Aviation Investigation Final Report

Location:	Page, Arizona	**Accident Number:**	WPR14FA262
Date & Time:	June 20, 2014, 14:30 Local	**Registration:**	N74584
Aircraft:	Mooney M20B	**Aircraft Damage:**	Substantial
Defining Event:	Controlled flight into terr/obj (CFIT)	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The commercial pilot was conducting a personal cross-country flight. The airplane was reported overdue, and search and rescue personnel discovered the wreckage 2 days later on a canyon hillside. The pilot had not filed a flight plan, he did not communicate with air traffic control during the flight, and no radar data were available to identify the flight route. Therefore, the pilot's flight planning and intentions could not be determined. Postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

No significant weather or turbulence was reported or forecast in the vicinity of the accident site around the time of the accident. However, high-density altitude conditions existed in the accident area about the time of the accident. Examination of the accident site revealed that the airplane impacted the canyon hillside with the wings parallel to the hillside in an upright attitude, consistent with a left banking turn. It is likely that the pilot flew into the canyon and was maneuvering around terrain and miscalculated the airplane's turning capability. Further, the airplane's climb performance, as the pilot was attempting to turn and climb above the terrain, was likely degraded due to the high-density altitude conditions.

Toxicological tests of the pilot detected ethanol, n-propanol, amlodipine, and salicylate. However, the ethanol level was well below the legal limit and was unlikely acutely impairing at the time of the accident, and the n-propanol was likely due to postmortem production. Amlodipine and salicylate are not directly impairing and, thus, would not have posed a flight safety hazard.

Probable Cause and Findings

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

The pilot's failure to maintain adequate clearance from terrain while maneuvering in a canyon in high-density altitude conditions.

Findings

Personnel issues	Use of equip/system - Pilot
Environmental issues	High density altitude - Effect on equipment
Aircraft	Altitude - Not attained/maintained
Personnel issues	Monitoring environment - Pilot
Environmental issues	(general) - Awareness of condition

Factual Information

History of Flight

Maneuvering-low-alt flying	Altitude deviation
Maneuvering-low-alt flying	Attempted remediation/recovery
Maneuvering	Controlled flight into terr/obj (CFIT) (Defining event)

On June 20, 2014, about 1430 mountain standard time, a Mooney M20B, N74584, sustained substantial damage when it impacted terrain about 35 miles southeast of the Page Municipal Airport (PGA) Page, Arizona. The pilot/owner was operating the airplane under the provisions of Title 14 Code of Federal Regulations (CFR) Part 91. The commercial pilot and passenger were fatally injured. Visual (VMC) meteorological conditions prevailed, and no flight plan had been filed. The personal cross-county flight departed PGA about 1409 for an unknown destination.

The Federal Aviation Administration (FAA) issued an Alert Notification (ALNOT) for the missing airplane after the pilot's wife notified them of the overdue airplane. A search ensued for the next couple of days and on June 22, 2014, the wreckage was located on a hillside by the Civil Air Patrol, in a canyon, near Page, Arizona. The pilot did not file a flight plan and no radar or contact with Air Traffic Control was identified for the flight route.

Examination of the accident site by the National Transportation Safety Board (NTSB), investigator-in-charge (IIC), revealed that all the major components of the airplane were contained within 85 feet of the main wreckage site. The airplane was recovered to a secure facility for further examination.

According to the pilot's wife, her husband was conducting a cross country flight to California and back, over several days, including a number of fueling stops each day. The trip started in South Carolina on June 15, 2014. The airplane landed in Las Vegas, Nevada on June 18, 2014.. The wife was an additional passenger on the accident airplane up to this destination. However, she deplaned at this location due to the high wind experienced the previous two days. The only anomaly with the airplane she mentioned was that it was leaking oil and they would have to add about 1-2 quarts of oil on each flight. On June 19, 2014, with the wife not onboard, her husband and a passenger flew to California and then returned to Las Vegas. The next day, they continued to fly eastward, back towards South Carolina, while his wife, selecting not to travel back on the accident airplane, returned home on a commercial flight.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	47,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Unknown
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	June 6, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 1500 hours (Total, all aircraft)		

Passenger Information

Certificate:		**Age:**	15,Male
Airplane Rating(s):		**Seat Occupied:**	Unknown
Other Aircraft Rating(s):		**Restraint Used:**	3-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:			

The pilot, age 47, held a commercial pilot certificate with airplane single-engine land and multi-engine land ratings. He was rated as an instructor in airplane single-engine land and multi-engine land and possessed an airplane instrument rating. The pilot was issued a second-class airman medical certificate on June 6, 2013, with the limitations stated to must wear corrective lenses for distant vision and have glasses for near vision. The pilot reported on his most recent medical certificate application that he had accumulated 1,500 total flight hours and 50 hours in the last six months.

The passenger was a 15 year old male. No FAA records were on file for the passenger.

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N74584
Model/Series:	M20B NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	1961	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1895
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	August 9, 2013 Annual	**Certified Max Gross Wt.:**	2449 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	5586 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	O-360-A1A
Registered Owner:	On file	**Rated Power:**	180 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The four seat, low-wing, retractable tricycle gear airplane, serial number (S/N) 1895, was manufactured in 1961. It was powered by a Lycoming O-360-A1A engine, serial number L-404-36, rated at 180 horsepower. The airplane was also equipped with a McCauley model 2D36C14, serial number (S/N) 902683, variable pitch propeller. A review of the maintenance logbooks revealed that the most recent annual inspection was completed on August 9, 2013, at an airframe total time of 5,586 hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PGA,4316 ft msl	**Distance from Accident Site:**	35 Nautical Miles
Observation Time:	13:53 Local	**Direction from Accident Site:**	282°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	130°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.01 inches Hg	**Temperature/Dew Point:**	36°C / -7°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	PAGE, AZ (PGA)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	14:09 Local	**Type of Airspace:**	Class G

A review of recorded data from the PGA, Page, Arizona, automated weather observation station, located about 35 miles southeast of the accident site, revealed at 1353 conditions were wind from 130 degrees at

8 knots, visibility 10 statute miles, clear sky, temperature 36 degrees Celsius, dew point -7 degrees Celsius, and an altimeter setting of 30.01 inches of mercury.

A review of the weather conditions by the NTSB Senior Meteorologist revealed no reports or forecast of turbulence, mountain wave activity, or other significant weather indicated in the vicinity of the accident site. Strong thermals were noted over the area with high density altitudes, high temperatures, and low relative humidity.

Utilizing the weather conditions at the nearing reporting station, the density altitude was calculated by the NTSB IIC to be about 8,594 feet mean seal level, for the departure time of the accident flight.

Airport Information

Airport:	PAGE MUNI PGA	**Runway Surface Type:**	
Airport Elevation:	4316 ft msl	**Runway Surface Condition:**	Rough
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Valley/terrain following

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	36.809165,-110.803611(est)

Examination of the accident site by the NTSB IIC, FAA inspectors, and an investigator from Lycoming Engines, revealed that the airplane impacted terrain on a canyon hillside at an elevation of about 5,170 feet. The canyon consisted of sharp turns of about 90 degrees in each direction and was about several hundred feet to 1,000 feet between canyon walls, in the local vicinity. The canyon walls were at a height of about 300 to 400 feet. The wreckage came to rest about 40 feet above the dry river bed, on a hillside with a slope of about 45 degrees. The wreckage was most consumed by a post impact fire and no cockpit instrumentation could be determined. No personal electronic devices or GPS were recovered from the wreckage.

A disturbed and burnt area of the rocky ground was observed about 25 feet in front of the wreckage, near two large boulders. Several fragments of wreckage were observed in the disturbed area including the engine starter. The airplane impacted nearly wings level to the hillside, consistent with a left bank. The fuselage came to rest on a heading of about 110 degrees magnetic and a large boulder was present in front of the cockpit area that impacted the front spar. A large circular impact impression was observed on the right and center portion of the wing consistent with the circular area of the boulder. The left wing

separated from the fuselage and was located about 15 feet below the main wreckage. The right wing was nearest to the hillside and remained partially attached and was bent upwards about mid-span from a large boulder located under the wing. The empennage was partially attached to the main fuselage and bent to the left.

The rudder and elevators remained attached at all their respective mounts. Flight control continuity established with the rudders to the cockpit controls. Continuity to the elevators was established, but full movement was unable to be obtained due to impact damage. Aileron continuity was unable to be safely determined at the site due to way the airplane was situated on the hill slope.

The engine was separated from the airplane and came to rest inverted at the bottom of the canyon, in a dry river bed, several feet in front of the main wreckage and directly below the disturbed ground area. The engine crankcase sustained several cracks on the top of the case. A large oil stain was observed under and in front of the engine. The carburetor and fuel pump were separated. One propeller blade remained attached. The other two blades had separated and were located in front of the main wreckage; one blade was located about 75 feet in front and the other blade was about 85 feet in front. Observation of the blades revealed leading edge gouging, torsional twisting, and chordwise abrasions. Further, two of the blade tips were separated.

Medical and Pathological Information

The Maricopa County, Office of Medical Examiner conducted an autopsy on the pilot on June, 23, 2014. The medical examiner determined that the cause of death was "multiple blunt force and thermal injuries."

The FAA's Civil Aeromedical Institute (CAMI) in Oklahoma City, Oklahoma, performed toxicology tests on the pilot. According to CAMI's report, cyanide, volatiles, and drugs were tested. Ethanol, N-Propanol, Amlodipine and Salicylate were detected.

A review of the pilot's positive finding by the NTSB's Chief Medical Officer, revealed that the Ethanol levels detected suggest possible alcohol ingestion before the accident. Additionally, Ethanol may be produced in tissues by putrefaction post mortem, often in conjunction with other alcohols such as N-Propanol Acetone and Methanol. However, the detected levels were very low and below the FAA limitation of 0.4%. The positive finding of N-Propanol, suggested some source other than ingestion. Amlodipine is a blood pressure medication also sold with the name Norvasc that is permitted for use by pilots. Additionally, Salicylate is major ingredient in aspirin and other pain-relieving medications that is an over the counter analgesic that may also prevent heart attacks.

Tests and Research

Further examination of the airframe and engine revealed that the left wing was thermally damaged to the

inner half and sustained a large puncture about mid-span and the right wing sustained thermal damage to the inner half. The airplane's fuselage was mostly thermally damaged. In the empennage section, the top portions of the vertical stabilizer and rudder sustained damage but were not thermally damaged. Flight control continuity with the ailerons was established to the wing attachment point and also from the wing root to the ailerons.

Examination of the engine revealed that it separated from the airframe via the engine mount. Most of the engine accessories also separated from the engine. All rocker covers were removed and the cylinder overhead areas were lubricated and unremarkable. The crankshaft could not be rotated by utilizing a hand tool on accessory section, due to impact damage. The combustion chamber of each cylinder was examined through a borescope, and the inspection revealed evidence of normal operational conditions. There was no evidence of oil lubrication depravation or contamination observed. There was no oil residue observed in the exhaust system.

The left magneto and right magneto were examined and no anomalies were observed. A spark was observed at all the respective leads when the magneto drive shafts were rotated by hand. The sparkplugs were removed and all sparkplug electrodes exhibited normal wear signatures when compared to the Champion Check-A-Plug comparison chart, with the exception of the cylinder number 2 top spark plug, which had debris in the electrode area.

The carburetor was thermally damaged and separated from the engine. It was disassembled for examination. The inlet filter was free from any obstructions and the float pontoons were thermally damaged. No additional anomalies were observed on the internal components.

The three-bladed propeller remained attached to the crankshaft flange. Only one blade remained attached and the other two blades were separated from the propeller hub. Both of the separated blades had their tips separated. All the blades exhibited leading edge gouging, torsional twisting, and chord-wise scratches. The spinner remained attached and impact marks and abrasions were observed on it.

The examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

Administrative Information

Investigator In Charge (IIC):	Nixon, Albert
Additional Participating Persons:	John Waugh; Federal Aviation Administration; Las Vegas, NV Mark Platt; Lycoming Engines; Williamsport, PA John Ceresna; Federal Aviation Administration; Las Vegas, NV
Original Publish Date:	May 16, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=89508