Aviation Investigation Final Report

Location:	Lagrangeville, New York	**Accident Number:**	ERA19FA249
Date & Time:	August 17, 2019, 16:13 Local	**Registration:**	N303TL
Aircraft:	Cessna T303	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of engine power (partial)	**Injuries:**	2 Fatal, 3 Serious, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

After flying one flight leg earlier in the day, the pilot flew to an intermediate stop on the way to his home base to purchase fuel. A surveillance video recording from the fueling airport showed the airplane land and taxi to the self-serve fuel pump where the engines were shut down for about 10 minutes while the airplane was fueled. The pilot then had difficulty starting both engines over several minutes. After the engines were running, the airplane taxied to the runway and did not appear to stop for an engine run-up.

The pilot performed a rolling takeoff, and the airplane lifted off after a roll of about 2,100 ft, slightly more than half the available runway length. A passenger reported that after liftoff, at an altitude of about 50 to 100 ft above ground level (agl), both engines lost partial power and began “stuttering,” which continued for the remainder of the flight. He further reported that the engines did not stop, but they were “not producing full RPM.” The airplane drifted left of centerline, which a witness described as a left yawing motion. The pilot corrected the drift and flew the runway heading over the grass on the left side of the runway; however, the airplane would not climb. After crossing the end of the runway, the pilot pitched the airplane up to avoid obstacles. Automatic dependent surveillance-broadcast data indicated that the airplane climbed from about 20 to 120 ft agl in a gradual left turn. During this time the groundspeed decreased from about 80 knots to about 69 knots. The altitude then decreased to about 50 ft agl, the groundspeed decreased to about 66 knots, and the left turn decreased in radius until the recorded data ended about 100 ft west of the accident site. The airplane descended and impacted a house.

Witness descriptions of the airplane yawing to the left while over the runway and again during its final left turn suggest that the loss of engine power may not have been symmetric (that is, one engine may have suffered more of a loss than the other).

Examination of the accident site revealed that most of the fuselage forward of the aft bulkhead came to rest within the perimeter of the north side of the house and was mostly consumed by a postcrash fire. Both engines were severely damaged by impact and fire. Due to the damage, the investigation was unable to determine a reason for the loss of engine power in both engines.

The surveillance video showed that the pilot did not sample fuel from the airplane sump drains after refueling, which would have provided him an opportunity to check the fuel for water or visible contaminants. However, a fuel sample taken from the airport's fuel supply after the accident indicated no anomalies.

The pilot's difficulty starting both engines, which were likely still relatively hot (they had been shut down for about 10 minutes) combined with the ambient temperature of 30°C (86°F), suggests the possibility of fuel vapor formation in the fuel lines while the airplane was on the ramp. However, once the engine is running, the likelihood of vaporization is reduced because the fuel flow through the lines is sourced from the relatively cooler fuel supply in the fuel tanks, and airflow over the engine from the propeller also cools the fuel. Further, the use of the auxiliary fuel pumps and open cowl flaps (required by the pilot operating handbook [POH] for takeoff) also reduces the likelihood of vaporization. The investigation was unable to determine the position of the cowl flaps or the auxiliary fuel pump switches or whether fuel vaporization may have occurred during takeoff.

Additionally, the pilot did not perform the procedure indicated in the POH for takeoff in hot weather conditions, which could have provided him an opportunity to verify before takeoff that the engines were producing the required minimum RPM and the required minimum fuel flow had been established.

Based on autopsy findings, the medical examiner listed atherosclerotic cardiovascular disease as a contributing cause of death. This placed the pilot at some increased risk for an acute cardiac event. However, there were no acute findings listed from the autopsy, and the surviving passenger did not describe such an event. The passenger reported the pilot was awake and alert and attempting to fly the airplane. Therefore, the pilot's cardiovascular disease was not a contributing factor in the accident.

Toxicology testing of the pilot's blood and urine was positive for previous cocaine use. Cocaine was detected in his urine and the inactive metabolites benzoylecgonine and ecgonine methyl ester were detected in both his blood and urine. The presence of the cocaine pyrolysis product anhydroecgonine methyl ester indicates that crack cocaine was probably smoked. The absence of cocaine and anhydroecgonine methyl ester in the blood suggests that the cocaine was smoked several hours before and perhaps late effects such as fatigue or inattention may have been present, especially if the pilot was a chronic user. It is unknown how frequently the pilot used cocaine. However, given the operational and mechanical issues described by the surviving passenger and the fact that no active cocaine compound was found in the pilot's blood, previous use of cocaine by the pilot was unlikely to have contributed to the accident.

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 in both engines during initial climb for reasons that could not be determined based on the available information.

Findings

Not determined	(general) - Unknown/Not determined

Factual Information

HISTORY OF FLIGHT

On August 17, 2019, about 1613 eastern daylight time, a Cessna T303, N303TL, was destroyed when it was involved in an accident in Lagrangeville, New York. The private pilot and one person on the ground were fatally injured. Two passengers and one person on the ground sustained serious injuries, and one person on the ground sustained minor injuries. The airplane was operated as a 14 *Code of Federal Regulations* Part 91 personal flight.

According to the passenger seated in the copilot's seat, on the morning of the accident the pilot and two passengers departed Republic Airport (FRG) and flew to Orange County Airport (MGJ), Montgomery, New York, where the pilot had a business meeting. After the meeting, they departed MGJ for the return flight to FRG, which included a stop at Sky Acres Airport (44N) in Lagrangeville, New York, to purchase fuel. The passenger reported that the flight from FRG to MGJ and the flight from MGJ to 44N were uneventful. He recalled that the pilot performed an engine runup prior to departing FRG; he did not recall if one was performed prior to the departure from MGJ or prior to the accident flight. The pilot fueled the airplane at 44N, where fuel records indicated he purchased 100 gallons of 100LL aviation fuel.

A review of surveillance video revealed that the airplane engines were shut down for about 10 minutes while the pilot and one of the passengers added fuel to both wing tanks. After the fueling, they did not take any fuel samples from the airplane's sump drains. After the pilot and both passengers boarded the airplane, the pilot made several unsuccessful attempts to start the left engine for about 30 seconds. Next, the pilot attempted to start the right engine several times over a period of about 30 seconds. During the last attempt, the engine started. The left engine was then started after about 10 seconds of engine cranking. No smoke was visible at any time during the engine start attempts. The airplane remained in position with the engines idling for about 2 minutes before it taxied around to the opposite side of the fuel pump and stopped for about 45 seconds with the engines at or near idle. The pilot then taxied from the fuel pump to runway 17 and did not appear to stop for an engine run-up (although the airplane was out of the camera view for about 14 seconds near the end of the taxiway). The pilot performed a rolling takeoff, and the airplane lifted off the runway in the vicinity of the windsock, which was located on the left side of the runway about 2,100 ft from the runway 17 threshold.

According to the passenger in the copilot's seat, shortly after liftoff at an altitude of less than 50 to100 ft, both engines lost partial power. They did not stop completely but sounded as though they were "not getting full RPM." The engines began "stuttering," which continued until impact with the house. As the airplane proceeded down the runway, it began to drift toward the left until they were over the grass next to the runway. The pilot corrected the drift and the airplane then tracked straight and remained over the grass. As the airplane continued beyond the end of the runway, it was not climbing, and the passenger noticed obstacles that he described as trees and a structure or building. The pilot pitched the airplane up to clear those obstacles. The airplane then began a left turn and as it reached the house the left wing struck the ground, and

the right wing struck a tree and the house. The airplane had “very little forward motion” after the initial impact. The passenger estimated that the airplane remained below 100 ft of altitude for the entire flight. He reported that the pilot continued to fly the airplane until impact and did not make any radio calls or say anything to the passengers. He did not hear any warning bells or alarms during the flight. The pilot and both passengers wore their seatbelts and shoulder harnesses.

The airport manager who was mowing the grass at the airport described the airplane’s rotation as “very abrupt” compared to other light twin airplanes he has observed taking off at the airport. Immediately after rotation, he noticed the airplane maintained very shallow bank angles; however, the nose was “high”, and the airplane appeared to yaw slightly to the left. The airplane appeared to correct toward the right before he lost sight of it behind the airport fuel tank. When the airplane emerged from the other side of the tank, the nose was initially lower, but then it pitched up again near the end of the runway before it disappeared behind some trees. The airport manager was wearing ear protection and listening to music and did not hear any engine noise.

Another witness reported that the airplane was “went in a straight line for a short distance and then quickly turned left about 40-45°” which she described as appearing “deliberate and controlled.” She added that she was “surprised the left wing didn’t dip down as the airplane turned. The wings looked like they were steady and pretty parallel to the ground during and after the turn.”

A review of Federal Aviation Administration (FAA) recorded automatic dependent surveillance – broadcast data revealed that after the airplane reached the end of the runway, it climbed from about 675 ft to 775 ft pressure altitude (about 20 to 120 ft above ground level [agl]) in a gradual left turn. During this time the calculated groundspeed decreased from about 80 knots to about 69 knots. The pressure altitude then decreased to 725 ft (about 50 ft agl), the calculated groundspeed decreased to about 66 knots, and the left turn decreased in radius until the recorded data ended about 100 ft west of the accident site.

AIRCRAFT INFORMATION

According to the airplane’s pilot operating handbook (POH), engine mis-starts (without puffs of black smoke) can result from an excessively lean mixture in cold or warm temperatures or by vapor lock in extremely high temperatures. If vapor lock is suspected, the primer switch (which operates the auxiliary fuel pumps) should be turned on for 5 to 10 seconds prior to starting the engine, to flush the vapor through the fuel lines. Additionally, the auxiliary fuel pumps are to be turned on for takeoff, landing, or any time vapor is suspected in the fuel system, such as in hot day/high altitude conditions or conditions during a climb that are conducive to fuel vapor formation.

The POH also prescribes a “Hot Day Takeoff” procedure which includes a static runup of the engines and evaluation of the maximum engine RPM achieved before takeoff. The procedure includes an adjustment to lean the mixture, if necessary, to ensure sufficient engine RPM and establish a required minimum fuel flow, prior to takeoff. The normal maximum RPM achieved during the procedure should be 2,400 and must be at least 2,300. The procedure does not

specify an ambient temperature range for which the procedure is required but does specify that it should be performed "on warm humid or hot days with heated engine(s) and oil and cylinder temperatures near mid-scale or higher." It prescribes adjustments and performance calculation penalties if the maximum RPM achieved is between 2,300 and 2,400.

METEOROLOGICAL INFORMATION

At 1653, the weather conditions at Hudson Valley Regional Airport (POU), Poughkeepsie, New York, located about 8 miles southwest of the accident site included temperature 30° C, dewpoint 20° C, wind from 170° at 7 knots, and an altimeter setting 29.93 inches of mercury. The density altitude calculated for the takeoff at 44N (field elevation 697 ft) was 2,633 ft.

WRECKAGE AND IMPACT INFORMATION

Examination of the wreckage revealed that most of the fuselage forward of the aft bulkhead was destroyed by fire. Except for the empennage, most of the wreckage that remained was found within the right (north) half of the house foundation perimeter. The north half of the house structure and roof was consumed by fire. The empennage remained largely intact and was found with the right horizontal stabilizer leaning against what remained of the rear wall of the house, oriented on a heading of about 030° magnetic. The damaged left wingtip, left engine, right engine, and the right (green) navigation light lens were found oriented along a line from the rear of the house to a bush by the front wall of the house, roughly the length of the wingspan and oriented perpendicular to the empennage. The cabin heater, which was mounted in the nose of the airplane, was found about 15 ft away from and in line with the orientation of the empennage.

Flight control continuity was confirmed from what remained of the flight control tubes near the cockpit, to the rudder, the elevator and to the outboard aileron bell cranks in each wing. Neither of the aileron pushrods were found. All cable ends were found at their respective attachment points. The right aileron cable was fractured in one location near the bell crank. The rudder and elevator trim actuators were near the neutral position. The aileron trim condition could not be determined. The remnants of the landing gear were found in the retracted position. The flap jackscrew actuator was consistent with the retracted position. All of the cockpit instruments were consumed by fire, and none were located except for one 2-inch diameter dial face that was illegible but consistent with a vacuum gauge. A metal avionics rack was located with ash inside. Several loose metal unidentified toggle switches were found near the cockpit area. Neither of the two electric fuel boost pumps were located. Remnants of both fuel selector valves were found; however, both were too thermally damaged to determine their position.

The cockpit engine and propeller controls were located; however, the preimpact position of the levers and the cable continuity to each engine could not be determined due to thermal damage.

Several spark plugs, rocker arm assemblies, and pushrods were found loose in the wreckage and could not be associated with a specific engine or cylinder.

The left engine was found in an upright position with damage consistent with thermal and impact forces. The crankshaft could not be rotated by hand. All six cylinders remained attached but exhibited impact and thermal damage. Cylinder Nos. 1, 3, and 5 exhibited impact and thermal damage with cooling fins being crushed. Cylinder Nos. 2, 4, and 6 were impact and thermally damaged with the top half of each cylinder melted away. The intake and exhaust rocker arms and shafts were separated from cylinder Nos. 2 and 4. The No. 6 cylinder head separated exposing a thermally destroyed piston dome. Only the piston skirt remained in the cylinder with the piston pin in place.

The left three-blade constant speed propeller assembly remained attached to the crankshaft propeller flange. A single propeller blade was visible in the debris with the other two blades thermally destroyed. All three propeller shanks remained attached to the thermally damaged propeller hub.

The right engine was found inverted with damage consistent with thermal and impact forces. The crankshaft could not be rotated by hand. All cylinder bases remained attached at their respective mounting pads. Cylinder Nos. 1 and 3 rocker covers were partially separated with thermal and impact damage. Rocker arms and shafts were intact on cylinder Nos. 1 and 3. The cylinder No. 5 cylinder head (forward portion) was separated exposing an intact piston. The Nos. 2, 4, and 6 cylinder heads were separated or melted away exposing intact pistons.

The right three-blade constant speed propeller was separated from the crankshaft propeller flange. Three propeller blade inboard shanks were located near the inverted right engine; however, the blade portions were thermally destroyed. A partial propeller hub was also located nearby with the dome cover and spring intact.

The Nos. 1 and 3 pistons on the right engine did not exhibit any damage or signatures consistent with pre-ignition or detonation. All other pistons identified for both engines had varying degrees of thermal and melting damage that precluded the identification of any signatures uniquely consistent with detonation or pre-ignition.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy of the pilot was performed by the Office of the Medical Examiner, Dutchess County, New York. The autopsy report listed the cause of death as “thermal injuries and smoke inhalation.” A contributing cause of death was “atherosclerotic cardiovascular disease.”

Toxicology testing performed at the FAA Forensic Sciences Laboratory identified cocaine at 51 nanograms per milliliter (ng/mL) in the pilot’s urine; cocaine was not detected in his iliac blood. The FAA laboratory also reported benzoylecgonine, an inactive cocaine metabolite, in his iliac blood and urine at 72 ng/mL and 3,084 ng/mL, respectively. Ecgonine methyl ester, a minor inactive metabolite of cocaine, was detected in the pilot’s blood and urine. Anhydroecgonine methyl ester, a pyrolysis product of smoked crack cocaine, was detected in the pilot’s urine. No carboxyhemoglobin level was reported in the pilot’s iliac blood.

ADDITIONAL INFORMATION

An FAA inspector obtained a 100 LL fuel sample from the fueling station at 44N. He reported that it was blue in color and no water was present.

History of Flight

Takeoff	Loss of engine power (partial) (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Private	**Age:**	65,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	November 1, 2017
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	November 5, 2017
Flight Time:	(Estimated) 1586 hours (Total, all aircraft), 358 hours (Total, this make and model), 1325 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N303TL
Model/Series:	T303 No Series	**Aircraft Category:**	Airplane
Year of Manufacture:	1984	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	T30300286
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	July 17, 2019 Annual	**Certified Max Gross Wt.:**	5150 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	2932 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:	C91 installed	**Engine Model/Series:**	TSIO-520-AE3B
Registered Owner:		**Rated Power:**	250 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	POU,166 ft msl	**Distance from Accident Site:**	8 Nautical Miles
Observation Time:	16:53 Local	**Direction from Accident Site:**	237°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Broken / 4700 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	170°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.93 inches Hg	**Temperature/Dew Point:**	30°C / 20°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Lagrangeville, NY (44N)	**Type of Flight Plan Filed:**	None
Destination:	Farmingdale, NY (FRG)	**Type of Clearance:**	None
Departure Time:	16:12 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Sky Acres 44N	**Runway Surface Type:**	Asphalt
Airport Elevation:	697 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	17	**IFR Approach:**	None
Runway Length/Width:	3830 ft / 60 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Serious	**Aircraft Fire:**	On-ground
Ground Injuries:	1 Fatal, 1 Serious, 1 Minor	**Aircraft Explosion:**	On-ground
Total Injuries:	2 Fatal, 3 Serious, 1 Minor	**Latitude, Longitude:**	41.7,-73.729164

Administrative Information

Investigator In Charge (IIC):	Brazy, Douglass		
Additional Participating Persons:	Wayne Van Steenberg; FAA/FSDO; Teterboro, NJ Michael Council; Continental Aerospace Technologies; Mobile, AL Ricardo Ascensio; Textron Aviation; Wichita , KS		
Original Publish Date:	February 16, 2022	**Investigation Class:**	3
Note:			
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=100074		