



Aviation Investigation Final Report

Location:	Brenham, Texas	Accident Number:	WPR18LA271
Date & Time:	September 20, 2018, 15:22 Local	Registration:	N756NN
Aircraft:	Cessna TU206	Aircraft Damage:	Substantial
Defining Event:	Fuel starvation	Injuries:	2 None
Flight Conducted Under:	Public aircraft		

Analysis

After completing a photographic mission, the pilot determined that there was adequate fuel remaining to reach his intended destination with a 45-minute reserve. During the landing approach, the engine began to lose power and the pilot switched from the left to right fuel tank, which the fuel gauges indicated had more fuel remaining; however, the engine did not respond, and shortly thereafter, the engine lost total power. The airplane impacted trees and a fence during the subsequent forced landing short of the runway.

Enough fuel for about one hour of flight was drained from the right main fuel tank after the accident, but both the tip tanks and the left main tank were empty. Examination did not reveal any pre-impact anomalies with the airframe or engine that would have precluded normal operation.

The pilot reported that he switched fuel tanks every hour during the flight but had failed to select the fuller tank during the landing approach as required by the manufacturer's Pilot's Operating Handbook (POH). Allowing a tank to run dry was allowable per the POH, but it required the engagement of the auxiliary fuel pump after the other tank was selected. Likewise, the emergency procedures for an engine failure in flight required the use of the auxiliary fuel pump.

The pilot had correctly planned for the airplane's fuel consumption but failed to select the fullest tank during the critical landing phase, which resulted in the loss of engine power due to fuel starvation. The pilot stated that due to the airplane's low altitude at the time of the loss of power, he did not have time to perform any items on the emergency checklist, and as such, did not turn on the fuel pump; however, the checklist was short and of sufficient significance that it should have been automatic to the pilot. Engagement of the fuel pump would likely have restarted the engine.

Probable Cause and Findings

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

The pilot's improper fuel management during the landing approach, which resulted in a total loss of engine power due to fuel starvation. Contributing to the accident was his failure to follow the published emergency procedures after the loss of engine power.

Findings

Aircraft	Fuel - Fluid management
Personnel issues	Use of checklist - Pilot
Personnel issues	Incomplete action - Pilot

Factual Information

History of Flight

Approach	Fuel starvation (Defining event)
Landing	Collision with terr/obj (non-CFIT)

On September 20, 2018, about 1522 central daylight time, a Cessna TU206G, N756NN, was substantially damaged when it was involved in an accident near Brenham, Texas. The airline transport pilot and passenger were not injured. The airplane was operated by The United States Department of Agriculture as a public flight.

After completing a series of photographic assignments in Central and North Texas, the pilot determined there was adequate fuel remaining to reach the destination airport with a 45-minute reserve. After circumnavigating rain showers, he began the landing approach. About 5 miles from the airport, the engine began to lose power.

The pilot noticed that the left fuel tank gauge indicated a lower quantity than the right, so he switched the fuel selector valve from the left to right tank; however, the engine did not respond, and shortly thereafter, the engine lost total power. The pilot reported that due to the airplane's low altitude, he did not perform any items on the emergency checklist, but instead focused his attention on executing a forced landing. The airplane impacted a tree just before touchdown and impacted a fence during the landing roll.

The airplane was equipped with long-range fuel tanks as well as tip tanks, which contained a usable fuel quantity of 76 and 27 gallons, respectively. Fuel from the tip tanks was transferred to the main tanks when needed using a transfer pump.

The airplane was equipped with the standard factory main fuel tank gauges, along with a CGR-30P electronic engine monitor manufactured by Electronics International. The unit had a fuel totalizing feature and was capable of displaying and recording fuel consumption and engine parameters, including cylinder and exhaust gas temperatures, fuel flow and pressure, and fuel remaining. The pilot reported that, before departure, he filled the airplane to capacity, and the recovered data indicated that he correctly set the fuel quantity in the totalizer to 103 gallons upon system startup. The engine operated continuously for 4 hours and 54 minutes, during which the average fuel flow was about 18.5 gallons per hour (gph), fuel pressure was 10 lbs per square inch (psi), and the engine speed was about 2,450 rpm. All engine parameters remained stable throughout the flight and appeared consistent with the airplane's performance specifications documented in the manufacturer's Pilot's Operating Handbook (POH).

The CGR-30P's calculated fuel remaining quantity decreased in a linear manner throughout, and 4 hours and 51 minutes after engine start, the quantity remaining reached 17.8 gallons. Over the final 3 minutes of the flight, the engine speed dropped to 1,510 rpm, and fuel flow and pressure decreased to 1.6 gph and 1.4 psi, respectively.

Although the left wing sustained impact damage, none of the airplane's four fuel tanks were breached. Aircraft recovery personnel drained about 18 gallons of fuel from the right main fuel tank and reported that both the tip tanks and the left main tank were empty.

The airplane was examined by a mechanic under the supervision of a Federal Aviation Administration inspector. The examination did not reveal any pre-impact airframe or engine anomalies that would have precluded normal operation.

The pilot reported that he switched fuel tanks every hour and planned an average fuel consumption of 18 gallons per hour. He reported that he had allowed a fuel tank in the accident airplane to run dry in the past, but the engine had always restarted after he switched tanks.

The emergency procedures section of the POH provided the following guidance for an engine failure in flight:

- (1) Airspeed - 75 KIAS.*
- (2) Fuel Selector Valve and Quantity - CHECK.*
- (3) Mixture - RICH.*
- (4) Auxiliary Fuel Pump - ON for 3-5 seconds with throttle 1/2 open; then OFF.*
- (5) Ignition Switch - BOTH (or START if propeller is stopped).*
- (6) Throttle - ADVANCE slowly.*

The POH permitted the exhaustion of a fuel tank in flight but required that the auxiliary fuel pump be engaged for a short period after the fullest tank had been selected. The POH also suggested that the pump be run briefly before exhausting the tank, to confirm its operation.

The first item in the before landing checklist stated, "Fuel Selector Valve – FULLER TANK".

Pilot Information

Certificate:	Airline transport; Commercial; Flight engineer	Age:	65, Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	Glider	Restraint Used:	3-point
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Glider; Instrument airplane	Toxicology Performed:	No
Medical Certification:	Class 2 Waiver time limited special	Last FAA Medical Exam:	
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	June 29, 2018
Flight Time:	7152 hours (Total, all aircraft), 2000 hours (Total, this make and model), 6856 hours (Pilot In Command, all aircraft), 56 hours (Last 90 days, all aircraft), 31 hours (Last 30 days, all aircraft), 10 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	Registration:	N756NN
Model/Series:	TU206 G	Aircraft Category:	Airplane
Year of Manufacture:	1977	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	U20604225
Landing Gear Type:	Tricycle	Seats:	3
Date/Type of Last Inspection:	June 1, 2018 Annual	Certified Max Gross Wt.:	3600 lbs
Time Since Last Inspection:	71 Hrs	Engines:	Reciprocating
Airframe Total Time:	4242.7 Hrs at time of accident	Engine Manufacturer:	Continental
ELT:	C126 installed, not activated	Engine Model/Series:	TSIO-520
Registered Owner:		Rated Power:	310 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:	K11R,308 ft msl	Distance from Accident Site:	6 Nautical Miles
Observation Time:	01:15 Local	Direction from Accident Site:	187°
Lowest Cloud Condition:	Scattered / 2500 ft AGL	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	3 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	100°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.94 inches Hg	Temperature/Dew Point:	25°C / 24°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	San Angelo, TX (SJT)	Type of Flight Plan Filed:	None
Destination:	Brenham, TX (11R)	Type of Clearance:	None
Departure Time:	10:40 Local	Type of Airspace:	Class E

Airport Information

Airport:	BRENHAM MUNI 11R	Runway Surface Type:	Asphalt
Airport Elevation:	317 ft msl	Runway Surface Condition:	Unknown
Runway Used:	16	IFR Approach:	None
Runway Length/Width:	6003 ft / 75 ft	VFR Approach/Landing:	Forced landing;Straight-in

Wreckage and Impact Information

Crew Injuries:	2 None	Aircraft Damage:	Substantial
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 None	Latitude, Longitude:	30.319999,-96.36(est)

Administrative Information

Investigator In Charge (IIC):	Simpson, Elliott		
Additional Participating Persons:	Michael Costallos; Federal Aviation FSDO; Houston, TX		
Original Publish Date:	June 24, 2021	Investigation Class:	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=98331		

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