This report was revised on August 25, 2014. See the docket for this accident for the original report.

ERA13MA139

HISTORY OF FLIGHT

On February 20, 2013, about 2006 eastern standard time (EST), a Beechcraft Corporation 390 Premier (Premier IA), N777VG, collided with a utility pole, trees, and terrain following a go-around at Thomson-McDuffie County Airport (HQU), Thomson, Georgia. The airline transport-rated pilot and copilot were seriously injured, and the five passengers were fatally injured. The airplane was registered to the Pavilion Group, LLC, and was operated under the provisions of 14 *Code of Federal Regulations* (CFR) Part 91 as a business flight. Night visual meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan was filed. The flight originated at John C. Tune Airport (JWN), Nashville, Tennessee, about 1827 central standard time (1927 EST).

On the morning of the accident, the pilot and copilot left their respective homes in South Carolina about 0230 for the 1-hour drive to HQU (where the airplane was based) to fly five passengers, who were employees of Vein Guys®, to JWN. (The National Transportation Safety Board [NTSB] notes that while the copilot is referred to as such in this report, his role in the cockpit is not required by federal regulations.) The airplane departed HQU about 0406 and arrived at JWN about 0459. (Although JWN is located in the central time zone, all subsequent times in this report are in EST unless otherwise noted.) Both pilots stated in postaccident interviews that the flight to JWN was uneventful and the weather was good. They reported that at the JWN terminal, they slept in the crew break room, completed paperwork, and worked on the computer. They left for a late lunch about 1500 and returned to the airport about 1630.

According to security camera footage from the JWN terminal, both pilots were observed walking toward the airplane about 1913, and about 1918, the five passengers were seen walking toward the airplane while one crewmember performed an external walk-around inspection. About 1923, the airplane taxied from the parking area and departed JWN at 1927. The pilot was the pilot flying and was in the left cockpit seat.

About 1927, the flight crew contacted departure control while climbing through 3,500 ft mean sea level (msl) and requested an IFR clearance to HQU. About 1930, the flight crew contacted the Memphis air route traffic control center (ARTCC) while climbing through 14,000 ft msl, and about 1933, the flight was cleared to climb and maintain a cruising altitude of flight level (FL) 270. According to flight crew interviews, the en route weather was good, and a tailwind in excess of 70 knots was observed.

About 1948, the flight crew contacted the Atlanta ARTCC and was cleared to descend to FL240. About 1953, the flight crew was given a further descent clearance to 11,000 ft msl along with the Athens, Georgia, altimeter setting. About the same time, the copilot tuned in the HQU automated weather observation system (AWOS) to receive the most

current weather at the destination airport. The AWOS at 1935 reported calm wind, temperature 10 degrees C, 10 statute miles visibility or greater, scattered clouds at 12,000 ft, and an altimeter setting of 30.13 inches of mercury. The pilot then set up the flight management guidance system for a visual approach to runway 10 at HQU with a 3.4-degree descent to the runway from a 5-mile final approach. The copilot tuned the instrument landing system for runway 10 as a backup.

About 1956, the flight crew advised the Atlanta ARTCC that they were descending through 18,500 ft, and 2 minutes later, they cancelled their IFR flight plan. About 1958, the copilot stated to the pilot, "ten thousand comin' up captain and you blowin' through." About 1959, the copilot told the pilot to adjust his altimeter. The pilot responded, "say, I'm kinda out of the loop or something. I don't know what happened to me there but I appreciate you lookin' after me there." The flight crew was then directed to contact Augusta approach control, and about 2000, the flight crew contacted Augusta approach control and advised that they were descending out of 8,400 ft and had HQU in sight. About 2002, the flight crew advised Augusta approach control that they would switch to the local HQU advisory frequency.

Concurrently, the pilot began to perform an "S" turn along the final approach path to the runway. About 1 minute later, the enhanced ground proximity warning system (EGPWS) aural alert announced that the airplane was 1,000 ft above the ground, and the pilot lowered the landing gear. According to the cockpit voice recorder (CVR), after the landing gear was lowered, about 2004, the copilot noted that the "ANTI SKID FAIL" annunciator light illuminated. The pilot continued the approach, and, about 2005, the airplane touched down on runway 10. Witnesses reported that after the airplane touched down, they heard or saw it go around. According to the CVR, the takeoff warning horn sounded about 0.3 seconds before the pilot stated that he was performing a go-around. The airplane lifted off near the departure end of the runway. The copilot directed the pilot to increase pitch. According to EGPWS data, as the airplane climbed to an altitude of about 63 ft above the ground, about 9 seconds after liftoff, the left wing struck a utility pole located about 0.25 miles east of the departure end of the runway. The airplane continued about 925 ft before colliding with trees and terrain. It was destroyed by impact forces and a postcrash fire.

During a postaccident interview, when asked about the approach, landing, and go-around at HQU, the pilot recalled checking the airplane's landing light switches to prepare for the landing. The next thing he remembered was waking up in the hospital on February 24, 2013. He did not recall any additional details about the approach, landing, or go-around or any airplane system anomalies, including any antiskid problems, during the flight.

In postaccident interviews, the copilot did not recall anything unusual about the glidepath and recalled being about 1 or 2 knots above reference speed. The copilot thought that the airplane touched down on runway 10 within 200 ft of the 1,000-ft runway marker. As he began to reference the after landing checklist, he heard the pilot announce a go-around, but the copilot did not know the reason for the go-around. He stated that he began to

monitor the airspeed indicator, saw that they were at 105 knots approaching the end of the runway, and thought "it was going to be close." The engines sounded like they always did on a normal takeoff. He thought something hit the airplane on his side and recalled seeing trees in the windshield. The next thing he remembered was seeing someone with a flashlight at the accident scene. He did not recall any alarm or aural caution before the go-around and indicated that everything looked normal.

PERSONNEL INFORMATION

The Pilot

The pilot, age 56, held an airline transport pilot (ATP) certificate with a single pilot type rating on the Premier IA. (The 390 Premier is the same as the Premier I/IA series.) He also held a flight instructor certificate with airplane single-engine land, airplane multiengine land, and instrument airplane privileges. He was the director of operations for Sky's the Limit, doing business as Executive Shuttle, a 14 CFR Part 135 operator based in Greenwood, South Carolina. He was hired by the Pavilion Group to provide private pilot services for their Premier IA under the provisions of 14 CFR Part 91. The pilot reported 13,319 hours total flying time, including 12,609 hours as pilot-in-command (PIC). He reported 198 hours, all as PIC, in the Premier IA. The pilot held a second-class Federal Aviation Administration (FAA) medical certificate, issued October 29, 2012, with a limitation to possess glasses for near/intermediate vision.

According to interviews and training records, the pilot attended the FlightSafety Premier I Series (RA-390) initial training course at the FlightSafety Wichita Learning Center, Wichita, Kansas, from June 7, 2012, through June 22, 2012. The ground instruction consisted of 58 hours of ground training and 11.5 hours of briefing/debriefing. The pilot also attended flight simulator training, which consisted of 15 hours of simulator training. He was type rated on the Premier IA on June 22, 2012, following a 2.2-hour simulator session and a 2.5-hour oral/written examination.

The pilot also attended the FlightSafety Premier I Series (RA-390) recurrent PIC course at the FlightSafety Greater Philadelphia/Wilmington Learning Center, Wilmington, Delaware, from January 3, 2013, through January 5, 2013. The ground instruction consisted of 12 hours of training and 4.5 hours of briefing/debriefing. The simulator portion of the training consisted of 7 hours of simulator time.

A copilot who previously flew with the pilot stated that the pilot was experienced, professional, and possessed good flying skills. Both copilots who flew with the pilot, including the accident copilot, stated that they did not have a specific role on the flights they flew with him in the Premier IA.

On February 15, the pilot flew the owner of Vein Guys® and his family to Orlando, Florida, and remained in Orlando until Monday, February 18. He did not use a copilot for the Orlando trip. On February 18, he flew the family to HQU and then drove to his residence, going to bed about 2100. On February 19, he awoke about 0500 for a 0930

flight to Olive Branch, Mississippi, with the accident copilot and Vein Guys® staff. The return flight landed at HQU about 1700 that evening. He arrived at his residence about 1820 and went to bed about 2100.

On the day of the accident, the pilot awoke about 0200 and arrived at HQU about 0330 for the 0400 flight to JWN. He described February 20 as a "tough, tough day" because of the early departure time. After arriving at JWN, he slept for about 4 hours in the pilot lounge. He did not sleep again that day. A review of the pilot's cell phone records revealed three outgoing calls were made during his 4-hour sleep break. The pilot indicated that he normally slept about 8 hours per night and that he typically awoke about 0600.

The Copilot

The copilot, age 40, held an ATP certificate. He possessed no type ratings. He was employed by and flew charters for Executive Shuttle, which was owned by the accident pilot. He accompanied the accident pilot on the Premier IA flights at the pilot's request and estimated that he had about 45 flight hours in the Premier IA. He reported 2,932 hours total time, including 2,613 hours as PIC. The copilot held a second-class FAA medical certificate, issued February 12, 2013, with no limitations.

The copilot received no simulator training in the Premier IA before the accident and did not complete formal training courses in the Premier IA. He received a 14 CFR 61.55 logbook endorsement on October 10, 2012, from the accident pilot, stating that he demonstrated the skill and knowledge required for safe operation of the Premier IA as second-in-command.

On Monday, February 18, the copilot was at home and awoke between 0600 and 0630 and went to bed about 2200. On Tuesday, February 19, he awoke between about 0530 and 0600 and flew with the captain to Olive Branch. After returning to HQU, the copilot made the 1-hour drive to his home but was not certain what time he went to bed or fell asleep. The last cell phone activity that day occurred about 2148. On Wednesday, February 20, the copilot awoke between about 0200 and 0215 and drove with the accident captain to HQU for the flight to JWN. The copilot told investigators he was able to sleep for about 4 to 5 hours in the pilot lounge (awakening about 1000 central time).

AIRCRAFT INFORMATION

The Premier IA was a carbon fiber composite fuselage, metal low-wing airplane powered by two Williams FJ44-2A turbofan engines mounted on the aft fuselage each rated at 2,300 lbs of thrust.

The Premier IA was not equipped with reverse thrust, and wheel braking was the primary means of stopping the airplane after landing. (The lift dump assists in putting weight on the wheels, which makes braking more effective.) The airplane was equipped with an electrically controlled antiskid system. According to the manufacturer, the system offered

protection from skids and could provide consistently shorter landing rolls for all runway conditions. The ANTI SKID FAIL annunciator would illuminate if a malfunction existed in the system when the ANTI SKID switch was in the NORM (normal) position.

Activation of the lift dump switch extended the three spoiler panels on each wing and overrode normal spoiler operation. A placard was located on the cockpit pedestal immediately aft of the lift dump switch that read, "WARNING DO NOT EXTEND IN FLIGHT." In addition, the Hawker Beechcraft Premier I/IA Model 390 Airplane Flight Manual (AFM), Section 3A—Abnormal Procedures, page A-25, states, "Do not extend lift dump in flight." Section 3A of the AFM (Abnormal Procedures) included the following warning: "Extending lift dump in flight could result in loss of airplane control leading to airplane damage and injury to personnel. Continued safe flight with lift dump extended has not been demonstrated."

The airframe and engine maintenance logbooks were not located after the accident. Pavilion Group used CAMP Systems as their maintenance management provider, and the Hawker Beechcraft Service Center, Atlanta, Georgia, also provided maintenance services.

The most recent record of maintenance performed on the airplane occurred on January 29, 2013, at Aeronautical Services, Greenwood, South Carolina. The maintenance included replacement of the left and right main tires, touching up exterior paint, and a battery capacity check. The total time on the airplane was not recorded at that time.

The most recent maintenance record indicating aircraft total time was on January 4, 2013, when the airframe total time was 635.4 hours. The most recent comprehensive airframe and engine inspection was recorded on June 15, 2012. The 600-hour Schedule A inspection was accomplished at 503.3 hours total time and 565 total airframe cycles.

METEOROLOGICAL INFORMATION

The National Weather Service (NWS) reported no significant weather and no precipitation over the region. The area forecast applicable for HQU expected light wind and scattered to broken high cirrus clouds, with visibility unrestricted. The NWS also issued an airmen's meteorological information that was current at the time of the accident for moderate turbulence below 8,000 ft over the area.

HQU was equipped with an AWOS that issued observations every 20 minutes. The HQU 1955 observation reported calm wind, visibility 10 miles or greater, sky clear, temperature 9 degrees C, dew point -4 degrees C, and altimeter setting 30.12 inches of mercury. The HQU 2015 observation reported wind from 240 degrees at 6 knots, visibility 10 miles or greater, broken ceiling at 12,000 ft above ground level (agl), temperature 11 degrees C, dew point -3 degrees C, and altimeter setting 30.15 inches of mercury.

AIRPORT INFORMATION

General

HQU was a general aviation airport with one asphalt runway (runway 10-28) measuring 5,503 ft long and 100 ft wide, with precision instrument markings on both ends. The runway had high-intensity runway edge lights that changed from white to amber for the last 2,000 ft in both directions. Both ends had red threshold lights and green approach lights. Adjacent to the touchdown zone for both ends of the runway was a two-unit precision approach path indicator (PAPI) system set at 3 degrees. (As later discussed, following an aeronautical study after the accident, the FAA changed the glidepath angle for the runway 28 PAPI to 3.5 degrees.) Postaccident tests and inspections of the airport lighting systems indicated that the lighting system was operating normally at the time of the tests.

The runway and taxiway lights were pilot-adjustable to low, medium, and high settings and would remain on for 15 minutes after activation. The PAPIs would not activate when the runway lights were set to the low setting. A City of Thomson administrator managed the airport with the help of an on-site airport manager who also managed a local fixed base operation (Spirit Aviation). The airport manager did not prepare or keep any logs about airport self-inspections, regular maintenance, wildlife strikes, lighting activation, or periodic inspection/calibration of the PAPI units. According to the airport manager, a local electrical contractor accomplished all preventative and repair work on the airport's lights and navigational aids on an as-needed basis. After the accident, the airport began keeping weekly logs of lighting outages, maintenance, and general field conditions.

The Georgia Department of Transportation (GDOT) inspected HQU biennially to ensure compliance with the requirements set out in GDOT's Rules and Regulations for Licensing of Certain Open-to-the-Public Airports. The GDOT inspections also included an airport inspection for the FAA's Airport Safety Data Program. The two most recent inspection reports from 2010 and 2012 determined that HQU met the minimum state licensing requirements but failed to meet federal requirements for precision and visual approaches. Specifically, runway 10 failed to meet FAA Part 77 reporting requirements for a 50:1 obstruction-free, precision instrument approach to 200 ft from the runway end. Similarly, runway 28 failed to meet the FAA Part 77 reporting requirements for a 34:1 obstruction-free, nonprecision instrument approach to 200 ft from the runway end. The obstructions listed for both approaches were trees, left and right of centerline. The 2012 inspection report for the runway 28 approach included an obstruction characterized as a power line, 66 ft high, and 2,200 ft from the displaced threshold, extending from the centerline to 400 ft right of centerline, which provided a 27:1 approach to 200 ft from the runway end and a 33:1 approach to the displaced threshold.

The Thomson city administrator stated that before 2012, no GDOT inspection report had identified the power line east of the airport as a potential obstruction. To determine whether the power line was an obstruction and to provide data in support of an official

airport layout plan, the city administrator authorized a formal survey of the airport. The survey had not been completed at the time of the accident or at the time of this report.

Airport Obstructions

During the accident sequence, the airplane struck a concrete electrical utility pole (Pole 48) that was about 1,835 ft east of the runway 28 threshold and 50 ft left of the extended runway centerline. Pole 48 was 72 ft high, and the airplane struck the pole about 58 ft agl. The pole was not equipped with lights, but orange visibility balls were on the adjacent wires.

The pole was owned and maintained by Georgia Power, a regional utility that supplied electric power to local businesses and residents. Pole 48 was erected in 1989, along with similar poles and electrical utility lines, to provide electrical power to the Milliken and Company textile plant adjacent to HQU. Thomson-McDuffie County entered into an "aviation easement" agreement with Deering Milliken, the owner of the Milliken Kingsley textile factory adjacent to HQU, in September 1973. The provisions of the easement were designed to protect the approach surface east of the airport. The text of the easement stated that Deering Milliken "…will not hereafter erect or permit the erection or growth of any structure, trees, or other object within or upon said parcel, which lies within the approach area of the 9-27 [now 10-28] runway to a height above the approach surface. Said approach surface being an inclined plane with a slope of 34:1, i.e. one ft of elevation for each 34 ft of horizontal distance, located directly over the center of said parcel." Milliken and Company entered into easement agreements with Georgia Power in May 1977 and again in August 1989 to grant the right to construct, erect, install, operate, and maintain "poles, wires, transformers, service pedestals, and other necessary apparatus" to supply electrical power to the Milliken Kingsley textile plant.

Title 14 CFR Part 77 establishes standards for approach surfaces to runways of various types and requires notice to the FAA of any proposed construction or alteration of existing structures that may affect the national airspace system. FAA Advisory Circular 70-7460-1K, "Obstruction Marking and Lighting," provides guidance on compliance with 14 CFR Part 77 and procedures for notifying the FAA of proposed construction or alteration. Specifically, a Notice of Proposed Construction or Alteration Form (FAA Form 7460-1) is required for notification. Upon receipt of Form 7460-1, the FAA will conduct an aeronautical study to determine the effects of the construction or alteration on navigable airspace. Then, the FAA will determine if the construction or alteration constitutes a hazard to air navigation.

Georgia Power did not notify the FAA before constructing the utility poles in 1989; therefore, the FAA had no knowledge of the poles as potential obstructions. Accordingly, there were no depictions or mention of possible obstructions on associated aeronautical charts.

After the accident, Georgia Power submitted FAA Forms 7460-1 for four utility poles east of the airport, including Pole 48. The FAA conducted aeronautical studies on the

poles and, on May 31, 2013, issued initial findings from the studies. Regarding Pole 48, the FAA determined in its initial findings that "…the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation." The study also stated that if the pole were lowered to a height of 46 ft or less it would not exceed obstruction standards, and a favorable determination could subsequently be issued. The FAA reported similar findings on the other three structures. The FAA stated in its findings that to pursue a favorable determination at the originally submitted height, further study would be necessary, and a formal request would be required within 60 days.

After the FAA issued the preliminary obstruction determinations, Georgia Power requested that the FAA conduct further study on the four obstructions to determine if a favorable determination could be achieved. On August 12, 2013, the FAA published public notices announcing the four aeronautical studies and invited interested parties to submit relevant comments before September 18, 2013. According to an FAA official, the final determinations for the four obstructions were not completed at the time of this report. Since the aeronautical studies were conducted, the FAA Flight Data Center issued several notices to airmen to alert pilots about obstructions and also to amend the approach and departure procedures at HQU accordingly. In addition, the FAA increased the glideslope angle for the runway 28 PAPI from 3.00 to 3.50 degrees.

FLIGHT RECORDERS

Although not required, the airplane was equipped with an L-3/Fairchild FA2100-1010 CVR. The CVR recording contained the last 30 minutes of digital audio, which was stored in solid-state memory modules. The CVR sustained significant heat and structural damage as a result of the accident. Despite the damage to the unit, three channels of recorded audio were available, ranging from good to excellent quality. The recording began at 1935:13 as the flight was at FL240, and the recording stopped about 2006 during the crash sequence. The airplane was not equipped with a flight data recorder, nor was it required to be so equipped.

WRECKAGE AND IMPACT INFORMATION

The airplane struck Pole 48, and sections of the pole and attached power lines were found along the wreckage debris path, which was oriented from west to east on an approximate magnetic heading of 085 degrees. The left wing was completely severed about 13 ft inboard from the wing tip and exhibited no fire damage. The severed wing was located about 320 ft east of Pole 48.

Various fragments of the airplane structure were found along the debris path leading to the main wreckage site, which was located about 925 ft east of Pole 48. Multiple trees, up to 2 ft in diameter, were severed or toppled in the main wreckage impact zone. The main wreckage consisted of the center wing section, a portion of the right wing, the main landing gear, the baggage compartment, the emergency locator transmitter rack, and the

empennage. The main wreckage was damaged by a postcrash fire and contained melted aluminum and burnt composite material. The forward fuselage was about 60 ft east of the main wreckage and was damaged by a postcrash fire.

The right engine was separated from the fuselage and was on the south side of the debris path between the main wreckage and the forward fuselage shell. The left engine was severed into two main sections with the compressor and the turbine and exhaust section located in a shallow pond on the north side of the debris path. A large portion of the ground in the vicinity of the accident site was charred and burned by a postcrash fire.

All three landing gear assemblies were located on scene. The left and right main landing gear actuators separated from the landing gear but remained attached to the wing structure. Measurements of the actuator positions, as found, corresponded to the “gear extended” or “down” position.

An examination of the nose landing gear actuator piston revealed that its extension was at an intermediate position. The nose landing gear had an external downlock mechanism to secure the gear in the down-and-locked position. The mating side of the external downlock mechanism was not observed and therefore precluded determination of the position of the nose landing gear. Fire and impact damage to the antiskid system components (antiskid control unit, power brake/antiskid control valve, and wheel speed transducers) prevented their functional testing.

The wreckage was transported to a storage facility where additional examinations of the wreckage were performed. The landing gear switch, which was cockpit-mounted, was found with the instrument subpanel attached to electrical wire. The switch exhibited heat and thermal damage consistent with a postcrash fire. The metal part of the switch handle was found in the down (extended) detent, and the J-hook was engaged on the handle. The lift dump switch assembly, which was mounted on the cockpit center console, was not located.

The electrically controlled and operated wing flap system was examined. The four flap positions available to the pilot were UP (0 degrees), 10, 20, and DN (30 degrees/full down). While the flap handle was found in the 10-degree detent, measurements of the flap actuator positions revealed that the flaps were at approximately the 15-degree position (a nonselectable, in-transit position) at the time of impact.

MEDICAL AND PATHOLOGICAL INFORMATION

Both the pilot and copilot sustained serious injuries. Drug and alcohol testing on the pilot and copilot was conducted by the FAA Civil Aerospace Medical Institute after the accident. Toxicology results were negative for both pilots on a wide range of drugs, including major drugs of abuse.

The Georgia Bureau of Investigation Division of Forensic Science listed the cause of death for all passengers as blunt force injuries.

SURVIVAL ASPECTS

The pilot's seat was found with the seatback and seat pan cushions attached to the frame, which was severely damaged with broken tubes in the seatback and seat bottom. The upper shoulder area of the seat was crushed forward and to the right. The seat, which was located near the remains of the cockpit, appeared to be forcefully detached from the cockpit floor track rails with small floor track pieces attached to the seat post. First responders removed the pilot from his 4-point restraint by cutting the belt webbing.

The copilot's seat was found attached to the floor structure in the remains of the cockpit. The seatback, seat pan cushions, and the 4-point restraint were consumed by the postcrash fire. The seat frame was severely damaged with broken tubes in the seatback and seat bottom. First responders found the copilot out of his seat and walking along an access road near the main wreckage area.

All six passenger seats were found scattered among the wreckage and were detached from the airplane floor structure. The seat backs and bottoms of all seats exhibited severe damage, including breakage of the structural tubing framework. The restraint systems on the passenger seats were attached to their respective seat frames, and all six buckles were unlatched. The belt webbing was intact on three of the seats, and the remaining three passenger seat restraints were consumed by fire. One of the six shoulder harnesses was found attached to the lap portion of the female buckle. The other five shoulder harnesses were found retracted in the seatback frame. None of the six passenger seat belt buckles or associated fittings were damaged.

TESTS AND RESEARCH

Enhanced Ground Proximity Warning System

The airplane was equipped with a Honeywell Mark V EGPWS. The nonvolatile memory (NVM) was downloaded, and, by design, the EGPWS recorded airplane performance data based on a parameter exceedance, which was, in this event, an excessive bank angle, most likely the result of the separation of the left wing after impact with Pole 48. The unit captured the data during the 20 seconds before the exceedance. The unit was designed to record for 10 seconds after the exceedance; however, only 2 seconds were recorded because electrical power to the unit ceased during the crash sequence.

The data indicated that during the go-around attempt, the airplane lifted off near the departure end of runway 10 (consistent with the copilot's statement). Per the EGPWS data, the landing gear remained in the down position until impact. The calibrated airspeed was about 125 knots when the airplane lifted off. The airplane continued straight ahead and slowly accelerated and gradually climbed, until a rapid pitch up was recorded, from 10.5 to 27.4 degrees within 1 second. One second later, the roll increased from 2.1 degrees left to 71.7 degrees left.

The first data recorded by the EGPWS showed that the airplane was configured at flaps 30; the flaps were raised to flaps 20 and were transitioning through flaps 15 when the data ended.

Engines

During postaccident examination, the No. 1 (left) engine exhibited extensive impact deformation and was split at the interstage case flange, aft of the axial low pressure compressor (LPC). The fan blades exhibited tip bending opposite the direction of rotation, and the low pressure turbine (LPT) shaft was twisted consistent with a sudden stoppage due to impact.

The No. 2 (right) engine was intact; however, some components, including the LPC, high pressure compressor, high pressure turbine, and LPT all exhibited blade tip rubs with corresponding case rubs. The accessory gearbox tower shaft was sheared, and damage consistent with impact was noted to the fuel pump, oil lube, and scavenge pump.

Wing Spoiler System Actuators

Examination and disassembly of the lift dump actuators revealed that one unit was 0.457 inch from full extension (panel extended), and the other unit was 0.221 inch from full extension. A determination of left or right could not be made due to fire and impact damage.

Examination and disassembly of the left blow-down actuator revealed that the unit was seized at the fully extended position. Damage to the clevis at the end of the actuator was consistent with the roll/speedbrake/spoiler panel in the fully extended position at impact. The right blow-down actuator had minimal damage and was fully functional when tested. Its position at impact could not be determined.

Examination and disassembly of the left roll control actuator revealed that the unit was 0.022 inch from the fully extended position. The right roll control actuator had minimal damage and was found to be fully functional when tested. Its position at impact was 0.201 inch from the fully extended position.

Spoiler Control Unit

The spoiler control unit (SCU) interfaced with the hydraulics and controlled hydraulic actuation of the six spoiler panels across the wings. The SCU was responsible for providing surface position commands and monitoring hydraulic components for malfunction detection and protection.

Exterior examination of the SCU revealed major fire and impact damage to the unit's housing. The bit and diagnostic card was also fire damaged. The data on the NVM chip were downloaded but were inconclusive; therefore, a determination of the actuation of the spoilers before and during the accident could not be made based on SCU data.

Flight Management Computer (FMC-3000)

The airplane was equipped with a Rockwell Collins FMC-3000 flight management computer. The unit was tested and operated normally on a test bench. NVM analysis indicated that no internal faults occurred on the FMC-3000 near the time of accident.

Air Data Computers (ADC-3000)

The airplane was equipped with two Rockwell Collins ADC-3000 air data computers (ADC). Examination revealed that the mounts on both ADCs were damaged from impact, indicative of forces during impact in excess of 20*g*. Both units operated normally on a test bench. The first unit showed a final power cycle with weight coming off wheels at 4 minutes after power on and weight on wheels again at 44 minutes after power on. Following the weight on wheels, within the 44th minute after power on, 3 faults were indicated in the NVM. In order, they were for a faulty Ps (static pressure) counter, a faulty Qc (impact pressure) counter, and an unexpected interruption. According to Rockwell Collins, these faults were most likely due to extreme acceleration causing electrical connections between the circuit cards within the ADC to fail. The second unit showed a final power cycle with weight coming off wheels at 4 minutes after power on and a return to weight on wheels at 44 minutes after power on. No faults were observed in the NVM.

Airplane Performance Study

The NTSB produced an airplane performance study of the landing and go-around phases of the accident flight largely based on information from the CVR and the EGPWS, as well as the physical evidence documented at the accident site. To attain the unfactored landing distance performance numbers contained in the AFM, the following conditions had to be met: thrust as required to maintain a 3-degree approach angle, retarding thrust to idle at 50 ft agl; approach speed at VREF; flaps down; antiskid normal; maximum braking; and lift dump extended after touchdown.

Beechcraft calculated stopping performance for several scenarios related to the accident flight. Beechcraft indicated that with the estimated stopping distance for the accident airplane with no antiskid system operative and the lowest braking action recorded during the flight test, the airplane would require about 1,560 ft to stop from the first speed recorded by the EGPWS (83 kts). This estimate decreases to 1,350 ft when moderate braking is applied. Based on EGPWS data, after touching down, the pilot did not stop the airplane within the first 2,900 ft beyond the runway 10 threshold and initiated a go-around with more than 2,400 ft of hard surface remaining; the first speed was recorded at this point. (The actual touchdown point was not recorded and could not be determined.) The wreckage examination, as well as drag estimates based on recovered EGPWS data, indicated that the lift dump remained extended during the go-around attempt. The airplane drag associated with the lift dump, flaps, and landing gear extended resulted in only marginal climb performance.

ORGANIZATIONAL AND MANAGEMENT INFORMATION

According to its website, Vein Guys® was a group of four physicians that operated several vein care centers in the southeastern United States, with offices in Augusta, Georgia; Atlanta, Georgia; Nashville, Tennessee; and Raleigh, North Carolina. According to interviews, the Pavilion Group was a subsidiary established by the owners of Vein Guys® to handle all business activities associated with the ownership and operation of its private airplane, which it used to shuttle physicians and staff between their offices in Georgia, Tennessee, and North Carolina and also for private flights to vacation destinations.

Before owning the accident airplane, the Pavilion Group owned a King Air 300 (N401BL) and used the pilot services of Executive Shuttle (owned by the accident pilot). The Pavilion Group sold the King Air and, in June 2012, purchased the accident airplane and continued to use the pilot services of Executive Shuttle. The Pavilion Group's airplanes were operated under the provisions of 14 CFR Part 91. According to the accident pilot, the Pavilion Group paid for the pilot's initial and recurrent Premier IA ground and simulator training at FlightSafety. Although Executive Shuttle operated as Sky's the Limit, a 14 CFR Part 135 certificate holder, the pilot stated in interviews that there was no signed contract between Executive Shuttle and the Pavilion Group (or Vein Guys®) for pilot services on the Pavilion Group's airplane, and all Premier IA flights Executive Shuttle operated for the Pavilion Group were conducted under 14 CFR Part 91.

ADDITIONAL INFORMATION

Takeoff Warning System

The airplane was equipped with a takeoff configuration warning system that provided an automatic aural warning to the flight crew during the initial portion of takeoff if the airplane was in a configuration that would not allow for a safe takeoff. The aural warning would continue until the airplane's configuration was changed to allow for safe takeoff, until action was taken by the pilot to abandon the takeoff roll, or until weight was off of the wheels. If either lift dump surface was not retracted, the speed brake/lift dump lever sensors were in the extended range, either flap position was greater than 22 degrees, or the pitch trim was outside of a predetermined range for takeoff, the aural warning would activate in the cockpit.

Antiskid System Failure and Pilot's Corrective Action

Pilots receiving training at FlightSafety on the Premier IA were taught to use the FAA-approved Abbreviated Pilot Checklist to handle system malfunctions. A failure of the antiskid system was included in the Abnormal Procedures section of the checklist. According to the checklist, the pilot should move the antiskid switch to OFF and plan for a flaps 10 or flaps up landing. The antiskid failure procedure also provided a note stating

that landing distance would increase about 130 percent with flaps up and 89 percent with flaps 10.

According to the Antiskid Failure Checklist (which is within the Abbreviated Pilot Checklist), the pilot was required to account for the loss of the antiskid system by applying a performance penalty to the normal landing distance, depending on the flap setting selected (flaps 10 or flaps up). Using weather conditions that prevailed at HQU at the time of the accident, the required landing distance with flaps up was 7,066 ft, and the required landing distance with flaps 10 was 5,806 ft. HQU runway 10's available runway length for landing was 5,208 ft, which did not meet the flaps up or flaps 10 performance penalty requirements, and a diversion to a longer runway would have been required. The Premier IA AFM Antiskid Fail procedure included a note that stated, "Use of flaps 20 or DN (30) for landing, with anti-skid failed, is prohibited."

The simulator instructor who provided the pilot's initial training stated in a postaccident interview that he would expect the pilot to use the written checklist for a systems failure, determine the proper flap setting for landing, and then apply the performance penalty for the landing, adding that the Antiskid Failure Checklist emphasized that the landing must be made with only flaps 10 or UP. According to the pilot's FlightSafety training records, he received antiskid system failure training during his recurrent simulator training on January 4, 2013.

On June 17, 2013, both pilots listened to the CVR recording for the accident flight, and according to subsequent interviews, neither pilot recalled seeing the ANTI SKID FAIL annunciator light illuminated on the approach. According to interviews with both pilots and a review of the CVR recording, the ANTI SKID FAIL abnormal checklist as outlined in the Abbreviated Pilot Checklist for the Premier IA was not conducted by the accident crew before landing at HQU. Further, the pilot stated that he did not think they needed the antiskid system on the landing at HQU and said the performance penalty would only apply if you were "trying to make your numbers" in the book made by the test pilots by applying maximum braking.

Balked Landing/Go-Around

According to recorded data and witness statements, the flight crew attempted a go-around after landing at HQU. The pilot did not recall the event during interviews, while the copilot stated that they conducted a go-around after the airplane touched down. Procedures for the Premier IA (AFM and Pilot Checklist) referred to the discontinuation of a landing approach as a "balked landing."

According to the FAA's *Airplane Flying Handbook* (FAA-H-8083, page G-2), a balked landing was synonymous with a go-around. Per the FAA Pilot/Controller Glossary, a go-around was a situation when a pilot abandons his/her approach to land. The *Airplane Flying Handbook* (chapter 8), "Approaches and Landings," states the following: "The go-around is not strictly an emergency procedure. It is a *normal* maneuver that may at times be used in an emergency situation.…Although the need to discontinue a landing

may arise at any point in the landing process, the most critical go-around will be one started when very close to the ground. Therefore, the earlier a condition that warrants a go-around is recognized, the safer the go-around/rejected landing will be."

According to the FAA's *Aeronautical Information Manual* (page PCG T-4), a touchdown was the point at which an aircraft first made contact with the landing surfaces. The *Airplane Flying Handbook* (FAA-H-8083-3A, page 8-7) explained that the landing process was not over until the airplane decelerated to a normal taxi speed or came to a complete stop. The FAA indicated in its May 14, 2013, response to NTSB Information Request 13-267 that a pilot may execute a balked landing/go-around if he/she determined that, after first contact with the landing surface, positive control had not been maintained or if continuing the landing process may expose the aircraft to unsafe conditions such as an unexpected appearance of hazards on the runway.

FlightSafety Premier IA instructors and evaluators in Wichita, Kansas, and Wilmington, Delaware, stated during postaccident interviews that a balked landing was an airborne maneuver typically taught to be performed at an altitude of 50 ft on the approach, and Premier pilots were not taught to execute a balked landing in the Premier IA following touchdown on the runway. The FlightSafety instructors and evaluators also stated that they discouraged students from executing a balked landing after touchdown. Beechcraft Premier IA manuals and FlightSafety training guidance for the Premier IA do not contain language prohibiting a balked landing procedure after touchdown.

The pilot told investigators that he did not recall if anyone at FlightSafety told him not to conduct a go-around or balked landing after touching down during his training. The pilot also stated that the only balked landings he conducted in training were while airborne. When asked by investigators if he recalled anyone at FlightSafety telling him not to conduct a go-around or balked landing after touching down, the pilot said "no." The pilot further stated that a balked landing was something that occurred in the air, and on the ground it was called a "touch and go." The pilot did not remember ever doing a touch-and-go in the simulator and had never done one in a Premier.

On March 29, 2011, the NTSB issued Safety Recommendation A-11-18, asking the FAA to "require manufacturers of newly certificated and in-service turbine-powered aircraft to incorporate in their Aircraft Flight Manuals a committed-to-stop point in the landing sequence (for example, in the case of the Hawker Beechcraft 125-800A airplane, once lift dump is deployed) beyond which a go-around should not be attempted." On June 10, 2013, the FAA indicated that it was impractical to fully implement the recommendation but that it would address the NTSB's concerns by issuing an Information for Operators (InFO). Pending the issuance of the InFO and the NTSB's review of an acceptable plan of action to ensure that all operators incorporate the guidance, the NTSB classified Safety Recommendation A-11-18 "Open—Acceptable Alternate Response."