Aviation Investigation Final Report

Location:	Atlanta, Georgia	**Accident Number:**	ERA15FA208
Date & Time:	May 8, 2015, 09:59 Local	**Registration:**	N5802V
Aircraft:	Piper PA-32R-300	**Aircraft Damage:**	Destroyed
Defining Event:	Fuel contamination	**Injuries:**	4 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Several days before the accident flight, the commercial pilot told his mechanic and flight instructor that the airplane had not been climbing well. The pilot had completed an engine run-up and subsequent test flight, and found no anomalies with the airplane. The accident flight was the second leg of a cross-country trip that originated earlier in the morning. During the accident takeoff, the pilot stated to air traffic control that the airplane was having trouble climbing. The airplane subsequently collided with terrain about 2 miles from the runway.

Postaccident testing of the fuel manifold showed that it was not operating normally and was contaminated with debris. The composition of debris and its origin could not be determined, but it was likely that the debris moved within the fuel manifold during operation and resulted in fluctuating power indications. Examination of the engine did not reveal any mechanical anomalies. Although the airplane was likely loaded 24 pounds in excess of its maximum gross weight, takeoff distance calculations showed that sufficient runway was available when loaded at the maximum gross weight for the departure and climb, assuming nominal performance of the airplane, engine, and pilot. Given that the airplane was having difficulty climbing, as communicated by the pilot to air traffic control during the departure, it is likely that during the takeoff, the debris in the fuel manifold prevented the engine from obtaining full power.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A partial loss of engine power due to contamination in the fuel manifold, which resulted in a collision with terrain shortly after takeoff.

Findings

Aircraft	Fuel - Fluid condition
Aircraft	Fuel distribution - Not specified

Factual Information

History of Flight

Initial climb	Fuel contamination (Defining event)
Emergency descent	Off-field or emergency landing
Emergency descent	Collision with terr/obj (non-CFIT)

On May 8, 2015, about 0959 eastern daylight time, a Piper PA-32R-300, N5802V, collided with a highway barrier during a forced landing attempt near Chamblee, Georgia. The commercial pilot and three passengers were fatally injured and the airplane was destroyed. The airplane was registered to and operated by TLT and GGBB LLC., as a personal flight. Day, visual meteorological conditions prevailed for the flight, which operated on an instrument flight rules (IFR) flight plan. The flight originated from Peachtree DeKalb airport (PDK), Chamblee, Georgia, about 0956 and was destined for University-Oxford Airport (UOX), Oxford, Mississippi.

The accident flight was the second leg of a cross-country flight that originated earlier that morning from Asheville Regional Airport (AVL), Asheville, North Carolina.

Review of air traffic control (ATC) voice communication data provided by the Federal Aviation Administration (FAA) revealed that the pilot contacted clearance delivery for an IFR clearance. ATC provided the clearance, which included radar vectors, and "climb and maintain 3,000; expect 8,000 in 10 minutes." The pilot read back the clearance correctly and confirmed that he had the most recent automatic terminal information service, which was information "Whiskey." The pilot contacted ground control and indicated that he was ready to taxi. Ground control instructed the pilot to taxi to runway 3R, via taxiway Bravo, hold short of runway 3L and the pilot read back the instructions correctly. The pilot then contacted the tower controller, informing him that he was holding short of runway 3L and ready to depart. The tower controller instructed the pilot to "fly heading 360 and cleared for takeoff." The pilot then questioned the controller regarding which runway to take off from and the controller cleared the pilot for takeoff from runway 3L, which was 3,746 feet long. Approximately 3 minutes after departure, the tower controller called the pilot to verify his heading. The pilot responded "zero-two-victor, I'm having some problem climbing here." The pilot subsequently stated "zero-two-victor; were going down here at the intersection." This was the last transmission made by the pilot.

A witness stated that he was about 2,300 feet off the departure end of the runway. He stopped to look at the airplane because it was moving extremely slow and only 75 to 100 feet above ground level when it went over his head. He added that the engine sounded normal and despite the slow speed. He continued to watch the airplane as it flew out of his view.

Another witness that observed the airplane prior to the accident said he heard a "clacking sound," but the engine rpm did not change. The engine sounded like it was at "wide open throttle" as it descended onto the highway and exploded.

According to the pilot's mechanic, about 4 days prior to the accident flight, the mechanic observed a

departure conducted by the pilot. He said that during climbout he watched as the airplane cleared trees at the departure end of the runway by approximately 50 feet. He added that shortly after that flight, the pilot called him and expressed his concern that the airplane was not climbing well. The mechanic mentioned to him that it was a warm day, and he was only a few hundred pounds under gross weight, with a slight tailwind. The mechanic further stated that the pilot said that he would do a run-up and if everything checked out, he would conduct a test flight the next day. The following day the pilot sent a text message to the mechanic and said that the run-up was good, but he wasn't getting full rpm at full power while static. About 30 minutes later, the pilot called the mechanic and told him he flew the airplane and everything was normal.

According to pilot's flight instructor, he said that the pilot called him 4 days prior to the accident flight and told him that he went flying and had some difficulty getting the airplane to gain altitude. He said that he had used up more than half of the runway when he was able to finally get the airplane in the air. The pilot told the instructor that he almost hit the trees near the end of the runway. The pilot also stated to the flight instructor that he did conduct "pre and post flight engine checks and noted no problems."

Pilot Information

Certificate:	Commercial	**Age:**	53,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	November 18, 2014
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 687 hours (Total, all aircraft), 672 hours (Total, this make and model)		

The pilot held a commercial pilot certificate with ratings for airplane single-engine land and instrument airplane. He reported a total flight experience of 667 hours, including 40 hours during the last 6 months, on his FAA second-class medical certificate application, dated November 18, 2014. The medical certificate indicated no restrictions. Review of the pilot's logbook revealed he had accumulated 687 total hours; of which, 672 hours were in the same make and model as the accident airplane.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N5802V
Model/Series:	PA-32R-300	**Aircraft Category:**	Airplane
Year of Manufacture:	1977	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	32R-7780365
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	July 22, 2014 Annual	**Certified Max Gross Wt.:**	3600 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	5616.03 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C91 installed, not activated	**Engine Model/Series:**	O540-K1G5D
Registered Owner:	On file	**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane was manufactured in 1977. It was powered by a Lycoming O-540-K1G5D engine rated at 300 horsepower at 2,700 rpm, and was equipped with a Hartzell three-bladed constant speed propeller.

The last annual inspection of the airframe and engine occurred on July 22, 2014, at an airframe total time of 5616.03 hours. The last recorded maintenance included the installation of a battery on May 5, 2015.

The airplane's maintenance logbooks were not located and were presumed to have burned in the aircraft wreckage. Copies of airframe and engine logbook entries dated July 22, 2014 were provided by the mechanic who completed an annual inspection of the airplane on that date. The airframe logbook entry noted the tachometer hour meter reading and airframe total time as 5616.03 hours. The engine logbook entry indicated that the engine had accumulated 774.86 hours since major overhaul, as of that date.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PDK,998 ft msl	**Distance from Accident Site:**	2 Nautical Miles
Observation Time:	09:53 Local	**Direction from Accident Site:**	160°
Lowest Cloud Condition:	Few / 6000 ft AGL	**Visibility**	6 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	80°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.13 inches Hg	**Temperature/Dew Point:**	24°C / 16°C
Precipitation and Obscuration:	Moderate - None - Haze		
Departure Point:	Atlanta, GA (PDK)	**Type of Flight Plan Filed:**	IFR
Destination:	OXFORD, MS (UOX)	**Type of Clearance:**	IFR
Departure Time:	09:56 Local	**Type of Airspace:**	Class D

The recorded weather at PDK, at 0953, included winds from 080 degrees at 4 knots; 6 statute miles visibility, few clouds at 6,000 feet, temperature 24 degrees Celsius (C), dew point temperature 16 degrees C, and an altimeter setting of 30.14 inches of mercury. The calculated density altitude was about 2,259 feet.

Airport Information

Airport:	Dekalb-Peachtree Airport PDK	**Runway Surface Type:**	
Airport Elevation:	998 ft msl	**Runway Surface Condition:**	Dry
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	3 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	4 Fatal	**Latitude, Longitude:**	33.891109,-84.272781(est)

The wreckage was located in the eastbound lane of interstate 285, approximately 2 miles from PDK. The airplane came to rest in the left service lane against a 5 foot barrier wall on a heading of 021 degrees magnetic. There was a postcrash fire that consumed the majority of the airplane. There were ground scars across four traffic lanes up to the concrete highway divider.
The cockpit and fuselage were fragmented and destroyed by postcrash fire. Flight control cables were attached to fragments of the flight controls. The right and left wings were fragmented and was destroyed by postcrash fire. The flight control surfaces were molten metal on both wings. The aileron bellcranks on the left and right wings were located within the fragments of the wings and connected to the flight control cables and turnbuckles. Flight control cable separations exhibited signs of overstress failures.
The empennage was fragmented and fire damaged. The flight control cables to the rudder control sector and stabilator bell crank remained attached to the fragmented fuselage and were traced to the forward section of the cockpit.
The left and right main landing gear were found in the extended position and the flap handle was impact damaged and observed in the 10-degree flap extension position. The throttle was found forward in the "full power" position, the propeller lever was forward at the "full increase" position, and the mixture lever was full forward at the "full rich" position. The fuel boost pump switch and selector was destroyed. Engine control linkage continuity was established from the cockpit controls to their respective engine connections.

An examination of the fuel system revealed that the all of the fuel lines before the firewall were destroyed. The fuel lines from the firewall to the fuel manifold were partially fire damaged. The fuel manifold and injector lines did not show signs of fire damage. The fuel manifold was removed during the examination of the engine and placed on a test bench and did not flow when tested up to 7 psi (normal test pressure is 4.5 psi). The unit was removed from the test bench and the bottom cover was removed. Following removal of the bottom cover, the gasket did not exhibit heat damage. The bottom portion of the movable portion of the body assembly was measured and found to be positioned 0.032 inch below the spool of the body assembly (normal closed position). The bottom of the movable portion of the body assembly was pushed by hand and some resistance was noted at first, but it then moved. The bottom cover was reinstalled and the four screws were torqued to the proper setting. The fuel manifold was placed on the test bench and debris was noted coming from the ports during initial flow. The unit was flowed at 4.5 psi (normal) and it was found to flow equally from all ports at 132 pounds-per-hour (pph); the minimum specification was 135 pph. The fuel manifold was removed from the test bench and the top cover, which was safety wired, was removed. Test bench fluid was noted on the top side of the diaphragm (air side) and some slivers of material were also noted. The movable portion of the body assembly was removed and contamination/debris was noted. Re-insertion of the movable portion of the body assembly into the body revealed slight binding.

The debris recovered from the fuel manifold was forwarded to the NTSB Materials Laboratory and examined using Fourier-transform infrared spectroscopy. The spectrum for the debris contained peaks that corresponded to signatures indicative that the material contained a carboxylic acid. A spectral library search was done on the debris spectrum. There were no strong matches found in the search; however, the debris spectrum had many similarities to several dicarboxylic acids, such as terephthalic acid and isophthalic acid. Carboxylic acids are pervasive in nature and are often found as precursors in polymer production, in adhesives and coatings, and are often naturally present in fuel as well as used as fuel additives (corrosion inhibitors and lubricity improving additives).

During examination of the fuel servo, it was noted that it was fire damaged. Due to the heat damage of the diaphragms, the unit could not be flow tested.

Examination of the propeller revealed that one blade was fractured off the hub. The spinner dome separated from the spinner bulkhead. All three blades exhibited rotational scoring and curling of the blade tips. There were impression marks on the preload plates indicating that the propeller was in the low blade angle position prior to impact. The propeller showed signs of power ON prior to impact. There were no discrepancies noted that would preclude normal operation. All damage was consistent with impact damage.

The propeller governor was mounted in a governor test stand and run through the standard factory acceptance test procedure for new or overhauled governors. The governor functioned normally and met all factory specifications, except for the maximum rpm. The governor maximum rpm setting was 2,660 rpm verses a factory specification of 2,555 +/- 10. Although the high rpm setting was higher than factory specifications, it did not affect the governor performance. A higher than specified rpm setting indicated an adjustment was made to the governor high rpm stop while installed on the airplane. The governor was then disassembled for visual examination of the governor components. There were no unserviceable conditions noted during the visual examination.

Examination of the engine revealed it was discolored consistent with exposure to the postimpact fire. The propeller and crankshaft flange were separated from the engine. The crankshaft flange was impact damaged. The left side of the exhaust system was crushed. The engine accessories were fire damaged. Both crankcase halves were fractured in the area of the No. 1 and No. 2 cylinders. The No. 2 cylinder head on the left side was impact damaged. The engine mount was bent and the engine was displaced toward the firewall. Three of the four engine mounts were impact fractured. The engine could not be rotated by turning the crankshaft flange due to impact damage and was further disassembled to examine the engine internal components. The cylinders were removed and no damage noted to the cylinders, pistons or valves other than fire and impact damage. The oil sump was removed and contained an unmeasured quantity of oil. The accessory case was removed and no damage to the rear gears was noted. The oil pump was disassembled and no damage to the pump bore or gears was noted. The crankcase halves were disassembled and the crankshaft and rod assembly was lifted out. The rods were free to rotate on the crankshaft rod journals and were not disassembled. The crankshaft main journals and crankshaft bearing surfaces did not show any anomalies. The camshaft was removed and no damage noted to the crankcase camshaft bearing surfaces. No damage was noted to the camshaft except that the cam lobe, which serviced the No. 3 intake and the No. 4 exhaust cam followers were worn. The cam lobe was measured at 1.364 inches using an uncalibrated dial caliper. The No. 4 exhaust lobe was measured at 1.464 inches. The No. 3 intake and No. 4 exhaust cam followers were pitted and worn.

Medical and Pathological Information

An autopsy was performed on the pilot by the DeKalb County Medical Examiner, Decatur Georgia.

The Federal Aviation Administration's Civil Aerospace Medical Institute performed forensic toxicology on specimens from the pilot with negative results for drugs and alcohol.

Additional Information

The weight and balance record dated August 24, 1999, noted the airplane's empty weight to be 2,154 lbs. According to the Pilot Operating Handbook (POH) the maximum takeoff and landing weight for this aircraft was 3,600 lbs. With full fuel (94 gallons useable), an estimated cargo weight of 216 lbs, and reported pilot and passengers weights of 690 lbs, the total weight computed was 3,624 lbs. According to fueling records the airplane was topped off with 20 gallons of fuel prior to departure. The estimated cargo weight was based on the fire damaged items that were collected during the airplane recovery.

The airplane's calculated takeoff distance assuming that it was loaded to its maximum gross weight, the flaps were set to 25 degrees, and given the weather conditions reported about the time of the accident, was about 1,050 feet. The distance required to clear a 50-foot barrier was about 2,000 feet.

Administrative Information

Investigator In Charge (IIC):	Alleyne, Eric
Additional Participating Persons:	Edward Rolon; FAA; Atlanta, GA Micheal Childers; Lycoming; Witchita, KS Ronald Maynard; Piper; Vero Beach , FL
Original Publish Date:	August 31, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=91149