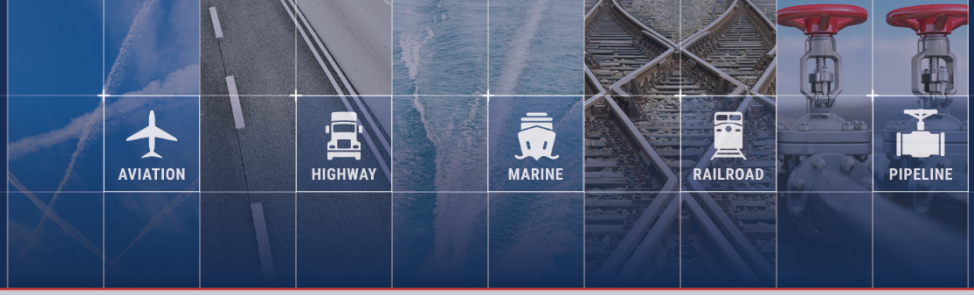

Aviation Investigation Final Report

Location:	Guymon, Oklahoma	**Accident Number:**	CEN13FA217
Date & Time:	April 1, 2013, 12:10 Local	**Registration:**	N9330M
Aircraft:	Mooney M20E	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

A witness reported that, after landing for an en-route fuel stop, the noninstrument-rated pilot checked the weather and then departed for a cross-country flight; instrument meteorological conditions prevailed at the time of departure. The burned wreckage was found 2 days later in a remote unpopulated area about 6 miles northwest of the departure airport. Examination of the accident site revealed ground scars and airplane damage consistent with a nearly vertical nose-down collision with terrain. Examination of the wreckage revealed no evidence of any preimpact mechanical malfunctions or failures, although the definitive operational status of the vacuum-driven instruments could not be determined. The weather information, which was corroborated by a witness, depicted deteriorating weather conditions with a lowering variable ceiling and the lack of a visible horizon in the area at the time of the accident. The low-visibility conditions were conducive to the noninstrument-rated pilot's development of spatial disorientation, and the airplane's near-vertical descent is consistent with the pilot's loss of airplane control due to spatial disorientation.

Probable Cause and Findings

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

The noninstrument-rated pilot's encounter with instrument meteorological conditions, which resulted in spatial disorientation and his subsequent loss of airplane control. Contributing to the accident was the pilot's decision to take off in deteriorating weather conditions.

Findings

Personnel issues	Visual illusion/disorientation - Pilot
Environmental issues	Low ceiling - Effect on operation
Personnel issues	Aircraft control - Pilot
Personnel issues	Decision making/judgment - Pilot
Aircraft	(general) - Not attained/maintained

Factual Information

History of Flight

Enroute-cruise	VFR encounter with IMC
Enroute-cruise	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)
Post-impact	Fire/smoke (post-impact)

HISTORY OF FLIGHT

On April 1, 2013, about 1210 central daylight time, N9330M, a Mooney Aviation Company, Inc. M20E, single engine airplane, was destroyed after impacting terrain near Guymon, Oklahoma. The pilot and passenger were fatally injured. The airplane was registered to and operated by a private individual. Instrument meteorological conditions (IMC) prevailed at the time of departure and a flight plan had not been filed for the 14 Code of Federal Regulations part 91 personal flight. The airplane departed Guymon Municipal Airport (KGUY), Guymon, Oklahoma, at 1204, and was en route to Meadow Lake Airport (KFLY), Peyton, Colorado.

The airplane had earlier that morning departed from El Reno Regional Airport (KRQO), El Reno, Oklahoma, with a final destination of KFLY. After landing for an en route fuel stop at KGUY the pilot checked the weather and departed during deteriorating weather conditions. The airplane failed to arrive at KFLY. The burned wreckage was discovered two days later on the afternoon of April 3, 2013, in a remote area about 6 miles northwest from KGUY.

PERSONNEL INFORMATION

The pilot, age 68, held a Federal Aviation Administration (FAA) private pilot certificate with a rating for only airplane single engine land. He did not hold an instrument rating. His first FAA pilot certificate was a student pilot certificate which was issued on December 1, 2004, and his FAA private pilot certificate was initially issued on December 14, 2005.

The pilot's logbooks were not available during the course of the investigation. Based on the pilot's most recent airman medical certification application, aircraft maintenance logbooks, aviation insurance company documents completed by the pilot, and other documents, the pilot's flight experience as of March 9, 2013, was estimated as 933 hours of total flight experience with about 638 hours of pilot experience in Mooney M20 series airplanes.

No records were found which indicated that the pilot had flight experience in any aircraft other than single engine land airplanes, and there was no logbook record of the pilot's instrument flying experience.

A certified flight instructor (CFI) administered a satisfactory flight review to the pilot on October 19, 2011, and reported that the pilot knew his aircraft and was knowledgeable of the regulations and proper

procedures. The CFI also reported that during the 1.4 hour long period of flight instruction the pilot flew the airplane well in visual conditions, but had some difficulty flying in simulated instrument conditions while wearing a hood. After more instruction the pilot's hood work improved and he completed three unusual attitude recoveries while under the hood.

AIRCRAFT INFORMATION

The four-seat, low-wing, retractable landing gear, single engine airplane, serial number (s/n) 1262, was manufactured in 1973. It was equipped with a 200-horsepower Lycoming model IO-360-A1A engine, s/n L-2718-51A, which drove a Hartzell, model HC-C2YR-1BF, 2-blade metal alloy propeller, s/n CH42095B.

The accident airplane was equipped with a Garmin GNS430W GPS; and an Aspen EFD 1000 system with an Aspen EWR50 XM weather receiver capable of displaying satellite weather overlays on the moving map display. The Aspen equipment had been installed in April, 2012. The airplane was also equipped with a J.P. Instruments EDM-700 engine monitoring system; an S-TEC System 30 two axis autopilot; and a model EBC-102A emergency locator transmitter (ELT).

Fuel receipts at KGUY showed the airplane had been topped-off to its 52 gallon capacity with 21.6 gallons of 100LL aviation gasoline. A postaccident fuel quality inspection of the refueling facility at KGUY was satisfactory.

A witness at KGUY reported that the pilot and passenger were seated in the two front seats, and the rear cabin was loaded with baggage and personal cargo "all the way up to the roof". The witness also reported that the pilot told him that he had "airborne XM weather radar installed on the airplane, but that it wasn't working".

METEOROLOGICAL INFORMATION

KGUY was the closest official weather station to the accident site and had an Automated Surface Observing System (ASOS5) whose reports were not supplemented by a human observer. At 1053 KGUY reported the wind was from 020 degrees at 17 knots, visibility 10 miles, ceiling overcast at 1,400 feet above ground level (agl), temperature 4 degrees Celsius (C), dew point 0 degrees C, with an altimeter setting of 30.17 inches of mercury.

At 1203 the data from KGUY revealed that the wind was from 360 degrees at 13 gusting to 23 knots, visibility 10 miles, ceiling broken at 800 feet agl, overcast clouds at 1,200 feet agl, temperature 3 degrees C, dew point 0 degrees C, with an altimeter setting of 30.20 inches of mercury. Remarks indicated that the pressure was rising rapidly.

At 1253 the data from KGUY revealed that the wind was from 020 degrees at 15 gusting to 21 knots, visibility 10 miles, overcast clouds at 800 feet agl, temperature 2 degrees C, dew point -1 degrees C, with an altimeter setting of 30.18 inches of mercury. Remarks indicated that unknown precipitation began at 15 minutes after the hour and ended at 30 minutes after the hour, and rain began at 18 minutes after the hour and ended at 28 minutes after the hour. The ceiling was variable from 600 to 1,000 feet agl. Remarks also indicated that the freezing rain sensor not operating.

A witness at KGUY reported that the cloud condition was a low ceiling when the airplane landed and the ceiling was even lower with sprinkling rain and sleet when the airplane departed.

Another witness recalled hearing hail or sleet on the hangar roof before the airplane departed.

Records showed that the pilot used a desktop computer in the FBO pilot's flight planning room to check weather using "WSI" and "Aviation Sentry Weather" before he departed from KGUY. However, neither of those resources logs access, so there was no record of what specific weather information was obtained by the pilot.

COMMUNICATIONS AND POSTACCIDENT SEARCH ACTIVITY

On April 1, 2013, about 0733, the pilot of the accident airplane telephoned the Flight Service Station (FSS) and received a pilot weather briefing to fly from KRQO to KFLY. The pilot received only a weather briefing for the expected 3-hour flight and did not file a flight plan.

There was no record of any subsequent communications from the pilot.

On April 2, 2013, family members had become concerned and notified the FAA that the airplane had failed to arrive. Within minutes several different agencies became involved in the search efforts. Local emergency responders near KFLY conducted a physical search and confirmed the accident airplane had not arrived at the airport and the pilot's vehicle was still there. The FSS issued an alert notice (ALNOT) which directed an extensive communication search for the overdue, unreported, or missing aircraft.

FAA air traffic control (ATC) coordinated with the U. S. Air Force Rescue Coordination Center (AFRCC) and with volunteers from the Civil Air Patrol (CAP). AFRCC reported there had not been any reports of ELT signals along the route of flight from KRQO to KFLY. FAA ATC and CAP forensic radar specialists identified several radar targets in the area around KRQO, but were unable to positively identify the accident airplane. A volunteer CAP cell phone forensics specialist began tracking data from the pilot's cell phone and determined the pilot's cell phone had last been in the vicinity of KGUY.

Direct coordination with the airport fixed base operator (FBO) at KGUY showed that the accident airplane had landed at KGUY at 1050 on April 1, 2015, refueled, and took off northbound from runway 36 at 1204.

The FAA ATC radar forensics specialist reported that radar coverage west and northwest of KGUY is "sparse" below 5,000 to 6,000 feet mean sea level (msl), and that no radar tracks were visible for the accident airplane. The KGUY airport is at an elevation of 3,125 feet msl, and the elevation of the accident location was estimated about 3,209 feet msl.

The FAA, FSS, and AFRCC, coordinated with volunteer CAP search teams from Texas, Oklahoma, and Colorado to immediately begin efforts for an airborne search, but the CAP units were prevented from launching because of adverse weather.

About 1600 on April 3, 2015, a local pilot at KGUY, who was aware of the missing airplane, was airborne on a local flight when he visually spotted the burned wreckage in a remote area about 6 miles northwest from KGUY. A local law enforcement officer drove to the accident scene and confirmed the location of the wreckage and the airplane's registration number. Other emergency personnel responded,

the ALNOT was cancelled, the AFRCC search and rescue mission was terminated, and the multi-state CAP search mission was terminated.

WRECKAGE AND IMPACT INFORMATION

The wreckage was found impacted on dirt and rock in high desert terrain in a remote unpopulated area. The intact wreckage was upright and remained in or immediately adjacent to the impact ground scars. The fuel tanks were breached and much of the airplane was mostly consumed by a postimpact fire.

Impact scars, accordion compression buckling of the leading edges of the wings, and other evidence at the scene, was consistent with a wings level, terrain impact of about 70 degrees nose down. Witness marks showed the tail surfaces had bent straight forward during the impact, struck the empennage, and then rebounded.

All of the airplane components and flight control surfaces were accounted for and remained connected. Flight control continuity was confirmed from the control surfaces to impact separations or to the melted metal mass in the cockpit area. Areas of some flight control push-pull tubes were missing or significantly damaged by fire but there was no evidence of preimpact separation.

Fire consumed the inboard portion of the right wing, most of the left wing, and much of the instrument panel, avionics, cockpit area, and the entire cabin area. The forward cockpit instrument panel and cabin area were unrecognizable. Impact damage and fire damage prevented a useful examination of the cockpit instruments.

Landing gear and gear doors were observed up and closed. The flaps were retracted. The elevator screw travel was observed on the wreckage as about 3 1/4 inches extension. The manufacturer reported that elevator screw travel for full nose-up trim is about 4 1/2 inches, and full nose down trim is about 2 inches.

The engine was then separated from the airframe and hung from a hoist for the examination. The propeller remained attached to the crankshaft. One propeller blade was bent aft under the engine and exhibited cord-wise polishing and scratches. The other blade was relatively straight and covered with soot. The propeller governor was partially deformed by fire.

The engine case was observed cracked open near the front of the case. The exhaust system had been crushed aft and upwards. Both magnetos were partially consumed by fire and were not further examined. The spark plugs were removed and appeared normal as compared to the Champion Aviation Check-a-Plug Chart AV-27. The spark plug electrodes were unbroken. The engine crankshaft flange was bent and the crankshaft could not be rotated. Engine drive train continuity was established visually. The engine driven fuel pump was observed to be mostly consumed by fire. The fuel servo was deformed by fire. All of the fuel injectors and the fuel flow divider were examined and appeared clear. The flow divider diaphragm was consumed by fire. The engine driven vacuum pump was disassembled and examined. The drive adaptor was melted and the rotor was observed impact cracked and broken. The rotor, pump vanes, and internal surfaces were examined.

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

MEDICAL AND PATHOLOGICAL INFORMATION

Autopsies were performed on the pilot and the passenger by the Office of the Chief Medical Examiner in Oklahoma City, Oklahoma.

Forensic toxicology was performed on specimens from the pilot by the Federal Aviation Administration (FAA), Aeronautical Sciences Research Laboratory, in Oklahoma City, Oklahoma. The toxicology report stated: tests for Carbon Monoxide were NOT PERFORMED; tests for Cyanide were NOT PERFORMED; NO ETHANOL was detected in Muscle. NO ETHANOL was detected in Liver: and NO DRUGS were detected in Liver.

FAA records showed the pilot's most recent Third-Class Limited Medical Certificate was issued on March 19, 2013, with a restriction: must wear corrective lenses for distant vision, and must possess glasses for near vision. At the time of the medical examination the pilot reported that he was taking no medications and he reported no new concerns.

TESTS AND RESEARCH

A fragmented, impact damaged, and thermally damaged Garmin GNS430W panel mount GPS device was removed from the wreckage and was examined at the NTSB vehicle recorder division in Washington, DC. An internal examination of the components revealed that heat from the postimpact fire destroyed most of the unit's electronic components. No recorded data was able to be extracted from the Garmin GNS430W.

A fragmented, impact damaged, and thermally damaged JPI EDM-700 engine data monitor was removed from the wreckage and was examined at the NTSB vehicle recorder division in Washington, DC. An internal examination of the components revealed that many of the unit's electronic components, including the memory, were found to be melted by exposure to flames. No recorded data was able to be extracted from the JPI EDM-700.

ADDITIONAL INFORMATION

According to FAA Advisory Circular 60-4A "Pilot's Spatial Disorientation," "Surface references and the natural horizon may at times become obscured, although visibility may be above visual flight rule minimums. Lack of natural horizon or surface reference is common … in extremely sparsely populated areas or in low visibility conditions. A sloping cloud formation (or) an obscured horizon … can provide inaccurate visual information for aligning the aircraft correctly with the actual horizon. The disoriented pilot may place the aircraft in a dangerous attitude."

"… tests conducted with qualified instrument pilots indicated that it can take as long as 35 seconds to establish full control by instruments after a loss of visual reference of the earth's surface. AC 60-4A further states that surface references and the natural horizon may become obscured even though visibility may be above VFR minimums and that an inability to perceive the natural horizon or surface references is common during flights … in sparsely populated areas, and in low-visibility conditions".

According to the FAA "Instrument Flying Handbook", FAA-H-8083-5B, "An obscured horizon … can provide inaccurate visual information, or false horizon, for aligning the aircraft correctly with the actual horizon. The disoriented pilot may place the aircraft in a dangerous attitude".

"In moderate unusual attitudes, the pilot can normally reorient by establishing a level flight indication on the attitude indicator. However, the pilot should not depend on this instrument if … its upset limits may have been exceeded or it may have become inoperative due to mechanical malfunction ... As soon as the unusual attitude is detected, the recommended recovery procedures … should be initiated by reference to the ASI, altimeter, VSI, and turn coordinator".

According to the FAA "Airplane Flying Handbook", FAA-H-8083-3A, "The pilot should remember, that unless (instrument flying) tasks are practiced on a continuing and regular basis, skill erosion begins almost immediately. In a very short time, the pilot's assumed level of confidence will be much higher than the performance he or she will actually be able to demonstrate should the need arise".

"A VFR pilot is in IMC conditions anytime he or she is unable to maintain airplane attitude control by reference to the natural horizon, regardless of the circumstances or the prevailing weather conditions. (This situation) must be accepted by the pilot involved as a genuine emergency, requiring appropriate action".

Pilot Information

Certificate:	Private	**Age:**	68
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	March 19, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	October 19, 2011
Flight Time:	(Estimated) 933 hours (Total, all aircraft), 638 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N9330M
Model/Series:	M20E	**Aircraft Category:**	Airplane
Year of Manufacture:	1973	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	1262
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	January 22, 2013 Annual	**Certified Max Gross Wt.:**	2575 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	2054 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C91A installed, not activated	**Engine Model/Series:**	IO360
Registered Owner:	On file	**Rated Power:**	200 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KGUY,3123 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	12:03 Local	**Direction from Accident Site:**	121°
Lowest Cloud Condition:	800 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 800 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	13 knots / 23 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	360°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.2 inches Hg	**Temperature/Dew Point:**	3°C / 3°C
Precipitation and Obscuration:	In the vicinity - None - Unknown precipitation		
Departure Point:	Guymon, CO (GUY)	**Type of Flight Plan Filed:**	None
Destination:	Peyton, CO (FLY)	**Type of Clearance:**	None
Departure Time:	12:04 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	GUYMON MUNI GUY	**Runway Surface Type:**	Asphalt
Airport Elevation:	3125 ft msl	**Runway Surface Condition:**	Wet
Runway Used:	36	**IFR Approach:**	None
Runway Length/Width:	5904 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	36.730556,-101.605278(est)

Administrative Information

Investigator In Charge (IIC):	Latson, Thomas
Additional Participating Persons:	William J Fitzgerald; FAA Lubbock FSDO; Lubbock, TX Troy Helgeson; Lycoming Engines; Williamsport, PA
Original Publish Date:	July 7, 2015
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=86577