Aviation Investigation Final Report

Location:	Cody, Wyoming	**Accident Number:**	WPR14FA188
Date & Time:	May 6, 2014, 11:59 Local	**Registration:**	N6704U
Aircraft:	Mooney M20C	**Aircraft Damage:**	Substantial
Defining Event:	Controlled flight into terr/obj (CFIT)	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The two pilots were on a multi-leg cross-country trip in the airplane to visit friends and relatives. Both pilots had current medical certificates, and it could not be determined who was acting as pilot-in-command at the time of the accident. The pilot seated in the right front seat had owned the airplane for over 20 years and had accumulated considerable experience flying it. Neither pilot had an instrument rating.

Postaccident review of meteorological information indicated that at the time of the flight's departure, the departure and arrival airports were reporting visual meteorological conditions; however, the initial segment of the flight required flight over mountainous terrain where instrument meteorological conditions (IMC) and mountain obscuration existed. There was no record of either pilot having obtained an official weather briefing before the flight; however, they were most likely aware of the mountain obscuration, as it would have been visible before takeoff and during the initial stages of the flight.

The airplane was equipped with a panel-mounted GPS receiver that was capable of providing minimum safe altitude information along a user-defined flight plan, but it is unknown if the pilots were using this feature. An iPad, which the pilots reportedly used for navigation, was found in the cockpit; however, impact damage to the device prevented determination of what navigation software was installed. Additionally a sectional chart covering the accident area was on board; however, the chart was found stowed in the rear pocket of the left front seat, indicating that the pilots were not using it during the flight.

Radar and weather data revealed that the airplane entered the clouds shortly after takeoff. The flight track began to waver slightly about 7 minutes after takeoff, likely due to the airplane being hand-flown as it entered IMC. The flight track remained generally on course toward the destination airport as the flight progressed, and there was no indication of an attempt to return to the departure airport. The

airplane flew through the mountainous terrain at a fairly consistent altitude about 2,500 ft below the maximum elevation figure of 12,500 ft mean sea level shown on the sectional aeronautical chart for the area and eventually struck the side of a mountain about 430 ft below its summit.

The consistency of the airplane's flight track indicates that the pilots most likely intentionally elected to enter IMC in an effort to fly over the mountainous terrain and into the clearer weather beyond. The airplane's altimeter was set to the correct pressure, and postaccident examination did not reveal any anomalies with the airframe or engine that would have precluded normal operation. The investigation was unable to determine why the pilots elected to fly at an altitude below the maximum elevation for the area.

While both pilots had reported histories of significant cardiovascular disease, autopsies and toxicological analysis did not reveal any findings that would have contributed to the accident. Although ethanol was detected in the right-seat pilot's urine, the levels were not sufficient to have caused impairment.

Probable Cause and Findings

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

The non-instrument rated pilots' decision to continue flight into known instrument meteorological conditions over mountainous terrain, which resulted in controlled flight into terrain.

Findings

Personnel issues	Decision making/judgment - Pilot
Environmental issues	Obscuration - Decision related to condition
Environmental issues	Mountainous/hilly terrain - Not specified

Factual Information

History of Flight

Enroute-cruise	VFR encounter with IMC
Enroute-cruise	Controlled flight into terr/obj (CFIT) (Defining event)

On May 6, 2014, at 1159 mountain daylight time, a Mooney M20C, N6704U, collided with mountainous terrain near Cody, Wyoming. The airplane was registered to, and operated by, the pilot/owner under the provisions of 14 Code of Federal Regulations Part 91. The private pilot/owner and private pilot-rated passenger sustained fatal injuries. The airplane sustained substantial damage to the forward fuselage and both wings. The cross-country personal flight departed Yellowstone Regional Airport, Cody, about 1140, with a presumed destination of Twin Falls, Idaho. Instrument meteorological conditions prevailed at the accident site, and no flight plan had been filed.

Both occupants were brothers and had departed from Fayetteville, North Carolina, on April 28 in the accident airplane with the intention of touring the country to visit friends and relatives. Their ultimate destination was Seattle, Washington, where they had planned on arriving by May 11.

Family members became concerned when they had not heard from both occupants by May 8, and initiated a series of exchanges with various local law enforcement agencies, airport personnel, and relatives throughout the Cody and Twin Falls area. On May 10, still unable to locate the occupants, family members contacted Lockheed Martin Flight Services, and an Alert Notice (ALNOT) was issued. Utilizing radar data provided by the Air Force Rescue Coordination Center, search and rescue personnel from the Park County Office of Homeland Security were able to visually locate the airplane by helicopter in mountainous terrain within the Shoshone National Forest.

The Federal Aviation Administration (FAA) provided radar data from the QSI (Lovell, Wyoming) Air Route Surveillance Radar sensor, which was located at an elevation of 9,962 ft, 60 miles east of the departure airport. The data revealed a primary target (no altitude information) on a beacon code of 1200, departing from the vicinity of Cody at 1141, and flying on a track of 248 degrees true towards the rising terrain of the Shoshone National Forest. Having passed over the town of Wapiti, 5 minutes later, the target initiated a right turn to 265 degrees and began reporting a Mode C altitude of 8,800 ft. For the next 6 minutes the target continued loosely on track as its heading varied back and forth 10 to 20 degrees in either direction. Having reached 9,900 ft, it passed below the 10,219 ft peak of Clayton Mountain, which was about 1 mile to the south. The track progressed for another 2 minutes, climbing another 200 ft, while passing 300 ft over an adjoining ridgeline, which rose above the targets altitude 500 ft to the south. The target continued on a course directly towards the eastern face of Howell Mountain, and over the next 96 seconds, began a climb to 10,500 ft as the terrain below fell away to 6,900 ft. The last recorded target occurred 24 seconds later, at an altitude of 10,200 ft.

The wreckage was located at an elevation of about 9,970 ft, on the eastern flank of Howell Mountain, about 430 ft below its summit, and about 1,200 ft northwest of the last target location.

Pilot Information

Certificate:	Private	**Age:**	84
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	October 13, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 4550 hours (Total, all aircraft), 2000 hours (Total, this make and model)		

Pilot Information

Certificate:	Private	**Age:**	86
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	October 9, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 625 hours (Total, all aircraft), 500 hours (Total, this make and model)		

Both occupants held current pilot licenses, and the airplane was equipped with dual controls. As such, a definitive conclusion regarding who was acting as pilot-in-command at the time of the accident could not be made.

Pilot/Owner

The pilot-rated owner was positioned in the right seat. He was 84 years old, and held a private pilot certificate with ratings for single-engine land, issued in 1967. He did not hold an instrument rating.

He held a third-class special issuance medical certificate issued on September 30, 2013, and valid for 1 year, based on a documented history of enlarged aortic root and aortic regurgitation. The certificate additionally had a limitation that he must have available glasses for near vision. At the time of application, he reported using Losartan and Hydrochlorothiazide.

On his most recent medical application, the pilot reported a total time in all aircraft of 4,550 hours, with 27 hours in the past 6 months.

FAA records indicated that he received a 60-day "Order of Suspension" on June 25, 2009, for landing and then crossing an active runway in the accident airplane at an airport in Class D airspace, without

establishing radio contact with air traffic control tower personnel.

Pilot/Pilot Rated Passenger

The second occupant was positioned in the left seat. He was 86 years old, and held a private pilot certificate with ratings for single-engine land, issued in 1952. He did not hold an instrument rating.

The pilot's most recent application for a medical certificate was dated September 9, 2013. At that time he was found ineligible due to coronary artery disease treated with coronary artery bypass grafting, and sleep apnea treated with continuous positive airway pressure therapy. Following a review by the FAA medical certification branch, he was issued a special issuance third-class medical certificate valid until September 30, 2014, with the limitation that he must wear corrective lenses for near and distant vision. At the time of application, he reported using Lisinopril, Hydrochlorothiazide, Atenolol, and Potassium Chloride.

On his most recent medical application, he reported a total time in all aircraft of 625 hours, with 27 hours in the past 6 months.

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N6704U
Model/Series:	M20C	**Aircraft Category:**	Airplane
Year of Manufacture:	1963	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2436
Landing Gear Type:	Retractable - Tricycle	**Seats:**	
Date/Type of Last Inspection:	April 7, 2014 Annual	**Certified Max Gross Wt.:**	2575 lbs
Time Since Last Inspection:	42 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4407 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	C91 installed, activated, did not aid in locating accident	**Engine Model/Series:**	O-360 SERIES
Registered Owner:	On file	**Rated Power:**	180 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The airplane was manufactured in 1963 and purchased by the pilot/owner in 1991. No maintenance records were recovered; however, a work order revealed that the last annual inspection, along with routine maintenance, was completed on April 7, 2014, at a maintenance facility in Kent, Washington. At that time the airplane had accrued a total of 4,407 flight hours. The tachometer time at the accident site indicated 4,448.5 hours.

The airplane was equipped with a single King KX-170B Nav/Comm transceiver and Indicator, along with a Garmin GNC-300XL GPS Receiver/Comm. Although the Garmin unit was certified for IFR

(instrument flight rules), a placard had been installed stating, "GPS APPROVED FOR VFR FLIGHT ONLY".

Onsite examination revealed that the frequency gauge of the King Navigation unit was set to 114.80 MHz, with the course index set to 250 degrees. This frequency selection did not match any navigation aids along the route of flight, with the closest match being the Worland (RLY) VOR (very high frequency omnidirectional range) ground station, located 100 miles east-southeast of the accident site.

The airplane was equipped with an original equipment factory-installed autopilot, however, impact damage prevented an accurate assessment of its operational status at the time of the accident. An iPad was located in the forward cockpit, and according to family members, was used by the pilots for navigation. The unit was sent to the NTSB Vehicle Records Division for data extraction; however, it had sustained crush and bending damage which had destroyed its memory storage components.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	COD,5102 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	11:55 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Few / 1200 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 3300 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	11 knots /	**Turbulence Type Forecast/Actual:**	/ Unknown
Wind Direction:	360°	**Turbulence Severity Forecast/Actual:**	/ Unknown
Altimeter Setting:	29.77 inches Hg	**Temperature/Dew Point:**	7°C / 5°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Cody, WY (COD)	**Type of Flight Plan Filed:**	None
Destination:	Twin Falls, ID (TWF)	**Type of Clearance:**	None
Departure Time:	11:40 Local	**Type of Airspace:**	Class E

Lockheed Martin Flight Services reported that no records were located indicating that the airplane's registration number was used to request a weather briefing, either by phone or through any approved DUAT vendors during the 3-day period leading up to the accident.

The National Weather Service (NWS) Surface Analysis Chart for 1200 MDT depicted a low pressure system with a central pressure of 995-hectopascals (hPa) over southwestern Wyoming along a frontal wave with a warm front extending eastward across southern Wyoming. Further north, a cold front was depicted surging out of Canada into Montana. The accident site was located between these two systems in an area of light northerly wind, with temperatures in the mid 40-degree Fahrenheit (F) range, with temperature-dew point spreads of 4-degree F. Light continuous rain was reported immediately north of Cody in Montana.

Yellowstone Regional Airport was located at an elevation of 5,102 ft. The airport was equipped with an Automated Weather Observation System (AWOS) which reported the following conditions at 1135,

about 5 minutes prior to departure:

Wind from 360 degrees at 12 knots, visibility unrestricted at 10 statute miles, a few clouds at 1,300 ft above ground level (agl), broken clouds at 1,900 ft, overcast clouds at 3,100 ft, temperature 8 degrees C, dew point 6 degrees C, and an altimeter setting of 29.75 inches of mercury.

At 1155, an updated observation included the following:

Wind from 360 degrees at 11 knots, visibility unrestricted at 10 miles, a few clouds at 1,300 ft, few clouds at 2,100 ft, overcast clouds at 3,300 ft, temperature 7 degrees C, dew point 5 degrees C, and an altimeter setting of 29.77 inches of mercury.

The terminal aerodrome forecast current during the accident period reported that marginal VFR conditions would prevail, with rain showers in the vicinity of Cody, scattered clouds at 900 ft agl, and overcast clouds at 1,500 ft. The weather was predicted to deteriorate further with overcast clouds down to 600 ft, and visibilities down to 2 miles.

The National Weather Service had a full set of AIRMETs (Airmen's Meteorological Information) current over the region, which reported mountain obscuration, turbulence, and icing conditions.

There were no SIGMETs (Significant Meteorological Information), Convective SIGMETs, or Weather Watches current prior to the accident. However, a Center Weather Advisory was issued by the Salt Lake City Center Weather Service Unit for an area of thunderstorms south of the accident site. Additionally, a convective SIGMET was issued for the area immediately south for an area of developing thunderstorms an hour after the accident.

The presumed destination, Twin Falls, was located at an elevation of 4,154 ft, 307 miles southwest of Cody. The initial route of flight took the airplane into the Absaroka Mountain Range, which contained peaks in excess of 12,000 ft. Beyond the accident site, a direct route would have taken the airplane over the lower open areas of the Snake River Plain, passing Idaho Falls, and onwards to Twin Falls.

A routine weather report (METAR) for Twin Falls was issued at 1053, which indicated wind from 250 degrees at 11 knots, 10 miles visibility, overcast clouds at 4,900 ft, and an altimeter setting of 29.75 inches of mercury. At 1353, winds were reported to be from 360 degrees at 4 knots, with 10 miles visibility, light rain, and an overcast ceiling of 3,200 ft.

Examination of the "Kollsman" window of the airplane's altimeter revealed that it was set to 29.75 inches of mercury.

Airport Information

Airport:	YELLOWSTONE RGNL COD	**Runway Surface Type:**	
Airport Elevation:	5102 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	44.398612,-109.901947

The airplane was located 44 miles west of Cody. Shortly after it was discovered, photographs were taken from a helicopter by the Park County Office of Homeland Security, which revealed that it was covered in snow that obscured the lower forward section of the cabin along with the left wing. The main wreckage came to rest facing uphill on a 30-degree slope, at the base of a steeper 45-degree sloping bowl area. The main cabin was upright on a heading of about 290 degrees magnetic, and the crushed remnants of the right wing outboard of the main landing gear were located about 80 ft to the left and uphill of the cabin. At that time, the left wing could not be located. Search and rescue personnel reported that the snow depths in the area ranged from 3 to 5 ft.

The occupants were removed from the airplane about 3 weeks after the accident, once the snow had melted sufficiently to allow safe access to the site. By that time the left wing outboard of the main landing gear was located in between the fuselage and the right wing. The outboard section of the wing was almost completely undamaged, with its aileron still attached; the corresponding left flap remained intact and connected to the fuselage at its inboard hinge. Small fragments of debris were observed in the snow continuing about 250 ft above the main wreckage.

Medical and Pathological Information

A postmortem examination was performed by Forensic Medicine and Pathology PLLC of Billings Montana. The cause of death for both occupants was reported as the result of multiple blunt traumatic injuries. Findings for the pilot/owner included hypertensive cardiovascular disease, with severe hypertensive, and atherosclerotic cardiovascular disease reported for the pilot/pilot rated passenger.

Toxicological tests on specimens recovered from both occupants, were performed by the FAA Civil

Aerospace Medical Institute. Analysis revealed no findings for carbon monoxide.

For the pilot/owner, analysis revealed the following findings:

>> 10 (mg/dL, mg/hg) Ethanol detected in Urine
>> NO ETHANOL detected in Blood (Cavity)
>> NO ETHANOL detected in Muscle

>> Losartan detected in Urine
>> Losartan detected in Blood (Cavity)

For the pilot/pilot rated passenger, analysis revealed the following findings:

>> NO ETHANOL detected in Vitreous

>> Atenolol detected in Urine
>> Atenolol detected in Blood (Cavity)

Refer to the toxicology report in the public docket for specific test parameters and results.

Tests and Research

Examination

The remote location of the airplane, along with treacherous snow conditions prevented an examination at the site immediately following the accident. The airplane was not insured, and therefore could not be recovered in a timely manner. As such, the entire examination was performed at the accident site by the NTSB investigator-and-charge and an FAA inspector on July 16, 2014.

Fuselage

The cabin sustained crush damage from the firewall through to the rear windows. The instrument panel along with all cabin flight controls were crushed and fragmented. The tail cone had buckled forward and was twisted 15 degrees along its longitudinal axis to the right.

Fragments of composite spinner material, as well as paint chips, scat tube, and rubber engine mounts were located in the soil about 5 ft in front of the engine. Shredded fragments of the engine cowling were located surrounding the primary wreckage, with the furthest piece located in the bowl area about 100 ft above the engine.

A total of nine pieces of luggage were located in the aft cabin, with a total weight of about 70 pounds.

The throttle, mixture, propeller and carburetor heat controls were all in the full forward position.

Right Wing

The right wing, which separated at the wing root, had slid past the fuselage since the day of the accident, and was located 25 ft to the south. The wing sustained significant leading edge crush, with the outboard section bent 90-degrees-aft midspan. The main landing gear remained within the well. The flap had detached, and was separated into two sections; the outboard of which was located adjacent to the cabin, with the inboard section just behind the tail section. The aileron was located midway between the wing and cabin.

Left Wing

At the time of the examination, the outboard section of the wing had slid about 300 ft down the mountain slope. According to search and rescue personnel, it slid down due to rotor wash from the recovery helicopter. The wing had separated from the spar at the wheel well, where it exhibited upwards and aft bending damage at its root. The inboard section of the wing remained attached at the fuselage and exhibited crush damage, which had forced the leading edge skins up and over the spar. The main landing gear assembly had separated from the spar, and was located next to the engine.

Empennage

The vertical and horizontal stabilizers remained attached to the tailcone, with all of their respective control surfaces attached. The empennage assembly remained attached, and control tube continuity was established from the control surfaces through to the aft cabin. The surfaces moved smoothly when pushed by hand.

Engine

The engine sustained minimal damage, exhibited no indications of catastrophic failure, and remained partially attached to the firewall. The carburetor had separated at the intake manifold, and had become detached from the inlet filter box, which was crushed. The forward pushrods for cylinders number 2 and 4 (inlet pushrod #2, exhaust pushrod #4) exhibited aft curvature. Both magnetos remained firmly attached to their pads, with all respective spark plug wires intact. All top sparks plugs, and the bottom spark plugs for cylinder 1 and 3, were removed and examined. All plugs exhibited normal to worn-out normal wear signatures when compared to the Champion AV-27 Aviation Check-A-Plug chart.

The engine's position and weight prevented complete rotation of the crankshaft at the accident site, however, the propeller could be partially rotated and exhibited free and smooth movement, with drive train continuity confirmed to the magnetos. All fuel lines from the firewall through to the engine driven fuel pump and carburetor were intact and tight at their fittings. The carburetor and both magnetos were removed for follow up examination.

The propeller remained attached to the engine crankshaft and appeared to have sustained minimal damage. The composite spinner had fragmented, with additional shards located underneath the propeller hub.

Examination of the airframe and engine did not reveal any anomalies which would have precluded

normal operation. A complete report is contained within the public docket.

Additional Information

Maximum Elevation Figures

According to the Great Falls Sectional Aeronautical Chart that was current at the time of the accident, the depicted Maximum Elevation Figure in the area of the accident site was 12,500 ft mean sea level (msl); the accident site was located at 9,970 ft. The route of flight spanned the Great Falls and Salt Lake City Sectional Charts. Although a full complement of charts was located in the rear pocket of the forward left seat, the only chart located in the forward cabin area was for Seattle.

Administrative Information

Investigator In Charge (IIC):	Simpson, Eliott
Additional Participating Persons:	Bruce J Hanson; Federal Aviation Adminstration FSDO; Casper, WY
Original Publish Date:	September 17, 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=89197