



NATIONAL TRANSPORTATION SAFETY BOARD

Central Region –Arlington, Texas

Record of Telephone Conversation

Person Interviewed: Capt. Sherwood H. Patterson and F/O Michael McShee

Date: August 10, 2011

Subject: – CEN10LA363

CAPTAIN PATTERSON

Capt. Patterson is employed by American Eagle Airlines and is 60 years of age. He was the pilot flying at the time of the turbulence encounter. He is based at DFW and resides in Asheville, NC. He has been a pilot with American Eagle for 11 years. He has over 10,000 hours of flight time, and approximately 2,500 hours time in type. His previous experience includes First Officer and Captain on Saab aircraft, Captain on ATR aircraft, and the First Officer and Captain on Embraer 145 aircraft. He is a line pilot and does not have check airman experience. His other flying experience included time as a pilot with Wings West Airlines in California, and flying a Cessna 206 as a missionary pilot in Africa. In addition to his pilot ratings, Capt. Patterson holds an airframe and power plant certificate. He has never been fired, terminated, or asked to resign from a pilot position. There was no jump seat rider aboard the flight. Capt. Patterson was subjected to drug and alcohol screening at Longview airport on the morning of June 29, 2010. Capt. Patterson was paired with the First Officer on all trips during June, but had not otherwise flown with him before.

After departure from Greensboro, there was a lot of local weather in the area that required deviations. The aircraft broke out above flight level (FL)200, but there was still noticeable turbulence. Capt. Patterson announced to the cabin that because of the turbulence the seatbelt sign would remain on. Later in the flight it smoothed out, and at approximately flight level 360 he was able to turn off the seatbelt sign. He announced that because of weather ahead, the sign would probably be coming back on in approximately 15 minutes. As the flight approached clouds ahead, Capt. Patterson advised the flight attendant that the belt sign would be coming back on and that she needed to sit down. The flight attendant made the PA announcement to the passengers, which Capt. Patterson monitored over the intercom system. With the aircraft entered the clouds, the seatbelt sign was on but the ride was smooth. Capt. Patterson was using the onboard radar to look ahead of the flight, adjusting the range and tilt to see what was coming up. He saw a red dot on the radar about 5 miles directly ahead or slightly to the right of the nose. He turned off the auto gain on the radar, and he and the First Officer both used their displays to evaluate the return. After some discussion, they concluded that they were above the top of the echo. Shortly afterwards the aircraft encountered moderate rain and chop. The

aircraft then encountered a severe downdraft which knocked the autopilot off and caused some of the cockpit displays to go blank. There was also a smell of electrical smoke in the cockpit. The aircraft then exited the clouds. Shortly afterward, the flight attendant reported that she had been injured and was unable to walk, and that there was a passenger who was bleeding. The flight attendant solicited help from the uninjured passengers.

The flight crew decided to divert to Shreveport, Louisiana to obtain medical attention. They began evaluating the loss of the cockpit displays, and by operating some switches the First Officer was able to recover most of the data. As the aircraft was operating in visual meteorological conditions, the captain decided to forgo further efforts to recover the displays and to land as quickly and safely as possible. After coordinating with dispatch and ATC, the crew decided that diverting to Shreveport would not work because of a thunderstorm approaching the airport. Instead they decided to go to Gregg County airport. The landing was uneventful, and the aircraft was met by emergency medical technicians. The EMTs asked the crew to deplane the uninjured passengers in order to improve access to the injured. The stretcher patients were removed through the galley door. Five or six other passengers also requested medical attention and were transported to the hospital by additional EMTs.

When the crew returned to the aircraft next morning, maintenance had done a severe turbulence inspection and found nothing wrong. Examination of the avionics power switches on the panel showed that one switch had been deselected, which may have been the cause of the blank displays. When this switch was reselected, the displays operated normally. There was no source identified for the electrical smell that the crew had detected following the incident. Capt. Patterson stated that his normal practice when using the onboard weather radar is to select the 100 mile range, adjust the tilt downward until ground clutter appears, and then raise it enough to remove the ground clutter. When operating in clouds he routinely adjusts the tilt and range of the radar as necessary to monitor weather ahead. During this flight, there were no storms observed along the path of the aircraft. There were some storms off to the left and right, but nothing straight ahead. As the aircraft approached the point where the turbulence encounter occurred, Capt. Patterson zoomed in to a closer range to look at a red dot that he had first observed on the 100 mile range. He reduced the range to 50 miles, and then 10 miles, and also adjusted the tilt of the radar. He was not sure of exactly what value he selected for the tilt, but did run the tilt both up and down. It is his experience that during cruise flight in the E145 aircraft, a tilt value of +1 or +2 produces good results. Capt. Patterson then set the range to 5 miles, and set the tilt to at least 5° down. He and the First Officer both agreed that the weather observed appeared to be below the aircraft. Shortly afterwards the aircraft encountered moderate turbulence and rain, followed by a severe downdraft. The force threw the captain and First Officer up into their seatbelts. The flight attendant later reported hitting her head during the encounter.

Capt. Patterson explained that on the E145 radar, the system alternately updates the captain's display and the first officer's display as the radar antenna sweeps left and right. Neither display gets data from every sweep of the radar.

Capt. Patterson stated that at the time of the turbulence encounter, the flight had just contacted a new controller. There were no relevant broadcasts of weather information from the previous controller, nor did the crew hear any pilot reports or other information that would indicate problems ahead. The controller in contact with the aircraft at the time of the turbulence report responded that it was the first report of turbulence he had received. Asked what kind of weather support he receives from ATC, Capt. Patterson responded that when he asks for a deviation his priority is to get an immediate turn in the direction that he thinks is the safest. He noted that ATC often has other priorities that can delay approval of such a request. ATC may ask if he can turn a different direction or take some other action than what he asked for. Asked about controllers proactively providing information about weather ahead, Capt. Patterson stated that he often receives reports about weather in the vicinity of the aircraft. Generally he has already seen what the controllers are reporting with the onboard systems, and they use the onboard radar to evaluate what's ahead. He does this using a technique such as adjusting the range and tilt of the radar. He stated that ATC reports of weather ahead are especially useful when the aircraft is operating in instrument conditions. In this situation, Capt. Patterson noted that if the controller had advised of heavy to extreme weather ahead of the aircraft that would have provided additional reaction time and possibly allowed the crew to deviate around the reported weather. He stated that specific weather information is useful, while general broadcasts such as those made regarding weather advisories being available on Flight Watch or other frequencies are less useful.

Asked to describe his radar training, Capt. Patterson stated that his initial training with American Eagle included watching instructional videos by Archie Trammell. Recurrent training since that time has consisted of ground school classroom lectures about radar out of the aircraft operations manual. Capt. Patterson does not recall receiving any specific instruction about radar operation during IOE or other flight training. His information on radar operation is largely self-taught. Formal training covers the mechanics of operating the unit, not the thought processes required to analyze the displayed data. Asked if he believes that he has mastered the radar system aboard his aircraft, Capt. Patterson noted that he has been using the radar system a long time and stated that he is comfortable with it. The system has a small 12 inch antenna, which imposes some limitations that require the operator to be very aggressive in adjusting tilt, range, and gain to examine weather ahead.

Capt. Patterson stated that while he and the First Officer were examining the weather ahead using their individual displays, he believed that the First Officer was taking approximately the same actions that he would have taken himself. They were both adjusting the range and tilt of the system to examine the weather ahead. He did not notice if the First Officer was also adjusting the gain of the radar. Capt. Patterson's assessment of the First Officer is that he is

above average in professionalism and ability. He stated that in the future, he will be more proactive in instructing first officers that fly with him about radar operation, and, when weather is encountered, in asking the First Officer to use different settings on his display to get a different look at the situation.

Asked what he could have done differently in this situation, Capt. Patterson stated that because of the sudden nature of the weather encounter, about all he could have done was to declare an emergency and turn the aircraft immediately rather than waiting for the controller's approval. There wasn't time for anything else. Asked about improved training on radar, Capt. Patterson noted that there is so much in the current training program that the training department is under pressure to cover a lot of material in a short time. It could be difficult to add significant training on radar to the existing program. He suggested that perhaps specific training on whether radar operation could be included in IOE flights, but it would be difficult to ensure that all pilots encountered significant weather conditions requiring use of radar during IOE.

F/O McSheehy

First Officer McSheehy is employed by American Eagle Airlines. He is based at DFW and resides in the Dallas area. He is 31 years old and began flying for American Eagle in March 2007. His previous flight experience includes one year with Pacific Wings Charter flying a Cessna 208, and additional time playing Piper Navajos for George's Aviation of Hawaii. First Officer McSheehy is a line pilot and has been a First Officer on Embraer 145 aircraft since 2007. He was paired with Capt. Patterson for all trips during June, but has not otherwise flown with him before. First Officer McSheehy reported total time as 3,100 hours with 2,000 hours time in type. He was subjected to post-accident drug and alcohol screening on June 29, 2010 at the Longview, TX airport. He stated that he has never failed a drug and alcohol screening, nor has he ever been fired, terminated or asked to resign from a pilot position.

The accident flight began in Greensboro. The crew was aware of thunderstorms along the route of flight approaching Texas and DFW. They had checked weather radar information on their own personal computers before leaving on the trip, and also had a weather printout supplied by American Eagle dispatch. The flight was uneventful until the turbulence encounter occurred. They were actively using the onboard radar to monitor weather ahead of the aircraft while en route. There were no reports on the radio of other aircraft encountering turbulence or other severe weather conditions that might cause concern.

First Officer McSheehy was the pilot not flying, and was actively using the radar. He believed it was set on the 150 mile range, but he did not recall the exact settings he was using. The crew was able to see the clouds ahead as they approached the point where the turbulence encounter occurred. They adjusted the range and tilt settings of the radar to attempt to determine what was coming up. They also switched in and out of auto gain in an attempt to evaluate any possible precipitation. Nothing was showing up in front of the aircraft until some apparent

precipitation appeared about 3 to 5 miles ahead. It started out green but then it turned red when it was two to three miles away. Both pilots were using the radar displays to evaluate it. Both pilots agreed that the observation was probably of no significance because whatever it was appeared to be below the aircraft. When the aircraft first entered the clouds, the ride was smooth. Then it began to rain. The aircraft started to climb, and then there was a sudden drop (faster than the climb.) About 10 seconds later the aircraft exited the clouds and was back in clear air. The autopilot disengaged in the downdraft and the captain was hand flying. The aircraft had climbed above the assigned altitude and the captain was trying to recover. There was an "electrical smell," and some of the avionics screens were blank. First Officer McSheehy believes they had lost the captain's MFD, the first officer's PFD, RMU2, and FMS2. They were all blank. There was no visible smoke, and no electrical fault was ever identified. To restore the blank screens, First Officer McSheehy selected a "symbol generator" reversionary mode on the avionics that was able to put all information back on the screen.

The flight attendant reported that she and a passenger were injured, so the crew declared an emergency with ATC. They were initially planning to divert to Shreveport, but after receiving information on severe weather in the Shreveport area, they decided to divert to Longview, Texas.

The crew reported having no significant conversations with ATC about weather before the accident. They did not receive any advisories or pilot reports indicating the possibility of severe turbulence.

First Officer McSheehy reported that his previous experience with ATC provision of weather information is that they are generally very helpful and advising of precipitation that may affect the flight. He believes that the ATC radar is usually more accurate than the radar aboard the aircraft because of the antenna size and limited coverage available to the crew. He was not sure what the source of the ATC weather radar information was. He stated that he does reach out and ask controllers about weather conditions, and they are typically very helpful. In this situation, there did not appear to be any reason to be asking ATC about whether ahead. There was no time to do so, because the weather on the aircraft radar appeared very suddenly. The crew could see the clouds ahead, but had no information to indicate a need to inquire about them. There was nothing on the radar, and no pilot reports of turbulence. First Officer McSheehy believes that an ATC advisory about the observed weather ahead would have helped. The combination of their visual observations and the radar observations from ATC would likely have resulted in the crew deciding to deviate around the area.

Asked about his previous weather radar training, First Officer McSheehy reported that when he was flying in Hawaii, use of weather radar was generally not necessary. After arriving at American Eagle, his initial ground school training on radar included information on modes and functions, and was presented as a part day lecture. Compared to the material covered in ground school, the aircraft operations manual systems book was more thorough. Radar training

provided to him so far has been fairly mechanical, containing instruction about the controls and settings, but very little information about how to interpret the display. During simulation and LOFT training, there was no information presented on weather radar operation. During his IOE flights, the captains provided some operational training on the radar as opportunities arose. First Officer McSheehy stated that most of his radar training has essentially been on-the-job training obtained from experience during operational flights. Captains do not typically provide actual instruction on the use of the systems, although they may consult with the First Officer as necessary to agree on analysis of observed weather ahead. At the time of the accident, First Officer McSheehy stated that he and Capt. Patterson were both doing their own independent radar operation and analysis, but then discussed their observations and agreed that there was no precipitation directly in front of the aircraft.

Asked what he recommends that other crews do differently to avoid such an encounter, First Officer McSheehy was unable to suggest anything that could have prevented the event. The circumstances were sudden and unexpected, and it would not be practical to ask ATC for information about every cloud along a flight. He did believe that radar training could be improved, with a more thorough curriculum and or instruction on how to use the different modes available in the radar system. Overall he believed that his training had been adequate, but could be better.

Leah D. Yeager
National Transportation Safety Board
Senior Air Safety Investigator