



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	Kellyton, Alabama	Accident Number:	ERA23FA087
Date & Time:	December 13, 2022, 09:25 Local	Registration:	N74586
Aircraft:	Mooney M20B	Aircraft Damage:	Substantial
Defining Event:	Fuel starvation	Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

The airplane was on an instrument flight rules flight and in cruise flight at 6,000 ft mean sea level (msl) when the pilot declared “mayday” and reported to air traffic control that the airplane’s engine was running rough. The controller subsequently provided a heading toward the closest airport about 11 nautical miles (nm) away, and upon turning left toward the airport, the pilot announced that the engine had regained power. The pilot elected to continue with the diversion and indicated that he was in instrument meteorological conditions (IMC). The controller continued to provide course guidance and advised the pilot of the weather conditions at the airport, which included an overcast ceiling at 800 ft above ground level. About four minutes after reporting that engine power had been restored, the pilot reported to the controller that he was, “engine out.” Radar contact was lost, and the airplane impacted trees and terrain about 5 nm from the diversion airport.

Postaccident examination of the airframe and engine revealed no evidence of preimpact mechanical failures or malfunctions that would have precluded normal operation. The wing fuel tank bladders appeared intact. While there was evidence of fuel leakage from the left wing fuel vent, the right wing remained clean with no evidence of fuel leakage or fuel blighting in the area surrounding the wing. About 18 gallons of fuel was drained from the left fuel tank, while the right tank was found empty. No fuel was found in the fuel hoses and fuel system components. The fuel selector was found positioned to the right wing tank.

The airplane was fueled with 22.2 gallons of fuel the day before the flight. The pilot’s phone contained a picture of a fuel receipt for about 38 gallons from the morning of the accident; however, the airplane registration number on this receipt did not match the accident airplane, and this purchase could not be definitively correlated to the accident airplane. Therefore, the

total amount of fuel onboard the airplane at the time of departure on the accident flight could not be determined.

Based on fuel consumption rates published in the pilot's operating handbook, the airplane likely consumed about 10.15 gallons of fuel between engine start to the pilot's first mayday call. If the airplane was fueled to capacity before takeoff, and the pilot had operated exclusively from the right fuel tank during the accident flight, about 17.25 gallons of fuel should have remained in the right tank at the time of the loss of engine power. That the right fuel tank was intact and empty at the accident site suggests the airplane was not fully fueled at the time of departure. A witness recalled the pilot stating before the accident flight that he hoped the airplane was already fueled so that he could get started on his pre-flight checks, indicating that he may have been in a rush to depart. The witness stated that the employee at the airport told him that the airplane was "fueled and ready." The extent of the pilot's preflight inspection could not be determined based on the available information.

The pilot had flown the accident airplane make and model for the first time the day before the accident flight, for about one hour. The pilot had received about one hour of ground instruction from the owner before the flight, but did not receive any flight training in the accident airplane. Although the pilot's logbook indicated that he had 18 total hours of experience in actual instrument meteorological conditions (IMC), the date of the last entry was 100 days before the accident flight, and the pilot's instrument currency and proficiency could not be determined.

The pilot sent a text message to a friend after the flight that occurred the day before the accident asking if he needed to switch fuel tanks during flight, indicating that the pilot lacked basic knowledge of the airplane's fuel system. Additional text messages between the pilot and another friend indicated that the airplane's autopilot was inoperative.

Based on all available information, the circumstances of the accident are consistent with a total loss of engine power due to fuel starvation. Hand-flying the airplane without the aid of a functional autopilot in IMC would have significantly increased the pilot's workload, particularly while troubleshooting a developing engine issue in an airplane in which he was unfamiliar. This task saturation may have resulted in the pilot forgetting to switch fuel tanks prior to and following the initial engine roughness. Additionally, the low cloud ceiling in the area of the accident site would have left the pilot with little time to locate a suitable landing area for a forced landing.

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 due to fuel starvation.

Findings

Personnel issues	Fuel planning - Pilot
Aircraft	Fuel - Fluid level

Factual Information

History of Flight

Emergency descent	Off-field or emergency landing
Emergency descent	Collision with terr/obj (non-CFIT)
Enroute-cruise	Fuel starvation (Defining event)

On December 13, 2022, at 0925 central standard time (CST), a Mooney M20B, N74586, was substantially damaged when it was involved in an accident in Kellyton, Alabama. The pilot was fatally injured. The airplane was operated by the pilot as a positioning flight conducted under the provisions of Title 14 *Code of Federal Regulations* Part 91.

Review of FAA air traffic control and ADS-B data revealed that the airplane departed runway 36 at Perry-Houston County Airport (PXE), in Perry, Georgia, about 0825 on an instrument flight rules (IFR) flight plan to Bessemer Airport (EKY), Bessemer, Alabama. After departure, the airplane turned toward the west and climbed to an altitude of 6,000 ft msl.

About 0918, the pilot transmitted “mayday” several times and advised the controller that he was experiencing a rough-running engine. At the controller’s questioning, the pilot confirmed that he wanted to divert to the nearest airport and the controller provided course guidance to Thomas C Russell Field Airport (ALX), Alexander City, Alabama, which he estimated to be about 8 miles away. Postaccident review of the airplane’s flight track data showed that the airplane was about 11 nautical miles (nm) northeast of the airport at this time.

Shortly after the pilot initiated a left turn to ALX, he reported that the engine was once again producing power; however, he wanted to continue to the nearest airport. The controller provided the weather conditions at ALX, which included an overcast ceiling at 800 ft above ground level and 10 statute miles visibility. The pilot indicated that he was in instrument meteorological conditions, and the controller continued to provide headings toward the airport. About four minutes after reporting that the engine power was restored, the pilot made a radio call stating, “I’m engine out.” Radio and radar contact were lost shortly thereafter about 5.8 nm north-northeast of the airport.

A witness near the accident site reported that he heard tree branches breaking and looked up to see the airplane “clipping the trees.” He indicated that the airplane appeared to be level and stated that there was no engine noise. Video obtained from the property owner showed the airplane impacting trees before rolling inverted and descending nose-first to the ground. The wreckage was located 5.5 nm north of ALX and about 1.25 nm west of the airplane’s last radar-observed position.

The pilot's logbook indicated that he had accrued 370.6 total hours of flight experience, with 18 hours in actual instrument conditions, as of September 4, 2022. There were no entries in the pilot's logbook after that date. In a post made by the pilot to a social media account on November 9, 2022, he stated that he had reached a total of 520 hours of flight experience. The pilot had received his instrument rating, commercial pilot certificate, and multi-engine land rating all within the 9 months before the accident.

The airplane owner reported that the pilot worked for him flying various airplanes that the owner managed. The pilot had flown the accident airplane make and model for the first time on a repositioning cross-country flight the day before the accident, lasting about one hour or less. The airplane's owner reported that the pilot received "at least an hour" of ground instruction on the accident airplane.

The pilot sent a text message to a friend after the flight the previous day asking if the autopilot worked in the accident airplane. The friend replied no, and that "it never has." The pilot subsequently asked, "...do you have to swap fuel tank sides in the Mooney like an archer/warrior or does it all crossfeed?" The friend replied that switching tanks was required, and stated that he did so every 45 minutes. The pilot subsequently stated that while he had not done so during the previous flight, he would during the next flight.

A witness who drove the pilot to the airport on the morning of the accident recalled the pilot stating before the flight that he hoped the airplane was already fueled so that he could get started on his pre-flight checks. The witness also stated that the employee at the airport told him that the plane was, "fueled and ready," and that the pilot took a picture of the fuel receipt with his phone.

The airplane's most recent annual inspection was completed on December 8, 2022, at tachometer time of 3,361.8 hours. The tachometer at the time of the accident indicated 3,365.9 hours. The accident pilot would have flown about 2 of the 4.1 hours since the annual inspection was completed.

A review of the pilot's logbooks as well as social media posts indicated that a significant portion of his recent flight experience had been flown in airplanes that either did not require the switching of fuel tanks in flight, or in Piper airplanes, in which the fuel selector valve was painted red and located on the sidewall on the pilot's left side. In the accident airplane make and model, the fuel selector is painted black and located on the floor beneath the pilot's seat, as described by the airframe manufacturer.

Fuel consumption calculations based on the pilot's operating handbook and supplement indicated that the airplane would have consumed about 10.15 gallons between engine start and the pilot's first mayday call. The airplane had a Supplemental Type Certificate modification for bladder fuel tanks that should have allowed the airplane to carry a total of 54.8 gallons, or 27.4 gallons of usable fuel in each of the fuel tanks; however, the STC did not list the Model M20B as applicable to receive this modification, therefore, the actual fuel capacity of the accident airplane could not be determined.

Fuel logs from Waycross-Ware County Airport (AYS), Waycross, Georgia, showed that 22.2 gallons of fuel were purchased the day before the accident. A photo of a fuel receipt obtained from the pilot's personal phone reflected a purchase of 38.2 gallons of fuel at PXE; however, the registration number depicted on the receipt was that of a different airplane, and not of the accident airplane.

Examination of the wreckage at the accident site revealed that the airplane came to rest inverted in a pasture, . All portions of the airplane were intact, except for the outermost portion of the left wing, including the left aileron, which was located at the base of large trees about 68 ft from the main wreckage. The fractured outermost portion of the left wing exhibited leading edge damage consistent with tree impact while in a left turn.

The propeller hub with propeller blades attached was impact-separated from the engine and embedded at the ground impact point. Examination of the propeller revealed that both blades exhibited minimal chordwise rotational scoring on the face sides and no remarkable twisting. One of the blades exhibited aft bending. The engine compartment and cockpit area were impact-crushed aft, and the fuselage and empennage were substantially damaged. The engine control levers were in their full forward positions. The engine turbocharger control lever was in the full aft position.

Control continuity was established from the rudder and elevator cockpit flight controls to the flight control surfaces; however, aileron control continuity could not be established due to impact damage at both wing roots. The main landing gear remained in the wheel wells, while the nose landing gear had been pulled out of the wheel well through impact forces. The flaps were found in the full up position.

Visual examination of the airframe revealed that the wing fuel bladders remained intact. While there was evidence of fuel leakage with clear signs of staining from the left wing fuel vent, the right wing remained clean with no evidence of fuel leakage or fuel blighting in the area surrounding the wing. The left tank fuel leak was plugged and about 18 gallons of remaining fuel was drained from the left fuel tank, while the right tank was found empty. No fuel was found in the fuel hoses and fuel system components. The fuel selector was observed positioned to the right wing tank.

Postaccident examination of the engine revealed that the sparkplug electrodes showed coloration and wear consistent with normal operation when compared to a Champion Check-A-Plug chart. Thumb suction and compression were attained on all cylinders when the crankshaft was rotated manually. Crankshaft and camshaft continuity were confirmed throughout the engine. A visual inspection of the cylinders revealed normal coloration and condition of the piston faces. The magnetos produced sparks on all leads when removed and rotated by hand. The carburetor was disassembled, and its fuel inlet screen removed. The fuel screen was free from debris and unobstructed. No fluid or sediment was present in the float bowl. The floats were of the black plastic style and moved freely throughout their travel range. Suction and expulsion were noted at the respective ports on the engine-driven fuel pump when rotated using an electric drill. No fuel was found in the fuel lines during the examination.

Pilot Information

Certificate:	Commercial; Private	Age:	38,Male
Airplane Rating(s):	Single-engine land; Multi-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:	Yes
Medical Certification:	Class 1 Waiver time limited special	Last FAA Medical Exam:	June 15, 2022
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	August 17, 2022
Flight Time:	(Estimated) 520 hours (Total, all aircraft), 312.1 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	Registration:	N74586
Model/Series:	M20B	Aircraft Category:	Airplane
Year of Manufacture:	1961	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	1897
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:	December 8, 2022 Annual	Certified Max Gross Wt.:	2450 lbs
Time Since Last Inspection:	4.1 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	3365.9 Hrs at time of accident	Engine Manufacturer:	Lycoming
ELT:	C91 installed, not activated	Engine Model/Series:	O360-A1D
Registered Owner:	RAINWATER FARMS LLC	Rated Power:	210 Horsepower
Operator:	RAINWATER FARMS LLC	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	Condition of Light:	Day
Observation Facility, Elevation:	ALX,686 ft msl	Distance from Accident Site:	6 Nautical Miles
Observation Time:	09:35 Local	Direction from Accident Site:	185°
Lowest Cloud Condition:		Visibility	10 miles
Lowest Ceiling:	Overcast / 1000 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	8 knots / None	Turbulence Type Forecast/Actual:	Unknown / Convective
Wind Direction:	110°	Turbulence Severity Forecast/Actual:	Unknown / Moderate
Altimeter Setting:	30.14 inches Hg	Temperature/Dew Point:	13°C / 13°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Perry, GA (PXE)	Type of Flight Plan Filed:	IFR
Destination:	Bessemer, AL (EKY)	Type of Clearance:	IFR
Departure Time:	09:25 Local	Type of Airspace:	Air traffic control;Class E

Airport Information

Airport:	Thomas C Russell Field Airport ALX	Runway Surface Type:	
Airport Elevation:	686 ft msl	Runway Surface Condition:	Vegetation;Wet
Runway Used:		IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	33.007645,-85.953344

Preventing Similar Accidents

Prevent the Preventable with Careful Fuel Management (SA-067)

The Problem

Within fuel-related accidents, fuel exhaustion and fuel starvation continue to be leading causes. From 2011 to 2015, an average of more than 50 accidents per year occurred due to fuel management issues. Fuel exhaustion accounted for 56% of fuel-related accidents while fuel starvation was responsible for 35% of these accidents. Fuel exhaustion is running out of fuel whereas fuel starvation is having fuel onboard that doesn't reach the engine for reasons such as a blockage, improperly set fuel selector, or water contamination.

Running out of fuel or starving an engine of fuel is highly preventable. An overwhelming majority of our investigations of fuel management accidents—95%—cited personnel issues (such as use of equipment, planning, or experience in the type of aircraft being flown) as causal or contributing to fuel exhaustion or starvation accidents. Prudent pilot action can eliminate these issues. Less than 5% of investigations cited a failure or malfunction of the fuel system.

What can you do?

- Pilots should know how much fuel they have onboard at all times.
- During preflight inspection, measure or visually confirm the fuel quantity. Do not rely exclusively on fuel gauges.
- Know how much fuel you will need for a given flight.
- Make sure you have a fuel reserve for each flight.
- Know your engine's fuel burn rate and actively monitor the fuel burn rate for the entire time the engine is operating.
- Know your aircraft's fuel system and how it works.
- Review your aircraft's POH and use the appropriate checklists.
- Don't stretch your available fuel supply. Stop and get gas!

See <https://www.nts.gov/Advocacy/safety-alerts/Documents/SA-067.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): Stratton, Lauren

Additional Participating Persons: Clayton Caessens; FAA/FSDO; Birmingham, AL
David Harsanyi; Lycoming Engines; Williamsport, PA
Will Chamberlain; FAA (ATC Group Member); Memphis, TN
Karena Marinas; NATCA (PC and ATC Group Member); Los Angeles, CA

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Investigation Class: [Class 3](#)

Note:

Investigation Docket: <https://data.nts.gov/Docket?ProjectID=106451>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).