked whether HOU airport had similar confusing intersections, he said, "No, it's not confusing there."

Interview: **Learjet Captain –LEX incident**
Date: **January 17, 2007**
Location: **Phone interview**
Time: **1400 EST**[14]
Present: **David Tew, William Bramble, NTSB; Don Rickerhauser**

During the interview, the captain stated the following information:

His total flight time was 6,000 hours. He had between 1,600 and 1,800 flight hours in the Learjet. He had 600 hours PIC. He had been a captain on the Learjet since April 2006. He had previously flown Cessna Caravans for 2.5 years.

[14] All times in this interview are eastern standard time (EST) unless otherwise noted.

His logbook indicated that on December 29, 2006, they were performing an acceptance flight on airplane. They were off duty on December 30, 2006. On December 31, 2006, the night before the incident, they flew a commercial airline into Chicago Midway International Airport (MDW), Chicago, Illinois to pick up an airplane. On the day of the incident, his duty started at 1452Z[15]. He said it was not "super early". They departed MDW at 1550Z and flew to Spirit of St Louis Airport (SUS), St. Louis, Missouri arriving at 1651Z. They departed SUS at 1746Z and flew to Louis Armstrong New Orleans International Airport (MSY), New Orleans, Louisiana arriving at 1913Z and waited there for two passengers. They waited between 3 and 5 hours on the ground at MSY. They departed at 2308Z from MSY and flew to Blue Grass Airport (LEX), Lexington, Kentucky arriving at 0046Z.

He had been into LEX previously, but always in the daytime. This was his seventh trip to LEX. It was dark when they arrived.

At LEX, they dropped one passenger off. They were on the ground for 20-30 minutes. They were given a clearance from tower to taxi. They were cleared to taxi to runway 22 via taxiway charlie (C). The captain said he was sure that's what the controller said.

The captain was asked if they performed a taxi briefing. He said he performed a taxi briefing that night and did one every time. He said they perform a taxi briefing before we leave the blocks and it included looking at where we were on the airport diagram and the taxiways we were cleared to taxi on to the runway.

He was asked how many items were on the Taxi checklist. He said they were still using the old checklist at that time and there were a few items on it. On the old checklist, a lot of it was verbalized between the pilot and copilot, checking between heading indicators and that kind of stuff.

He was asked where he was located when they finished the Taxi checklist. He said the Taxi checklist was done way before they reached runway 26. He said they were right at the end of the airline terminal before the right hand turn was made onto the taxiway, that paralleled the runway.

He was asked what they did and said from that point. He said the runway heading had been bugged for runway 22. About halfway between where they made the right turn and the runway, they switched to tower frequency and tower issued them a takeoff clearance to take off on runway 22 and fly runway heading. The takeoff clearance was received when they were about 75 yards before the hold short line for runway 26. Asked if he remembered the wording of his takeoff clearance, the captain said he could not recall exactly, but it was something like, "Cleared for takeoff 22 runway heading."

The captain said, from being in LEX in the past, he recalled that it was a slight left turn after you made the left turn from the taxiway onto runway 26. However, on this

[15] Z is a designation for Greenwich Mean Time

occasion, the taxiway was straight across. He was asked if he had any idea why he thought the taxiway to runway 22 was to the left instead of straight ahead as he came onto runway 26. He said that was just his idea as he taxied and the airport diagram seemed to indicate a slight turn. He said he thought there was also another taxiway to the left, but he was not planning on using that one. He was intending to take the taxiway that led to the approach end of runway 22 rather than the touchdown zone.

He was asked if he recalled any obstructions to his view of the taxiway lights. He said when he got to the hold short lines for runway 26, he could not see across runway 26 to the taxiway that took you to runway 22. He was asked what did it look like and he responded it looked like you were staring at a hill. You could not see across runway 22, as you were slightly lower than the runway at that point. As he made the left turn across the runway 26 hold short line, he was expecting to see the taxiway lights for runway 22. When you got up onto runway 26, you noticed the taxiway to runway 22. He said at the angle he was on the runway, he could not see straight down the taxiway. He then saw the blue taxiway lights and knew that was where he needed to be. He was asked if he recalled what the intensity of the lights was when he taxied out. He said he thought the lights were on bright. He said he knew the lights were not on the low setting.

He said when he taxied onto runway 26, he knew the tower probably thought they were going to line up on runway 26, because of the airplane's angle. However, he saw the taxiway out of the corner of his eye to the right and three things happened at once. He saw the taxiway to runway 22, the F/O saw the taxiway and said, "it's over here," and the tower controller chimed in at the same time. The tower controller was concerned that they were lining up for takeoff on runway 26. His transmission sounded something like, "……. It looks like you're lining up on 26. I cleared you for takeoff on 22." The F/O responded, "yeah we've got it, no problem, we see the taxiway". According to the captain, they never lined up for takeoff on runway 26, but they were on it.

The captain was asked if he was planning on taking off at that point. He said "No", the takeoff trims were not set and nothing else was set for takeoff at that point. The captain was asked when they did the takeoff checklist. He said it was done slightly before they rolled onto runway 22. He said that they had already done some of the checklist items, but had not completed the checks when they were making the turn. Some of the flow was nonverbal, like turning on the window heat. That was done as soon as you were cleared for takeoff.

He was asked if it was legal for him to take off on runway 26. He responded No. He said company policy for that airplane was to takeoff with nothing less than 4,000 feet of runway.

The captain was asked if the airplane was stopped after he had taxied onto runway 26. He said he would not say it stopped. He taxied onto the runway, made a turn, and then made a right turn to get back on the taxiway.

He was asked if he could see down runway 26 as he taxied across. He said probably but he did not recall. He said he could not even recall whether the runway 26 lights were on or off.

He had made three previous trips to LEX before the recent construction. During one previous visit in the last year and a half, there was construction on one of the taxiways. A back taxi was required to get on runway 22. He had to do a 180-degree turn to take off in the opposite direction. He was asked if the taxiway configuration near runway 26 appeared to have changed since his last visit and he responded no.

The captain was asked if the area where taxiway alpha (A) met runway 22 was confusing. He said he could see how it could be confusing at night. He had never had an issue in the daytime, but that trip was the first time he had seen it at night. He said in-ground lights or reflectors across runway 26 that guided you to the taxiway would help. Asked whether he thought the airport signage was adequate, the captain stated he did not think there was any problem with the airport signage. He said he thought LEX was not any more confusing for surface navigation than an average airport of similar size. It was just confusing in that one little spot. He said that particular spot was not any more confusing than average.

He was asked if he could think of any other areas on other airports that were similarly confusing. He said there was one spot concerning runway 1 and runway 9 at Waco Regional airport. They had runways that came together in that same arrangement. The elevation at Waco Regional was pretty flat and there was no hill so it was easier to see.

The captain was asked if there was anything wrong with the airplane at all. He said, if there were anything, it would have been a passenger convenience item. There were no maintenance problems.

He had never had any incidents or accidents before.

He said he had previously been into LEX on the following dates:

(1) 8/20/05

(2) 12/1/05

(3) 12/24/05 –this trip involved an overnight stay with a 12/25/05 departure

(4) 4/27/06

(5) 6/14/06

(6) 7/25/06

(7) 1/01/07

Addendum submitted by

David Tew