NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

May 7, 2015

Specialist Report

OPERATIONAL FACTORS

ENG11IA047

Contents

A. INCIDENT

Operator: ExpressJet Airlines
Location: Moline, Illinois
Date: August 29, 2011
Airplane: ERJ-145

B. SUMMARY

On August 29, 2011, at about 1236 central daylight time, an Embraer EMB 145 XR, registration N27152, operated by ExpressJet Airlines as United Express flight 5821, departed the left side of runway 10 during the landing roll out at Quad City International Airport, Moline, Illinois. There were 50 passengers and 3 crew members on board with no injuries reported. The airplane sustained minor damage. The flight was operated under the provisions of 14 Code of Federal Regulations Part 121 as a domestic passenger flight from Denver International Airport.
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C. OPERATIONS GROUP

Captain David Lawrence - Chairman
Senior Air Safety Investigator
National Transportation Safety Board (NTSB)
490 L'Enfant Plaza East S.W.
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Mr. Luciano Saraiva Resende
Flight Operations Engineer
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Captain Trey Ables
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ExpressJet/Atlantic Southeast Airlines
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Captain Michael Shanks
Chairman, Central Air Safety Committee
Airline Pilots Association (ALPA)
Bush Intercontinental Airport - IAH
Houston, Texas

D. BACKGROUND

The Operation Groups Chairman did not launch on this incident. On September 30, 2011, the Group Chairman traveled to Houston, Texas to conduct interviews of ExpressJet training department personnel, and conduct simulator tests of the Moline, IL runway excursion of ExpressJet 5821 that occurred on August 29, 2011. The NTSB was assisted by representatives from ExpressJet, ALPA, and Embraer. The FAA did not travel to Houston, but participated in the subsequent interviews.

E. PILOT INFORMATION

The crew consisted of a captain, a first officer (FO) and one flight attendant. It was the fourth day of a four day trip, and was the first trip the captain and FO had flown together.

1.0 Captain

According to his interview, the captain was 40 years old. He went to flight school in Arizona in 2002. He was a flight instructor there before getting hired by ExpressJet in 2005. He was based in Chicago, and he trained in Houston for both ground school and simulator. He had flown the

E135 and E145 at ExpressJet, and was a Captain on the E145. He held a first class medical with a limitation to wear corrective lens, and he was wearing them at the time of the incident.

He estimated his total time was 5,100 hours, with 1,600 hours as pilot in command (PIC). About 4,000 hours of his total time was in the Embraer aircraft, and about 720 hours was as Captain. He upgraded in September of 2007.

1.1 Certificates and Ratings[1]

Ground Instructor – Advanced certificate issued April 22, 2005

Flight Instructor – Airplane Single & Multi Engine, Instrument Airplane certificate issued August 21, 2009

Airline Transport Pilot – Airplane Multiengine Land EMB-145, Commercial Privileges Airplane Single Engine Land, ATP EMB-145 Circ Appc – VMC Only Circ. Apch. -VMC Only certificate issued September 4, 2007.

2.0 First Officer

According to his interview, the FO was 36 years old. He was a former flight instructor in 2002 having flown various Cessna and Piper aircraft before he was hired at ExpressJet in January of 2007, where he had flown the E135 and E145 as a First Officer (FO). He held an Airline Transport Pilot's license with an E145 Second in Command (SIC) rating, a Certified Flight Instructor certificate with instrument and multi-engine ratings, and had a First Class Medical certificate. He estimated his total flight time was 5,500 hours, with about 1,000 hours as Pilot in Command (PIC). He estimated his total E145 flight time at 4,000 hours.

2.1 Certificates and Ratings[2]

Flight Instructor – Airplane Single and Multiengine Instrument Airplane certificate issued June 24, 2010

Commercial Pilot – Airplane Single and Multiengine Land Instrument Airplane, EMB-145, EMB-145 SIC Privileges, EMB-145 Circ Appc – VMC Only certificate issued March 7, 2007.

F. WEATHER[3]

Metars:
KMLI 291452Z 08005KT 10SM CLR 22/14 A3006 RMK AO2 SLP176 T02170144 51007
KMLI 291552Z VRB03KT 10SM CLR 24/14 A3007 RMK AO2 SLP180 T02390144
KMLI 291652Z 10003KT 10SM CLR 24/13 A3006 RMK AO2 SLP178 T02390133

[1] Source: FAA.
[2] Source: FAA.
[3] Weather information provided by Mr. Paul Suffern, NTSB.

KMLI 291752Z 00000KT 10SM CLR 24/13 A3005 RMK AO2 SLP172 T02440128 10244 20144 58003

Incident occurred at 1753Z.

KMLI 291852Z 15007KT 10SM CLR 26/14 A3004 RMK AO2 SLP170 T02560139
KMLI 291952Z VRB03KT 10SM CLR 26/14 A3003 RMK AO2 SLP166 T02610139
KMLI 292052Z 09005KT 10SM CLR 26/13 A3000 RMK AO2 SLP157 T02610128

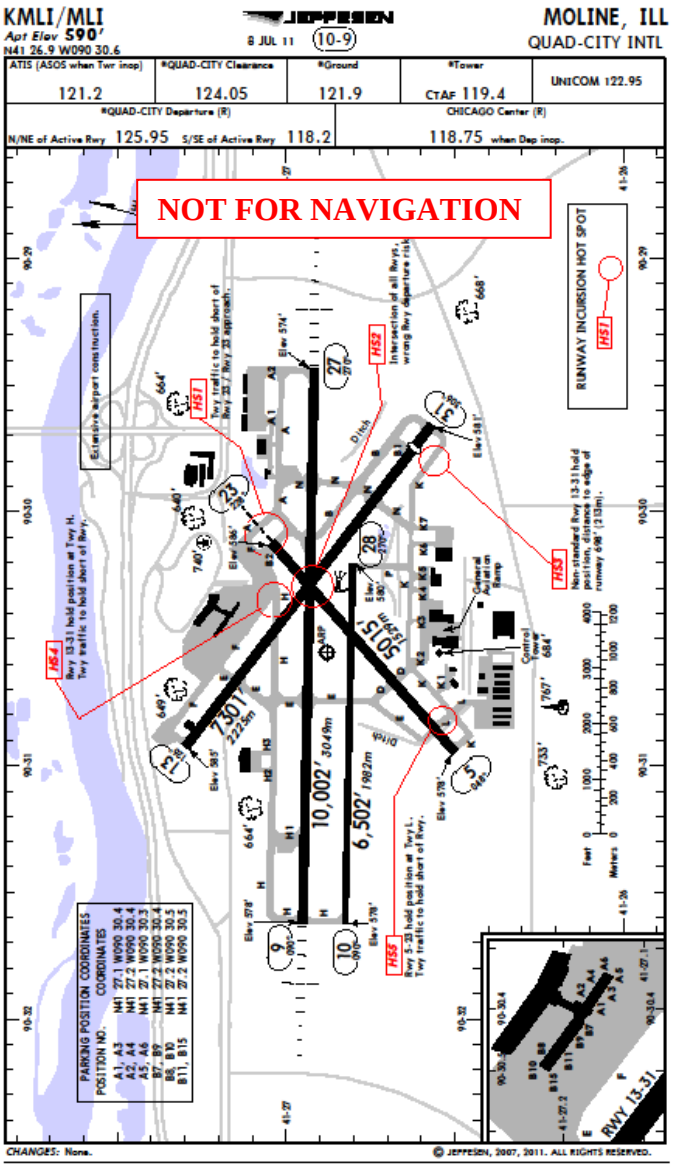
TAFs
KMLI 291249Z 2913/3012 VRB03KT P6SM SKC
FM291700 13005KT P6SM SCT040
FM300100 14003KT P6SM SCT250
FM300500 14003KT P6SM SCT120=

G. AIRPORT

Quad City International Airport (MLI) was located 3 miles south of Moline, Illinois. The airport had an elevation of 590 feet mean sea level (msl), and was located at Lat/Long: 41-26-53.8281N / 090-30-27.0724W. The incident occurred on runway 10, which was 10,002 feet long and 150 feet wide. It had a concrete surface that was grooved and in excellent condition. The runway was serviced with runway edge light (high intensity) and a 1,400 foot medium intensity approach lighting system with runway alignment indicator lights.

3.0 Runway 10 Chart[4]

[4] Source: Jeppesen.



H. INTERVIEW SUMMARIES

4.0 Interview: David Rodgers, Captain ExpressJet Airlines

Date: September 14, 2011
Location: Via Tele-conference
Time: 1430 EDT

Present were: David Lawrence - National Transportation Safety Board (NTSB); Vince Terrell, Federal Aviation Administration (FAA); Luciano Saraiva, Embraer; Trey Ables, ExpressJet Airlines; Mike Shanks, Airline Pilots Association (ALPA); Erin Shields (ALPA), representative.

During the interview, Captain Rodgers stated the following information:

His name was David Saxon Rodgers, and he was 40 years old. He went to flight school in Arizona and started in 2002. He was an instructor there before getting hired by ExpressJet in 2005. He was based in Chicago, and he trained in Houston for both ground school and simulator. He had flown the E135 and E145 at ExpressJet, and was a Captain on the E145. He had never been an instructor at ExpressJet nor a Check Airman. Previous to ExpressJet, he had flown various Piper and Cessna aircraft. He held a first class medical with a limitation to wear corrective lens, and he was wearing them at the time of the incident.

There was no one on the jumpseat during the incident flight. This was the fourth day of a four day trip, and was the first trip he had flown with the FO. He said the FO's flying was excellent.

He estimated his total time was 5100 hours, with 1600 hours as PIC. About 4000 hours of his total time was in the Embraer aircraft, and about 720 hours was as Captain. He upgraded in September of 2007.

He had never failed a drug or alcohol screening, and was screened for this incident. He had never been treated for drug or alcohol abuse, and had never been fired, terminated or asked to resign from employment. He previously failed a CFI checkride, but retested and passed.

He said it was a warm, calm clear day and they conducted a visual approach to runway 10, and the winds were about 090 degrees at 3 knots. Prior to the landing they had talked the runway being shorter and more narrow than normal and wanted to stay focused about staying on the centerline of the runway. They landed softer than expected. When they touched down, the nose wheel was just to the left of the centerline of the runway, and started moving slightly to the left at first. It was gradual, and there was "jerk" to the steering. He started to put normal right pedal correction, and increased the pressure, but got no response, and the aircraft continued to "diverge from the centerline." He called for the FO to "pull the trigger, pull the trigger", and he thought instinctively that the FO was already on the trigger. He said the FO "got on the brakes with me".

The aircraft started moving away from the runway "more and more", and they realized the aircraft would not stay on the runway. They both were holding onto the brakes to slow the aircraft, and they hit a runway sign as the aircraft left the paved surface.

After they stopped, he said "what the hell just happened", and he checked for major issues to determine if they needed to evacuate the aircraft, and there was none. They asked the passengers to stay seated, and they called the ARFF crew for an outside assessment of the aircraft, and decided to do a "fireman assist" egress through the main door since the airstairs couldn't reach the aircraft in grass. They deplaned through the main door. They started the APU, but then realized the APU was on MEL, and they were actually running the aircraft on batteries, and then decided to shut down the aircraft.

He said he was the pilot flying. They picked the aircraft up in Denver. The approach to runway 10 was visual, but they backed it up with the localizer. He said the runway was narrower than they were accustomed to, and they spoke about it in the normal arrival briefing. This was his

first time to land at Moline. They run the arrival checklist at about 18000 feet, and the approach checklist when being maneuvered for the approach. There was no airborne check of the nosewheel steering. Other than the APU, there were no other deferred maintenance items in the logbook. There were no maintenance problems on the inbound leg, and they did not receive any maintenance briefing from the crew or mechanics in Denver regarding the airplane.

There were no aural or visual warnings during the approach phase. There were no aural or visual alerts or warnings during the landing. He said the weight on wheel sensors would activate the nosewheel steering, but they did not get any steer inop message during the initial landing. He said the "steer inop" came on when they came to a stop, and he assumed it came on when they pulled the trigger, but he was concentrating on looking outside. Once the trigger is pushed, the steering wheel should go to "free castor".

He said they touched down in the touchdown zone, about 1000 to 1500 down the runway, and he thought he deployed to the thrust reversers, but wasn't sure since he thought afterwards he should have used reverse thrust to help control the aircraft. He said when they landed, he had one hand on the control yoke and one hand on the thrust levers. He did not remember the airspeed they were at, and didn't remember the speed they landed at. He said he normally deployed the thrust reversers after the mains and nose wheel touched down. He said the memory items were to deploy the reversers, but the use of them was at their discretion. These are not necessarily verbalized, though he did remember saying "pull the trigger" during the event.

They landed gear down and flaps 45 degrees.

There were no unusual sounds or vibrations during landing. The autopilot was off for landing, and the flight directors were on. The aircraft did not have autothrottles.

He said he had never experienced a problem with the nosewheel steering on the E145. He said they had trained for nosewheel steering problems on takeoff in the simulator, but did not recall if they had ever trained for it on landing in the simulator.

He said the procedure for uncommanded swerving was to control the airplane using the rudder and differential braking, and to not use the tiller. If you cannot control it, you pressed the disconnect trigger, and if necessary use differential reverse if it is available. He believed he saw this anomaly in the simulator on takeoff in May during recurrent training. He said he had a few "pilot induced" issues with the steering during taxi, but no real issues.

He said the memory items for uncommanded swerving was for both pilots, but believed they were more directed to the Captain. When you hit the trigger, it disconnected the steering and you would not need to hold it down. To reengage the steering you would press down on the tiller wheel.

He said when he initially saw the aircraft drifting to the left after landing, he remembered moving his left hand toward the tiller but did not engage it. He moved is hand back to the trigger as he started calling "trigger". He did not believe his hand reached the tiller, and did not try to steer the airplane with the tiller after landing since they were well over 100 knots at the time. He

would normally bring his hand to the tiller as the aircraft slowed to about 60 knots, but would not engage it until about 40 knots so prevent the aircraft from jerking once engaging the steering. He did not recall ever getting a jerk after engaging the steering on landing.

After the event, he called for the uncommanded steering QRC while they assessed the aircraft situation. They then shut the engines down and completed a parking checklist. He did not believe they ever did an after landing checklist. They did pull they CVR breaker. After they shut the batteries off, he realized the gust lock had not been engaged, so he turned the batteries back on to engage the gust lock, and then shut them off.

He said they had not distractions in the cockpit during the approach and landing.

He said there was a clip near the tiller wheel they used to hold their Jepp charts. It was a metal bracket that would hold the entire Jepp book as opposed to only a single chart. Theses clips were sold from various sources, and there were different types. He was using this during the landing. He said the book "definitely" did not fall off during this landing, and did not hit the tiller, though he said it had happened before to him. He said he had the Jepp book fall off the clip before and hit the tiller wheel and jerk the nose on the aircraft. The book sat above the tiller wheel at about 4 inches, but was not right on top of the tiller. There are different variations of these clips, and most pilots used them. He said the company had not provided guidance on their use, and since he saw them advertised on the crew bulletin boards, he guessed the company did not discourage their use.

He said his overall health was good, though he currently had pneumonia and wasn't feeling well. He said he exercised a lot. He took no prescription drugs, just vitamins. He had no changes in his health or finances over the year, but did break his right arm earlier in the year and was off duty for a while. He said he had no lasting effects from his arm once healed. He had no changes in his personal life over the recent year.

He said during the landing he did not look at the EICAS since he was concentrating on the steering problem and was looking outside. He only remembered looking at the EICAS after they came to a stop. He did not ever remember using the disconnect trigger and not getting the steer inop light, though he said it sometime would come on after a short delay. He said that would happen during the parking, when they disconnected the steering.

He said the FO would conduct a flight control check during taxi out, and he remembered that they performed this during the Denver taxi, and there were no issues with the flight controls. The check would involve checking the ailerons and elevators were free. He said after they push back, the Captain would perform a rudder check after pushback and before engaging the steering by pushing the rudders fully. He would not push the trigger before the rudder check since the steering should already be disengaged. He had never performed that check during taxi out.

He said the steering got its power from hydraulics on the "number one" system. He said there was no restriction on which engine to shut down during taxi. If a tug was attached, it was standard to start number tow first. He had never run into a steering engage/disengage problem during a pushback.

He said after they left the runway, he could not remember how much runway they had remaining, but did not think they were half way down the runway. He was not sure about their speed.

He said he did not remember if he heard the steering inop "ding" on landing. He said they did not have any steering issues during the Denver taxi out. He did not remember having to use additional right rudder on the Denver takeoff, and it was a "normal takeoff." He said they turned the airplane to the right when entering the departure runway in Denver, and it was a sharp 90 degree turn.

On the landing roll in Moline, they had full rudder to the right, but after they left the runway, he couldn't remember if he used left rudder or relaxed the rudders while they were braking. He did not remember the speed at which he hit the trigger. He did not remember any loose items in the cockpit during the landing.

He said he felt like they were not getting any response to the steering, though they felt it respond to the braking. He said after they put the right rudder in, it felt like it was continuing to the left and never straightened out.

He said he had never hit the disengage switch in flight, and had never landed with the switch pressed. He did not know what would happen, but guessed the wheels would castor straight ahead. He said if the steering was within 7 degrees during free castor, it would self-center.

He said he thought he did the right thing, and was trained in the simulator on this event. He had heard other pilots that had not seen a steering problem in the simulator, and would suggest everyone see it. He had not seen any guidance from the company following the Akron event, but may have missed it.

Interview ended at 1525 EDT.

5.0 Interview: Sean Meehan, First Officer for ExpressJet Airlines

Date: September 14, 2011
Location: Via Tele-conference
Time: 1300 EDT

Present were: David Lawrence - National Transportation Safety Board (NTSB); Vince Terrell, Federal Aviation Administration (FAA); Luciano Saraiva, Embraer; Trey Ables, ExpressJet Airlines; Mike Shanks, Airline Pilots Association (ALPA); Erin Shields (ALPA), representative.

During the interview, First Officer Meehan stated the following information:

His name was Sean Patrick Meehan, and he was 36 years old. He was a former flight instructor in 2002 having flown various Cessna and Piper aircraft before he was hired at ExpressJet in January of 2007 where he had flown the E135 and E145 as a First Officer (FO). He held an

Airline Transport Pilot's license with an E145 Second in Command (SIC) rating, a Certified Flight Instructor certificate with instrument and multi-engine ratings, and had a First Class Medical certificate. He estimated his total flight time was 5,500 hours, with about 1,000 hours as Pilot in Command (PIC). He estimated his total E145 flight time at 4,000 hours.

The incident occurred on the fourth day of a four day pairing, and this was the first trip the FO had flown with this particular Captain. He said he was drug and alcohol tested following the incident, and to the best of his knowledge he passed. He said he had never failed a check ride, had never failed a drug or alcohol screening, had never been treated for drug or alcohol abuse, and had never been fired or asked to resign from employment. He stated that he was terminated from a mortgage company in 2005.

He said the incident flight was a "standard flight" prior to the approach phase. The Captain was the flying pilot. ATC had kept them "high close to the airport," but they got down and stabilized by 2,000 feet on a "visual glideslope", and the weather was "severe clear". He said everything was normal, and added that the Captain had briefed that this was his first time into Moline, Illinois (MLI), the FO had been there before, and the runway was narrow and shorter than usual. The Captain briefed him that they would plan to roll to the end of the runway with a left turn off.

He stated the touchdown on the runway was "unusually good", and he began to focus on the tower controller's call for the turn off. After the main gear touched down, the nose came down and the aircraft "immediately" began to swerve to the left. He had expected the Captain to correct "as usual", but the aircraft continued the left turn. He noticed that the Captain had tried to make appropriate inputs, then said "something's not right" and called for the "trigger". He said it felt like the hit "a patch of ice".

They departed the runway and into the grass area to the left of the runway. He said he was holding the nose wheel steering disconnect switch in, and "momentarily" gained control of the aircraft but couldn't' avoid hitting a runway panel. He was concerned that the nose wheel "wouldn't hold up". When they stopped the aircraft, they ran the uncommanded swerving QRC checklist, and took inventory of their situation. They talked to the flight attendant, and gave ATC instructions that they were in the grass and needed assistance. They assessed their situation and looked for EICAS messages. They shut the engines down after starting the APU, and told the ARFF crew they were "secure". They deplaned the passengers out the main cabin door, and there were two firemen who assisted the passengers.

They then realized that the APU was on MEL, so they shut down the APU and shut down the power to the aircraft, even though there were still a few passengers left to deplane. They then walked around the aircraft and inspected for damage to the gear and to look for leaks.

He said they were flying a visual approach backed up by the ILS to runway 10 at Moline, and crossed the marker on speed and on altitude. The weather was beautiful, and the winds were light and variable. They had some turbulence during cruise altitude that required them to change their altitude, but there was no turbulence on the approach to MLI. They had a wind vector they could check on in the cockpit, but he did not recall if he saw that. He said there was no special briefing by the Captain regarding the runway other than the width of the runway was 100 feet.

There were no deferred maintenance items on the aircraft other that the APU, and there were no issues reported to them regarding the aircraft when they arrived to the aircraft in Denver.

He estimated that the aircraft landed about 1500 feet down the runway. Their weight was about 42,000 pounds, and the approach speed was about 134 or 133 knots. He did not remember when the Captain turned the autopilot off, but it was usually around 1000 feet, and he said the flight directors were on. They deployed the reversers, but did not use them because they had briefed that they would roll to the end of the runway. He could not remember if it was an SOP to use the reversers, but they normally did deploy them.

He said he had never encountered this type of event before in the aircraft, and did not remember being trained on a nose wheel steering problem in the simulator or in ground school. They were trained on the memory items, but their actions were based upon their experience in handling the airplane, and what they had heard about from the Akron event. He said they were supposed to also use thrust to help control the direction of the aircraft.

He said they had no distractions on the approach, and they did not push the nose wheel steering disconnect switch prior to landing. He was not sure what alerts you got if you pushed the switch in flight, but said they should have received a steer inoperative message and aural "ding" on the ground. The steering is checked to be disengaged before engine start.

He said the tiller wheel would override the disconnect switches, and he was "pretty sure" nothing hit the tiller switch on landing. The pilots used one of three or four types of Jeppesen chart holder clips that attached near the sliding window. He was not sure if those clips were approved, or if the company had a policy on their use.

He said he did not see the Captain put his hand on the tiller wheel after landing, and remembered him calling for the "trigger" 3 times. He also held the trigger down on his side, and was applying full right rudder and full right brake as the aircraft turned left. He could not recall if both of the Captain's hands were on the control yolk. He could not recall if he heard any aural warnings or sounds after landing. He said the Captain did not attempt to use right reverse thrust. He said that most Captain's would normal start using the tiller wheel on landing at about 60 knots after they were slowed enough to make a turn off.

He had heard about the Akron nose wheel steering event "3rd party", but not from the company.

He did not remember if he heard an aural chime when he pressed the disconnect switch, but did remember seeing the EICAS message for steer inoperative after the aircraft stopped.

He said when they were in Denver, for departure, he said they made several right hand 90 degree turns when taxiing to the runway. The Captain never mentioned nay problems with the steering during taxi.

He said they were traveling at about 110 to 120 knots when he pressed the trigger on landing, but they never really gained any steering control, and never took out full right rudder. He said there was on small Cessna aircraft that had taken off prior to their arrival.

He did not recall seeing any obstructions under the foot pedals, but there were loose articles in the cockpit that were found underneath his feet after the excursion.

He said his overall health was good, and he took no prescription or non-prescription drugs. He had no changes in his health, finances or personal life over the past year.

He said he thought that crew should see this type of event in the simulator, since they had not, and "90% of what we were doing was gut instinct." He had not had a PC since the Akron incident, but had heard that some pilots were seeing steering events in the simulator. He had not seen any written material from the company regarding the Akron event or steering issues, and could not remember seeing any FIL's or ops bulletins on steering issues since the Akron event.

Interview concluded at 1400 EDT.

6.0 Interview: Brian Alexander, ExpressJet Program Manager

Date: September 30, 2011
Location: ExpressJet Training Facility – IAH Airport
Time: 0930 CDT

Present were: David Lawrence - National Transportation Safety Board (NTSB);); Luciano Saraiva, Embraer; Trey Ables, ExpressJet Airlines; Mike Shanks, Airline Pilots Association (ALPA) – via phone.

During the interview, Captain Alexander stated the following information:

His name was Brian Keith Alexander, and he was 39 years. He was hired by ExpressJet in March, 1997. His current position was Program Manager for the ERJ.[5] His background in aviation was all civilian flying. He attended Auburn University, where he received a degree in aviation management. He flew some Part 135 freight after college before he was hired by ExpressJet. He estimated that his total time was about 8,000 hours. He estimated that he had about 6,500 hours Pilot in Command (PIC) time, and about 2,000 of those hours were in "the E-jets". He flew the BE1900 for ExpressJet, and upgraded on BE1900 in 1998. He then upgraded to Captain on the Embraer in 2000. He had been "OE check airman on 1900," an instructor on the ERJ, a proficiency check airman on the ERJ, and an "OE check airman on the ERJ."

He said his roles and responsibilities as program manager included oversight of the flight training program and the instructor group. He was not an APD on the ERJ, but "that was in the works", and he oversaw the 8 APD's on the EMB145. He had authority for the flight operations manual, and all approved programs. He also had oversight of the full flight simulator curriculum. He said ExpressJet spilt the oversight of the ground training and the flight training.

[5] Embraer Regional Jet.

In the FTD[6], there were no nosewheel steering issues taught, unless it was as a procedural discussion of the memory items from the QRC. In the FFS[7] it was addressed during initial training modules, during the Captain training, and also discussed during ground school. For the ground school, it was covered during systems training of the landing gear and brakes.

He said after the initial excursions events, "we saw an issue", and the memory items were added to the QRC for uncommanded swerving. He was not sure what the previous procedure was since it occurred prior to 2006, and "was before my time".

He said nosewheel steering problems were taught in the simulator, and typically occurred on takeoff. The malfunction was available on the simulator instructor panel, and the instructor would "announce the event before it happened." He was not sure if the training of a nosewheel steering occurred on landing, but thought that was at the instructor's discretion, and ExpressJet was not AQP yet.

He said in the FFS syllabus, this training occurred during session two, and it was listed in the syllabus as a failure during the takeoff roll. In the Captain's syllabus, it was shown as occurring at 115 knots on the takeoff roll for the OE check airman training. He said the last FFS syllabus was revised on June 30, 2011, but it did not include a nosewheel steering failure on landing. He said that they were aware of the situations, and were looking at possible revisions to the syllabus, and an "FIM" revision was pending. They were going to include these events on takeoff and landings.

He said ExpressJet would sample specific items of interest during proficiency checks, and recently that included nosewheel steering issues. Their guidance for the sampling was found on their FC30 proficiency check form, but the nosewheel steering issues for sampling was not included on that form. He said the conducted informal "polling" of the instructors, and they noted no negative trends from the pilot group when handling nosewheel steering issues in the simulator.

For the training in the simulator, the event was briefed in the briefing room prior to entering the simulator, but during the simulator session, the student would not know when they were going to receive the failure. "Typically" he would introduce the event at about 100 knots since the instructor panel allowed him to preset a speed for the failure. If the student had problems handing the event, he would then redo the event at a slower speed. He said that for many of their new hire pilots, this was their first exposure to jet training, and since the training occurred early in the syllabus, they would often have to repeat the maneuver. He thought session two was a "good point in the syllabus" to introduce the nosewheel steering uncommanded swerving event since the student was able to "correlate the information learned from ground school", and the session also included V1 cuts, aborted takeoffs, and single engine air work. He said that simulator session two was "the big malfunction session."

[6] Fixed training device.
[7] Full flight simulator.

He said in the briefing room, they would talk about the nosewheel steering "in general", and that would then lead them up to the "inop issues." They would review the memory items, along with a systems review. There was a "walk through, or 'fly the paper tiger' during the brief." He would discuss with his students what a steer inop would look like versus an uncommanded swerve event, and cover the memory items and systems review.

He said that the memory items for the uncommanded swerving QRC checklist were not verbalized, but the anomaly was verbalized when it occurred, and usually included the title of the event as it was listed in the QRC. He said that for the nosewheel steering event, it was not verbalized as the title was written in the QRC.

He said he could adjust the degree of the malfunction in the simulator based upon the speed at which he selected the event to occur at. He said the swerving was more aggressive at higher speeds.

When asked about the success rate for the ExpressJet pilots in handling the uncommanded steering problem in the simulator, he said most seem to do well, though he had seen some crews end up "in the weeds", and the common theme was failure to select the disconnect switch. He said that after both crewmembers failed to hit the switch, they would usually get "a deer in the headlight" look, wondering what happened.

He said they would still look into improvements in the training, but were waiting for results from the investigation. He was not sure if there had been any common themes regarding maintenance issues, and discussions continued to take place. They were also looking at highlighting the uncommanded nosewheel steering on landing in the simulator, but nothing formal had gone out to the pilots as yet. They had a check airman's meeting earlier in the week, and no "heavy details" were announced. They were going to include the malfunction as a landing event in future training sessions, and that should go into effect by October 10, 2011. He said the reception from the instructors had been positive, and they would continue to sample these events on the proficiency checks. He said that although the landing event was not in the syllabus, some trainers already included that in their sessions.

He said that while they were "sampling" the uncommanded swerving training event in the simulator, they were not documenting it anywhere for trending or analysis, and the data was not collected.

He said he did not know the Moline incident crew.

H did not know the crew from the Moline excursion. He was on the ERC at ExpressJet, but had not seen a nosewheel steering issue come before the committee.

Interview concluded at 1030 CDT.

7.0 Interview: Greg Wooley, ExpressJet Director of Flight Training

Date: September 30, 2011

Location: ExpressJet Training Facility – IAH Airport
Time: 1045 CDT

Present were: David Lawrence - National Transportation Safety Board (NTSB);); Luciano Saraiva, Embraer; Trey Ables, ExpressJet Airlines; Mike Shanks, Airline Pilots Association (ALPA) – via phone.

During the interview, Captain Wooley stated the following information:

His name was Gregory Scott Wooley, and he was 45 years. His current title was Acting Director of Operations, and he was currently the Director of Flight Training. He was hired by ExpressJet in 1997. He previously served as a ground instructor, as CRM facilitator, and flight instructor on the 1900. He was a captain on the Beech 1900, the Program Manager on the 1900, Manager of Flight Standards, Director of Flight Standards, and Director of Training Standards. He had flown as Captain and FO on the BE1900 and Captain on the Embraer E145. He estimated that his total time was about 5,500 to 6,000 total hours. He had about 4,000 hours pilot in command (PIC) time, with about 300 hours as PIC in the E145. He said he was not current, and the last time he flew was about four months ago. He would normally maintain his currency, but he "spent a lot of time being none current." Before coming to ExpressJet, his flying was mainly private. He held a CFI and CFII[8] certificate, and had flown a small amount of corporate flying.

He said his role as Director of Flight Training was to oversee both training managers for ExpressJet and Atlantic Southeast Airlines, and liaison with the FAA for both operations and training. He was responsible for the qualifications and training for the flight crew members. He said the POI[9] from the FAA was Rick Tailor, and he was in contact with him "every other day." He said they had "cursory" talks about the nosewheel steering event, but their conversations mostly centered around single certificate operations between the two airlines.

He said he was trained on nosewheel steering uncommanded swerving during his recurrent training in 2000. His last two PCs[10] had uncommanded swerving events, and both were on landing. The initial training program "has it on the ground for takeoff, and it is randomly selected." He said he personally had not received feedback from the instructors regarding how well the pilots were performing the nosewheel steering uncommanded swerving procedures since they had been emphasizing it in training and checking, and he had not sought the feedback. He said there was no formal means to document the instructor's feedback, and no data was collected.

He said the SDRs were shared with him through the maintenance and safety departments, but he did not recall them discussing any nosewheel issues on the Embraer fleet.

He said he had seen the video Embraer produced discussing the nosewheel steering commanded swerving procedures, and the ExpressJet instructors had also seen it, but was not sure if the line pilots had seen it. He said they were going to include the video in ground school "in the near

[8] Certified Flight Instructor and Instrument Instructor.
[9] Principle Operations Inspector.
[10] Proficiency checks.

term", but could not provide a specific date. He had not received any feedback from his instructors regarding the video

He said he had reviewed the emergency procedures for the nosewheel steering, and "they always worked for me in the sim."

He said he interacted with the line pilots on a regular basis when he would jumpseat from ATL to IAH. He did not conduct any observations of the simulator training. He said he thought that ExpressJet employed about 10 APD's[11].

He said that when procedural changes were required, they would be written by the manual writers then reviewed by the MRC (manual review committee) to see how the procedure would affect various areas and departments. That would then generate a procedural change that would be incorporated into the manual. Embraer would only be consulted if the procedural change deviated from the manufacturer's guidance. He did not remember anything specific coming from Embraer regarding changes in the nosewheel steering procedures or guidance.

He said that ExpressJet had quarterly Flight Safety Action team meetings to look at data and trends. There had been nothing regarding the nosewheel steering, and did not recall if any trends were identified related to the nosewheel steering.

He did not know either of the crewmembers for the Moline runway excursion. He did talk to the Captain after the event to offer support. He said the Captain did not share any details about the event with him.

He said the safety culture at the airline was "a good one" with a "robust" ASAP program. Like any other carrier, they had their own small percentage of pilots who did not adhere to the SOPs. He said ExpressJet had run two separate LOSA[12] audits; one with Continental and one with the University of Texas. The results generated "minor changes," with more of an emphasis on checklist discipline. He said they learned "we weren't good at checklist discipline." He did not recall if there were any issues with sterile cockpit. He said they were going to try and model Continental procedures before running another LOSA.

He said he would characterize pilot morale at ExpressJet as "medium" due to low job satisfaction since the company had been "financially distressed for awhile." The quality of pilot applicants they were getting was "on par with the last hiring boom in 2007," but they are starting to see a drop in the experience levels of their applicants. He said studies had shown that pilots with too little and too much experience were equally difficult to train, and they generally had better luck training applicants that had come from a formal aviation education program. He said they were adjusting their standards to accommodate these applicants, but could not specify what those adjustments were. Current hiring at ExpressJet was based upon attrition and increased block hours generated from the merger with ASA, and did not come from added airframes. He said the company was currently under Section 6 negotiations with the union.

[11] Aircrew Program Designee.
[12] Line Oriented Safety Audit.

He said they would refocus their education efforts on the Embraer video and procedures. They would continue to sample nosewheel steering problems on PCs, and were asking instructors to spend 5 minutes just training the maneuver.

Interview concluded at 1140 CDT.

I. RELEVANT PROCEDURES

8.0 Uncommanded Swerving on the Ground

According to the ExpressJet E145 Flight Operations Training Manual (dated 02/14/2009 - Rev. 75), pilots received systems ground training on the nose wheel steering system, including the Nose wheel steering EICAS[13] messages, controls and indicators. According to the ExpressJet Program Manager, uncommanded swerving on the ground was trained in the full flight simulator (FFS) during initial and captain upgrade training. This training would occur on takeoff, not landing. The most recent simulator syllabus (dated June 30, 2011) also did not include a nosewheel steering failure on landing. According to ExpressJet, they were considering including uncommanded nose wheel steering on landing simulator training in a future syllabus.

8.1 Procedures

For an uncommanded nose wheel steering event, pilots at ExpressJet were trained to use the Steering System Inoperative or Uncommanded Swerving on Ground checklist in the Company Flight Manual (COM), Section 2 Emergency/Abnormal Procedures (dated January 22, 2008, Rev. 41). The procedures used by ExpressJet pilots were consistent with the procedure recommended by Embraer, and included in the FAA approved Airplane Operations Manual (AOM), Abnormal Procedures (Rev. 35, page 7).

[13] Engine-indicating and crew-alerting system .

8.2 ExpressJet Uncommanded Swerving on Ground Checklist[14]

STEERING SYSTEM INOPERATIVE OR UNCOMMANDED SWERVING ON GROUND

Light	EICAS
CAUTION	STEER INOP (may be presented)

Control the airplane using rudder command and differential brakes.
Tiller . . . . . DO NOT USE

IF unable to control the airplane:
Steering Disengagement Trigger . . . . . PRESS
Consider the use of differential thrust reverse if available.

Note: Do not actuate the steering handle since it will reengage the steering system and will disable the 7° maximum nose wheel deflection protection. This may cause the nose wheel to be steered up to its limit and may exacerbate the swerving effect.

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J. ATTACHMENTS

Attachment 1 – Dispatch Release
Attachment 2 – Pilot Statements
Attachment 3 – Party Forms
Attachment 4 - Simulator Testing

Prepared by: Captain David Lawrence, NTSB

[14] Source: ExpressJet Company Flight Manual (COM), Section 2 Emergency/Abnormal Procedures (dated January 22, 2008, Rev. 41)., page 2-218.