Aviation Investigation Final Report

Location:	Cullman, Alabama	**Accident Number:**	ERA20FA063
Date & Time:	January 5, 2020, 12:43 Local	**Registration:**	N420PW
Aircraft:	Vans VANS RV-6	**Aircraft Damage:**	Destroyed
Defining Event:	Fuel exhaustion	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Witnesses reported that, during the airplane's initial climb, when it reached about 350 ft above the ground, they heard loud "pop" and a loss of engine power. The witnesses watched as the airplane entered an immediate "sharp left banking turn" in what appeared to be an attempt to return to the airport. The airplane "stalled and went into a left spiral downward turn." The airplane completed two turns before impacting the ground on airport property adjacent to the taxiway.

The position of the airplane's fuel selector as found would have supplied fuel to the engine from the left fuel tank; however, both of the airplane's fuel tanks were breached during the accident and no evidence of fuel was found in either. There was no post-crash fire and there was no residual fuel noted at the accident site. The traces of fuel that were recovered from the airplane's fuel system were absent of water. Otherwise, no evidence of preimpact mechanical failure or malfunction was noted during the examination of the recovered airframe and engine. The airplane's recent fueling and flight history could not be definitively determined from available evidence other than that the airplane had last been fueled at the accident airport just over 1 month before the accident, and that the pilot had flown it on at least one trip in the intervening time.

Toxicology testing performed on the pilot identified cocaine in urine, but there was no evidence that any active cocaine remained in the pilot's body. THC, the primary psychoactive component of cannabis, was not found; however, its active metabolite was in urine at very low levels. Therefore, the pilot was not directly impaired by his drug use at the time of the accident; whether he was feeling any effects from withdrawal could not be determined. Overall, it is unlikely that the pilot's drug use contributed to the circumstances of this accident.

Based on the available information, the circumstances of the accident are consistent with a loss of engine power due to fuel exhaustion, and the pilot's subsequent exceedance of the airplane's

critical angle of attack during an attempted return to the runway, which resulted in an aerodynamic stall/spin.

Probable Cause and Findings

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

The pilot's inadequate planning, which resulted in fuel exhaustion and a total loss of engine power during the initial climb. Also causal was the pilot's exceedance of the airplane's critical angle of attack while attempting to return to the runway after takeoff, which resulted in an aerodynamic stall/spin, loss of control, and impact with terrain.

Findings

Personnel issues	Fuel planning - Pilot
Aircraft	Fuel - Fluid level
Aircraft	Airspeed - Not attained/maintained
Personnel issues	Aircraft control - Pilot

Factual Information

History of Flight

Initial climb	Fuel exhaustion (Defining event)
Enroute-descent	Loss of control in flight

On January 5, 2020, about 1243 central standard time, an experimental, amateur-built Vans RV-6, N420PW, was destroyed when it was involved in an accident near Cullman, Alabama. The private pilot and passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* (*CFR*) Part 91 personal flight.

A review of airport surveillance video revealed that the pilot and passenger arrived about 1230. At 1240, the airplane was seen on the taxiway, where it stopped for a moment before continuing to the active runway. At 1242, the airplane was seen climbing from runway 02, when the video stopped recording.

According to witnesses, the airplane taxied to runway 02 and began the takeoff roll. During the initial climb, when the airplane reached about 350 ft above the ground, a loud "pop" was heard. The witnesses watched as the airplane entered an immediate "sharp left banking turn" in what appeared to be an attempt to return to the airport. The airplane "stalled and went into a left spiral downward turn." The airplane completed two turns before colliding with the ground on airport property adjacent the taxiway. Several other witness described a similar series of events, including the engine making a "pop" noise and/or a loss of engine power prior to the airplane making a steep turn back toward the runway before descending to the ground. The airport authorities and witnesses responded immediately to the accident scene.

AIRPLANE INFORMATION

Review of the airplane's maintenance records revealed that it's most recent condition inspection was completed in 2014.

The airplane's co-owner stated that the pilot had flow the airplane from Cullman Regional Airport (CMD), Cullman, Alabama to Auburn University Regional Airport (AUO), Auburn, Alabama around December 31, 2019. During the return flight from AUO to CMD, the pilot had diverted to Hartselle/Morgan County Regional Airport (5M0), Hartselle, Alabama due to the wind conditions at CMD. The estimated total distance for the trip was about 260 nautical miles. The co-owner did not know when the airplane had been brought back to CMD, nor whether it had flown between then and the accident flight. Review of fueling records at CMD revealed that the airplane was last fueled on November 29, 2019, with 18.7 gallons of 100LL aviation fuel.

WRECKAGE INFORMATION

The airplane impacted terrain about 1,500 ft from the departure end of runway 02. All flight control surfaces were located at the accident site. The cockpit was crushed to the bulkhead of the fuselage. The instrument panel was crushed and the instruments were impact-damaged. The instruments did not display any reliable information due to impact damage.

There was no post-crash fire, and although the fuel tanks were breached, there was no residual fuel noted onsite. Examination of the fuel selector revealed that the selector was between the left and right fuel tank. Pressurized air was supplied to the fuel selector, and it was discovered that when positioned between both tanks, fuel was only supplied from the left tank. The fuel selector was placed in the right tank position and pressurized air was supplied through the lines and the air moved to the right fuel tank line as noted on the selector. The selector was placed in the left fuel tank position and pressurized air was supplied through the lines and the air moved to the left fuel tank line as noted on the selector.

Examination of the engine revealed that the crankcase remained intact and displayed impact damage. There were no fractures in the case that would indicate a catastrophic internal engine failure. During the examination of the carburetor, the upper section was removed from the float bowl and was observed to be about ½ full of blue liquid with an odor consistent with aviation gasoline. A test of the liquid with water finding paste revealed no indication of water in the liquid. No damage was noted to the brass fuel floats or the needle and seat assembly. The engine-driven fuel pump remained attached to the engine and no damage was noted. The pump was removed and produced air from the outlet port when actuated by hand. Liquid with an odor consistent with aviation gasoline drained from the pump when it was removed and tilted. The pump was partially disassembled, and no damage noted to the internal check valves or the rubber diaphragms. No liquid drained from the fluid line from the airframe to the engine driven fuel pump or the fluid line from the pump to the carburetor when they were removed.

The cylinders were examined using a lighted borescope. The piston faces, cylinder bores, and valve heads displayed normal operating and combustion signatures. While rotating the vacuum drive it was noted that all four cylinders displayed thumb compression and suction. During rotation it was noted that all the rocker arms and valves moved accordingly. Examination of the magnetos revealed the left magneto was broken away from the accessory case and the right magneto remained attached. Both magnetos were rotated and both produced spark on all terminals. Examination of the propeller assembly revealed the two blade, constant speed propeller remained separated from the propeller flange and displayed impact damage signatures. Both propeller blades revealed “S” type bending and exhibited chordwise scratching. One blade displayed aft bending and twisting deformation.

MEDICAL AND PATHOLOGICAL INFORMATION

According to the autopsy performed by the University of Alabama’s Department of Pathology, the determined cause of death was multiple blunt force trauma and the manner of death was accident. No significant natural disease was identified.

Toxicology testing performed by the Alabama Department of Forensic Sciences identified benzoylecgonine in cavity blood.

Toxicology testing performed by the FAA's Forensic Sciences Laboratory identified cocaine in urine but not in blood; its inactive metabolites, benzoylecgonine and ecgonine methyl ester, were identified in blood and urine. While no delta-9-tetrahydrocannabinol (THC, the psychoactive component in cannabis) was found in blood or urine, its active metabolite, 11-hydroxy-delta-9-THC, was found only in urine at 2.6ng/ml and its inactive metabolite, carboxy-delta-9-THC, was found in blood at 1.5 ng/ml and in urine at 15.2 ng/ml.

Cocaine is a central nervous system stimulant available for topical use by prescription as a Schedule II controlled substance; it has a high potential for abuse. THC is the primary psychoactive compound in cannabis and causes a variety of psychoactive symptoms.

Pilot Information

Certificate:	Private	**Age:**	40,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	November 24, 2014
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 460 hours (Total, all aircraft), 460 hours (Total, this make and model)		

Passenger Information

Certificate:		**Age:**	Female
Airplane Rating(s):		**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	4-point
Instrument Rating(s):		**Second Pilot Present:**	No
Instructor Rating(s):		**Toxicology Performed:**	No
Medical Certification:		**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:			

Aircraft and Owner/Operator Information

Aircraft Make:	Vans	**Registration:**	N420PW
Model/Series:	VANS RV-6 Undesignat	**Aircraft Category:**	Airplane
Year of Manufacture:	2014	**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	20181
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	August 18, 2014 Condition	**Certified Max Gross Wt.:**	1500 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1263 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C91A installed, activated, did not aid in locating accident	**Engine Model/Series:**	O-360-A1D
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:	CMD,969 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	12:35 Local	**Direction from Accident Site:**	2°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.3 inches Hg	**Temperature/Dew Point:**	11°C / -1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Cullman, AL (CMD)	**Type of Flight Plan Filed:**	None
Destination:	Cullman, AL (CMD)	**Type of Clearance:**	None
Departure Time:	12:43 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Cullman Regional Airport-Folso CMD	**Runway Surface Type:**	Asphalt
Airport Elevation:	969 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	02	**IFR Approach:**	None
Runway Length/Width:	5500 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	34.272777,-86.858055(est)

Administrative Information

Investigator In Charge (IIC):	Alleyne, Eric
Additional Participating Persons:	Porter Mayberry; FAA/FSDO; Birmingham, AL Mike Childers; Lycoming; Williamsport, PA
Original Publish Date:	April 21, 2022
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=100763