



Aviation Investigation Final Report

Location:	Angel Fire, New Mexico	Accident Number:	CEN13FA183
Date & Time:	March 3, 2013, 13:20 Local	Registration:	N3484X
Aircraft:	Mooney M20E	Aircraft Damage:	Substantial
Defining Event:	Loss of control in flight	Injuries:	4 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Before takeoff, strong, gusting wind from the west was present, so a fixed-base operator (FBO) employee asked the pilot about his intent to fly. He stated that the pilot seemed “confident” about his ability to fly the airplane and that he was not concerned about the wind. As the airplane departed, the reported wind was 33 knots gusting to 47 knots. The FBO employee stated that he saw the airplane “crab” into the wind about 40 degrees right of the runway’s heading. The airplane rose and fell repeatedly as its wings rocked. When the airplane was between 75 and 150 feet above the ground, the left wing dropped, and the airplane then rolled left, descended inverted, and impacted terrain in a nose-down attitude. A postimpact examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. A weather research and forecasting model indicated that, at the time of the accident, the accident site was located within a turbulent mountain-wave environment, with low-level windshear, updrafts and downdrafts, downslope winds, and an environment conducive for rotors (that is, a violent rolling wave of air occurring in lee of a mountain or hill in which air rotates about a horizontal axis). The pilot had no prior experience flying out of the accident airport and it was the highest elevation airport he had ever used. In addition, he had limited experience flying in mountainous areas.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot’s loss of control while flying in a turbulent mountain-wave environment. Contributing to the accident was the pilot’s overconfidence in his ability to safely pilot the airplane in gusting wind conditions and his lack of experience operating in mountainous areas.

Findings

Environmental issues	Terrain induced turbulence - Effect on operation
Environmental issues	(general) - Effect on operation
Personnel issues	Self confidence - Pilot
Personnel issues	(general) - Pilot
Environmental issues	Mountainous/hilly terrain - Effect on operation
Personnel issues	Aircraft control - Pilot

Factual Information

History of Flight

Takeoff	Other weather encounter
Takeoff	Loss of control in flight (Defining event)

HISTORY OF FLIGHT

On March 3, 2013, about 1320 mountain standard time, a Mooney M20E, N3484X, impacted terrain after departing the Angel Fire Airport (KAXX), Angel Fire, New Mexico. The private pilot and three passengers were fatally injured. The airplane was substantially damaged and a post-impact fire ensued. The aircraft was registered to and operated by Verhalen Flyers LLC, Scottsville, Texas, under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight, which operated without a flight plan. The flight was departing KAXX at the time of the accident and was destined to the Dallas-Fort Worth area.

When the pilot arrived at the fixed base operator (FBO), an employee from the FBO questioned the pilot's intent to fly in the windy weather. The pilot indicated that he planned to fly and that the winds would not be a problem. When the pilot radioed on universal communications (UNICOM) that he was taxiing to runway 17, the current wind and altimeter were relayed to the pilot by the FBO employee, which were repeated by the pilot. Due to snow piles on the airfield, the FBO employee could not see the takeoff and next saw the airplane airborne with a significant crab angle into the wind, about 40 degrees right of the runway heading. The airplane rose and fell repeatedly as its wings rocked. Then employee saw the airplane's right wing rise rapidly. The airplane rolled left, and descended inverted with the airplane's nose pointed straight down.

An eyewitness riding in a car along Highway 434, west of the airport, saw the airplane take off from the runway. The witness perceived that the airplane was struggling to gain altitude. When the airplane climbed between 75 to 150 feet above the ground, the airplane appeared to momentarily hover before the left wing dipped quickly and the airplane descended nose first to the ground.

PERSONNEL INFORMATION

The pilot, age 33, held a private pilot certificate for airplane single engine land. On October 13, 2011, he was issued an unrestricted third class medical certificate. On his medical certificate application, the pilot reported having accumulated 380 total hours. The pilot's logbook was not available for review by the investigator. Paperwork filed with the pilot's insurance company reported that as of October 2012, the pilot accrued 459 hours with 384 hour in the same make and model as the accident airplane.

The pilot reported to the FBO manager that he had flown the accident airplane for five years. He added that KAXX was the highest airport that he had landed at, although he had flown to some lower elevation airports in Colorado and Wyoming on previous flights. The pilot's experience flying out of airports with high density altitude is not known.

A cousin of the pilot, who lived in the local area, reported that the night before the accident he had discussed airplanes and the airplane accidents in the Angel Fire area. The pilot reported to him that flying in wind did not bother him.

AIRCRAFT INFORMATION

The four seat, low wing, single engine airplane, serial number 1156, was manufactured in 1966. It was powered by a 200-horsepower, fuel-injected, Lycoming IO-360-A1A engine which drove a two-blade, metal, constant speed, Hartzell HC-2YK-1BF propeller. The airplane's log books were almost completely consumed in the post impact fire. Information retrieved from receipts, reported that the airplane's most recent annual inspection occurred on December 7, 2012, at a tachometer and airframe total time of 4,752.65 hours. The engine had accrued 6,859.85 hours, with 1,736.75 hours since major overhaul. At the accident site, the airplane's tachometer read 4,785.84 hours.

METEOROLOGICAL INFORMATION

At 1315, an automated weather reporting facility located at KAXX, reported wind from 250 degrees at 33 knots gusting to 47 knots, visibility 10 miles, a clear sky, temperature 47 degrees Fahrenheit (F), dew point 17 F, and a barometric pressure of 29.93 inches of mercury. Utilizing this weather, the density altitude was calculated at 9,549 feet.

KAXX and the accident site were located in a basin nearly encompassed by mountainous terrain. Mountains to the west and northwest of the airport have peaks between 10,470 and 13,160 feet. A weather study was compiled for the accident site. An upper air sound for 1400 mountain standard time (MST) depicted an unstable vertical environment which would allow mixing of the wind on the lee side of the terrain. Winds as high as 55 knots could occasionally reach the surface. Satellite imagery between 1300 and 1400 MST recorded a large amount of standing lenticular cloud near all of the mountainous terrain around the accident site. These clouds indicated the presence of a mountain wave environment. At 0322 and 1134, the National Weather Service issued wind advisories for the accident area that warned of a west of southwest wind between 25 and 35 miles per hour (mph) with gusts to 50 mph.

A Weather Research and Forecasting (WRF) model was created to simulate the accident's weather conditions. The WRF model indicated that the accident site at the accident time was located within a turbulent mountain wave environment, with low-level wind shear, updrafts and downdrafts, downslope winds, and an environment conducive for rotors.

The pilot did not receive a weather briefing and it is not known what weather sources the pilot referenced prior to takeoff.

AIRPORT INFORMATION

The Angle Fire Airport is located at an elevation of 8,380 feet. It has one asphalt runway, 17-35, which is 8,900 feet long by 100 feet wide. The airfield is non-towered and utilizes a common traffic advisory frequency. The departure runway was runway 17, which has a 0.6% upgrade. An Automated Weather Observing System (AWOS-3) is located on airport property.

Information contained in KAXX's airport/facility directory contains remarks for "strong gusty crosswinds possible" and "high density altitude probable."

Located in the airport's FBO were posters and literature warning pilots about crosswinds, mountainous terrain, weight and balance, take off performance, density altitude, and runway 17's upgrade.

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest about 0.2 miles south-southwest of the airport. It was located near the intersection of the runway's extended centerline and Highway 434. The initial impact point was a crater on the highway's shoulder. The crater contained acrylic glass and near the crater was the airplane's propeller. Fifteen feet east of the crater was the main wreckage which was inverted. A postimpact fire consumed a majority of the fuselage and empennage. Both wings remained attached to the fuselage and displayed near symmetric accordion crushing. Both fuel tanks were breached and empty. The left wing's outboard section remained intact, along with its aileron. The inboard portion of the left wing, around the area of the fuel tank, was consumed by fire to include a majority of the left flap. The left main gear was thermally damaged and buckled. The right wing remained mostly intact, with its aileron and flap still attached at their respective locations. The right flap appeared set to 15 degrees. The right main gear was extended. The vertical stabilizer and horizontal stabilizers were buckled, torn, and thermally damaged. Flight control continuity was established from the ailerons to the cockpit controls. The rudder and elevator rods remained connected to their control surfaces until just forward of the vertical stabilizer where fire had destroyed and melted a majority of the control rods.

The airspeed indicator read 81 mph. The attitude direction indicator depicted a left wing low, inverted attitude. The tachometer read 2000 rpm. The altimeter's Kohlsman window read 29.93.

The propeller fractured at the propeller flange. Both blades displayed leading edge nicks and gouges, deep, chordwise scratches, and leading edge polishing.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was conducted on the pilot by the Office of the Medical Investigator of the State of New Mexico. The autopsy noted the cause of death as a result of multiple blunt force injuries. The manner of death was ruled an accident.

Forensic toxicology was performed on specimens from the pilot by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. Testing did not detect ethanol or drugs. Specimens from the pilot were not suitable to test for carbon monoxide; however, specimens from a passenger were tested and did not contain carbon monoxide.

ADDITIONAL INFORMATION

Weight and Balance

An old copy of the airplane's weight and balance, marked "superseded 6/28/02" was located in the wreckage. Utilizing the data contained on the form and information on file with the Federal Aviation Administration, an estimated weight and balance was calculated for the accident airplane. Postmortem weights of the airplane occupants were obtained from the Office of the Medical Investigator. These weights were not corrected for clothing or water loss due to thermal injuries. Occupant seats were assumed in the forward positions for better forward center of gravity (CG). The occupants' baggage was consumed in the postimpact fire and could not be weighed. An estimate of ten pounds per bag was given

to the six bags reported to be on the airplane. Twenty-eight gallons of fuel was reported to be in the tanks prior to flight. The airplane's weight was calculated at 2,518.77 pounds with a moment arm of 123.98 inches. This placed in airplane aft of the manufacturer's center of gravity moment envelope.

Excerpts from FAA Aeronautical Information Manual

In Chapter 7, Section 7-5-6, "Safety of Flight, Mountain Flying," the following described hazards to pilots during operation in mountainous terrain.

"High density altitude reduces all aircraft performance parameters. To the pilot, this means that the normal horsepower output is reduced, propeller efficiency is reduced and a higher true airspeed is required to sustain the aircraft throughout its operating parameters."

"Mountain waves occur when air is being blown over a mountain range or even the ridge of a sharp bluff area. As the air hits the upwind side of the range, it starts to climb, thus creating what is generally a smooth updraft which turns into a turbulent downdraft as the air passes the crest of the ridge. From this point, for many miles downwind, there will be a series of downdrafts and updrafts."

Pilot Information

Certificate:	Private	Age:	33, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
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:	October 13, 2011
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 459 hours (Total, all aircraft), 384 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	Registration:	N3484X
Model/Series:	M20E	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	1156
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:	December 7, 2012 Annual	Certified Max Gross Wt.:	2575 lbs
Time Since Last Inspection:	33 Hrs	Engines:	1 Reciprocating
Airframe Total Time:	4786 Hrs at time of accident	Engine Manufacturer:	LYCOMING
ELT:	C91A installed, not activated	Engine Model/Series:	IO-360-A1A
Registered Owner:	VERHALEN FLYERS LLC	Rated Power:	200 Horsepower
Operator:	VERHALEN FLYERS LLC	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	KAXX, 8380 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	13:15 Local	Direction from Accident Site:	
Lowest Cloud Condition:	Clear	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	33 knots / 47 knots	Turbulence Type Forecast/Actual:	/
Wind Direction:	250°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.93 inches Hg	Temperature/Dew Point:	8°C / -8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Angel Fire, NM (KAXX)	Type of Flight Plan Filed:	Unknown
Destination:	Dallas, TX	Type of Clearance:	None
Departure Time:	13:20 Local	Type of Airspace:	

Airport Information

Airport:	Angel Fire Airport KAXX	Runway Surface Type:	Asphalt
Airport Elevation:	8380 ft msl	Runway Surface Condition:	Dry
Runway Used:	17	IFR Approach:	None
Runway Length/Width:	8900 ft / 100 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Substantial
Passenger Injuries:	3 Fatal	Aircraft Fire:	On-ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	4 Fatal	Latitude, Longitude:	36.406944,-105.291114

Administrative Information

Investigator In Charge (IIC):	Aguilera, Jason
Additional Participating Persons:	Richard Hammer; Federal Aviation Administration; Albuquerque, NM Robert Collier; Mooney Aircraft Company; Kerrville, TX
Original Publish Date:	January 30, 2014
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=86341

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](#).