Aviation Investigation Final Report

Location:	Smithville, Tennessee	**Accident Number:**	ERA19LA004
Date & Time:	October 3, 2018, 17:30 Local	**Registration:**	N8371P
Aircraft:	Piper PA 24-180	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot stated that before departing on a local flight, he was delayed for about 10 minutes on the ground waiting for other traffic before he could back-taxi to the run-up area before takeoff. He completed the engine run-up and takeoff roll with no anomalies noted. After takeoff, when the airplane was about 300 ft above the runway, the engine experienced a total loss of power and the propeller windmilled. The pilot lowered the landing gear and touched down on the remaining runway. The airplane overran the departure end, traveled down an embankment, and came to rest upright in low brush. Postaccident examination of the engine revealed no evidence of preimpact mechanical malfunctions or failures that would have precluded normal operation. The weather conditions at the time of the accident were conducive to the formation of serious carburetor icing at glide (idle) power settings. Thus, it is likely that during the ground delay, a period during which the engine would typically be operating at low power, carburetor ice formed, which resulted in a total loss of engine power during the initial climb.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

A total loss of engine power during initial climb due to carburetor ice that formed during an extended ground delay.

Findings

Environmental issues	Conducive to carburetor icing - Effect on equipment
Environmental issues	(general) - Contributed to outcome

Factual Information

History of Flight

Standing	Preflight or dispatch event
Initial climb	Loss of engine power (total) (Defining event)
Landing	Off-field or emergency landing
Landing	Runway excursion

On October 3, 2018, about 1730 central daylight time, a Piper PA-24-180, N8371P, was substantially damaged during a forced landing after takeoff from Smithville Municipal Airport (0A3), Smithville, Tennessee. The private pilot was seriously injured. The airplane was privately owned and operated under the provisions of Title 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed and no flight plan was filed for the local flight.

According to the pilot, there was no taxiway at 0A3 so he was delayed about 10 minutes by traffic before he could back-taxi to the run-up area prior to takeoff from runway 24. The pilot completed the engine run-up and takeoff roll with no anomalies noted.

After liftoff, the pilot retracted the landing gear and during the initial climb, about 300 feet above the runway, the engine stopped producing power, but the propeller continued to "windmill." The pilot stated that there was no time to perform remedial actions to restore power, so he lowered the landing gear and touched down on the remaining runway. The airplane overran the departure end of the runway, traveled down an embankment, crossed a road, and came to rest upright in low brush.

The pilot held a private pilot certificate with ratings for airplane single-engine land and instrument airplane. His most recent Federal Aviation Administration (FAA) third-class medical certificate was issued April 25, 2012, and his most recent FAA Basic Medical was issued on May 1, 2017. A review of the pilot's logbook revealed 834 total hours of flight experience, of which 431 hours were in the accident airplane make and model.

The four-seat, single-engine, low-wing, retractable landing gear airplane was manufactured in 1964 and powered by a Lycoming O-360 engine, rated to produce 180 horsepower. Its most recent annual inspection was completed on October 1, 2018, at 2,840 aircraft hours. The engine had also accrued 2,840 total hours of operation; of which, 1,200 hours were since its last major overhaul. The accident flight was the first flight following the annual inspection.

The FAA inspector who responded to the accident location reported the airplane came to rest in an upright position, 384 ft beyond the departure end of runway 24. The airplane remained intact, but the aft portion of the fuselage was fractured and twisted, and the left aileron was bent. Examination of the engine revealed that all three propeller blades exhibited twisting, tip curl and chordwise scratching. The inspector noted fuel in both wing tanks and the fuel appeared absent of water and debris.

The engine and its accessories were examined under the supervision of an FAA inspector. All of the spark plugs were removed and visually examined with no anomalies noted. Rotation of the engine's crankshaft produced compression on all four cylinders, and normal valvetrain movement was observed when the crankshaft was rotated. Examination of the engine's cylinders with a lighted borescope revealed no damage to the cylinders or pistons. Fuel was present throughout the fuel system ,carburetor, and fuel filters, and it the fuel was absent of water and debris. Fuel was also present in the carburetor and no water and no debris was found within the carburetor float bowl. The engine-driven fuel pump was actuated by hand and functioned normally. The engine oil, engine oil filter, and engine oil pickup screen were all absent of debris. Both magenetos were removed and when their input drives were rotated with a drill, produced spark at all towers.

At 1735, the weather reported at Upper Cumberland Regional Airport (SRB), about 14 miles east of the accident site, included wind from 200° at 4 knots, visibility of 5 miles with haze, few clouds at 4,400 ft, temperature 28° C, dew point 21° C, and an altimeter setting of 30.06 inches of mercury. The calculated relative humidity at this temperature and dewpoint was 65%.

According to an FAA Icing Probability Chart, the atmospheric conditions at the time of the accident were "conducive to serious icing at glide [idle] power." According to FAA Advisory Circular 20-113, "To prevent accident due to induction system icing, the pilot should regularly use [carburetor] heat under conditions known to be conducive to atmospheric icing and be alert at all times for indications of icing in the fuel system." The circular recommend that when operating in conditions where the relative humidity is greater than 50%, "…apply carburetor heat briefly immediately before takeoff, particularly with float type carburetors, to remove any ice which may have been accumulated during taxi and runup." It also stated, "Remain alert for indications of induction system icing during takeoff and climb-out, especially when the relative humidity is above 50 percent, or when visible moisture is present in the atmosphere."

Pilot Information

Certificate:	Private	**Age:**	60,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	BasicMed	**Last FAA Medical Exam:**	May 4, 2017
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	May 18, 2017
Flight Time:	(Estimated) 830 hours (Total, all aircraft), 431.7 hours (Total, this make and model), 800 hours (Pilot In Command, all aircraft), 2.4 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N8371P
Model/Series:	PA 24-180 Undesignat	**Aircraft Category:**	Airplane
Year of Manufacture:	1964	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	24-3629
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	October 1, 2018 Annual	**Certified Max Gross Wt.:**	2551 lbs
Time Since Last Inspection:	0 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	2840 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	O-360
Registered Owner:	On file	**Rated Power:**	180 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KSRB,1024 ft msl	**Distance from Accident Site:**	14 Nautical Miles
Observation Time:	17:35 Local	**Direction from Accident Site:**	69°
Lowest Cloud Condition:	Few / 4400 ft AGL	**Visibility**	6 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	200°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.05 inches Hg	**Temperature/Dew Point:**	28°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Smithville, TN (0A3)	**Type of Flight Plan Filed:**	None
Destination:	Smithville, TN (0A3)	**Type of Clearance:**	None
Departure Time:	17:30 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Smithville Municipal Airport 0A3	**Runway Surface Type:**	Asphalt
Airport Elevation:	1084 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	24	**IFR Approach:**	None
Runway Length/Width:	4257 ft / 75 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	35.985553,-85.809165(est)

Preventing Similar Accidents

Preventing Carburetor Icing (SA-029)

The Problem

According to NTSB aircraft accident data, from 2000 to 2011, carburetor icing was a cause or factor in about 250 accidents. On average, carburetor icing causes or contributes to two fatal accidents per year. Accident evidence shows that some pilots do not recognize weather conditions favorable to carburetor icing and inaccurately believe that carburetor icing is only a cold- or wet-weather problem. Pilots may also have not used the carburetor heat according to the aircraft's approved procedures to prevent carburetor ice formation. In addition, some pilots may not recognize and promptly act upon the signs of carburetor icing.

What can you do?

- Check the temperature and dew point for your flight to determine whether the conditions are favorable for carburetor icing. Remember, serious carburetor icing can occur in ambient temperatures as high as 90° F or in relative humidity conditions as low as 35 percent at glide power.
- Refer to your approved aircraft flight manual or operating handbook to ensure that you are using carburetor heat according to the approved procedures and properly perform the following actions:
    - Check the functionality of the carburetor heat before your flight.
    - Use carburetor heat to prevent the formation of carburetor ice when operating in conditions and at power settings in which carburetor icing is probable. Remember, ground idling or taxiing time can allow carburetor ice to accumulate before takeoff.
    - Immediately apply carburetor heat at the first sign of carburetor icing, which typically includes a drop in rpm or manifold pressure (depending upon how your airplane is equipped). Engine roughness may follow.
- Consider installing a carburetor temperature gauge, if available.
- Remember that aircraft engines that run on automotive gas may be more susceptible to carburetor icing than engines that run on Avgas.

See https://www.ntsb.gov/Advocacy/safety-alerts/Documents/SA-029.pdf for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Spencer, Lynn
Additional Participating Persons:	William K Keeney; FAA/FSDO; Nashville, TN
Original Publish Date:	November 19, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=98406