Aviation Investigation Final Report

Location:	CARSON CITY, Nevada	**Accident Number:**	LAX00LA215
Date & Time:	June 4, 2000, 12:42 Local	**Registration:**	N201CE
Aircraft:	Mooney M20J	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	4 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The airplane collided with the ground during an off airport forced landing after the airplane began losing altitude immediately after lift off. In the morning, the pilot had flown from another airport direct at 13,500 feet without experiencing any problems and intended to take 3 passengers up on a local flight. On the accident flight, he completed a full power run up and leaned to slightly rich of best power. His run up was normal, the engine was running smoothly, and he felt that it was developing full power. He had picked a go-no-go point that he estimated was about 2,000 feet down the runway. The airplane accelerated normally and lifted off well before his selected go-no-go point. The airplane attained expected climb speed, but a less than expected climb rate. All of the instruments seemed to be within normal ranges, but the airplane stopped climbing. The airplane was approaching the end of the runway and steadily losing altitude. The pilot set up for the off airport landing but saw a berm directly ahead. In order to avoid the obstruction, he aggressively pushed the yoke forward, and applied full right rudder. The left wing speared into the ground and the airplane cart wheeled. The spark plugs for cylinder no. 2 were lighter in color than the others. Investigators observed an unidentified particle obstructing the cylinder no. 2 fuel injection nozzle, and water in the fuel flow divider. The flow divider diaphragm was intact and undamaged. The engine driven fuel pump's internal cavities displayed areas of corrosion. The valve bodies had areas of rust where material was missing. Sediment was resting on the compensator diaphragm. The gascolator was clean. The fuel servo fuel inlet screen was not contaminated. Examination of the fuel injector servo revealed internal corrosion, and contamination by a large piece of black contamination on the unmetered side of the diaphragm. The servo flowed satisfactorily during the bench test, but was somewhat rich. A review of the airplane's logbooks revealed an overhaul of the injection system at the same time of an engine overhaul in November 1998. A logbook entry dated January 17, 2000, noted an ultrasonic cleaning of the fuel nozzles. The density altitude was computed to be 7,680 feet.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: a loss of engine power due to contamination of the fuel system resulting in partial blockage of the cylinder number 2 fuel injection nozzle. A factor in the accident was the high density altitude.

Findings

Occurrence #1: LOSS OF ENGINE POWER(PARTIAL) - NONMECHANICAL
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (C) FUEL SYSTEM,NOZZLE - CONTAMINATION,OTHER THAN WATER
2. (C) FUEL SYSTEM,NOZZLE - FLOW RESTRICTED
3. WEATHER CONDITION - HIGH DENSITY ALTITUDE

Occurrence #2: FORCED LANDING
Phase of Operation: DESCENT - EMERGENCY

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: EMERGENCY LANDING AFTER TAKEOFF

Findings
4. AIRCRAFT PERFORMANCE,CLIMB CAPABILITY - EXCEEDED
5. TERRAIN CONDITION - GROUND

Factual Information

On June 4, 2000, at 1242 hours Pacific daylight time, a Mooney M20J, N201CE, sustained substantial damage when it collided with terrain about 1 minute after takeoff from Carson City, Nevada. The owner operated the airplane as a personal flight under the provisions of 14 CFR Part 91. The commercial pilot and three passengers sustained serious injuries. Visual meteorological conditions prevailed, and no flight plan had been filed for the local area flight.

The pilot submitted a written statement. The pilot stated that he departed Cameron Airpark, California, in the morning and flew direct to Carson City at 13,500 feet without experiencing any problems. At Carson City he intended to take the right seat passenger, who the pilot was encouraging to take flying lessons, up for a local flight. He said that he spent time discussing preflight issues such as weight and balance and performance since they would be near maximum gross weight and at a density altitude of 7,400 feet.

The pilot stated that he completed a run up at 2,000 rpm and slightly leaned the engine prior to rolling onto the runway. He did not plan to take off; he intended to demonstrate and discuss what would happen on the take off. He gradually applied full power and proceeded down the runway. The airplane momentarily became airborne. However, the pilot reduced power, and it settled back to the runway.

The pilot taxied back and prepared to take off. He completed a full power run up and leaned to "slightly rich of best power." He said that the run up was normal, the engine was running smoothly, and he felt that it was developing full power. He had picked a go-no-go point that he estimated was about 2,000 feet down the runway.

The pilot said that the airplane accelerated normally and lifted off well before his selected go-no-go point. He dropped the nose to build up airspeed while the airplane was in ground effect, and then brought the gear up. He recalled seeing an indicated airspeed of 85 knots and a climb of 200 feet per minute, but he was expecting to see 600 feet per minute. He estimated that the airplane was 100 feet above the ground, and all of the instruments seemed to be within normal ranges. The airspeed dropped to 80 knots, and the airplane stopped climbing. He thought that the engine was still producing full power.

The pilot reported that the airplane was approaching the end of the runway and steadily losing altitude while maintaining full power. He saw no good landing site, but did see a patch of ground ahead of him. He concluded that he was too low to execute anything but a shallow turn. He set up for the off airport landing, and thought that he eventually extended the landing gear.

As he approached the landing point, he saw an embankment ahead of him. He thought that he

could either try to stretch his glide over the embankment, and possibly stall, or collide with the embankment head on. He pulled up to stretch the glide, but the airspeed bled off immediately. At the last moment he decided to turn sharply to the left. He aggressively pushed the yoke forward, and applied full right rudder. He watched the left wing spear into the ground and drag along for a short time. The pilot did not recall anything else until he regained consciousness.

The pilot felt that he was probably losing power within 5 seconds of take off, and that the loss of power was gradual over 5 to 10 seconds. He felt that the takeoff run was normal, but the rate of climb after lift off and gear retraction was below normal. He said the airplane initially climbed slowly. However, it lost the ability to fly even in ground effect with full power. He felt that the airplane did not stall at any time. He thought that colliding with the ground with a cross controlled slip of full right rudder against left aileron resulted in the low angle cartwheel. He felt that this maneuver avoided the sudden and much more severe impact that would have occurred if he had flown the airplane straight into the terrain.

A witness taxiing another airplane stated that he heard a pilot announce departing runway 27. He then saw the Mooney exit the runway at an intersection. The Mooney taxied back to the run-up area and pulled up beside the witness. He heard the engine rpm accelerate to what he thought was full throttle. He couldn't tell if the pilot was leaning the engine or completing a magneto check, but noted that the pilot was looking at the dash. The witness heard the airplane backfire several times.

The witness said that the Mooney pulled back onto the runway and departed. The witness stated that he then pulled onto the runway when the Mooney was about 1/4 of the way down the runway. He began completing his leaning procedures. He then saw the Mooney over halfway down the runway, still on the ground, and it appeared to be moving slowly. The witness saw the Mooney pull up, and then he began his takeoff roll. The witness's airplane did not accelerate well, so he aborted his takeoff. He could see the elevator moving on the Mooney. After clearing the airport boundary fence, the Mooney went straight up to a maximum height of about 100 feet. The airplane was headed for rising terrain and banked left. The left wing tip contacted the ground, and the airplane cartwheeled.

An investigator from Textron Lycoming examined the engine under the supervision of the Federal Aviation Administration (FAA). He turned the engine manually and obtained thumb compression on all cylinders in firing order. Compression for Cylinder no. 2 was notably weaker than the other cylinders. He heard a hissing sound in the vicinity of the cylinder no. 2 exhaust port during the compression stroke.

None of the spark plugs displayed physical damage, and all had coloration similar to each other except cylinder no. 2. The spark plugs for cylinder no. 2 were lighter in color than the others. Both of the magnetos sparked on hand rotation, and the magnetos' timing was within 1 degree of each other. The investigators observed mechanical continuity throughout the rotating group, valve train, and accessory section during the manual rotation.

The Lycoming representative examined the fuel system. He removed the fuel injector nozzles, and observed an unidentified particle obstructing the no. 2 fuel injection nozzle. He disassembled the fuel flow divider. It contained a clear liquid, which he determined was water by using a Kolor-Kut water finding paste. The flow divider diaphragm was intact and undamaged.

The Lycoming representative removed and examined the engine driven fuel pump. Its internal cavities displayed areas of corrosion. The valve bodies had areas of rust where material was missing. Sediment was resting on the compensator diaphragm.

The gascolator was clean. The fuel servo fuel inlet screen was not contaminated.

Precision Airmotive Corporation in Marysville, Washington, examined the fuel injector servo under the supervision of the FAA, and prepared a report. The report noted significant evidence of water contamination in the servo diaphragm and contamination by an undetermined black substance. The servo flowed satisfactorily during the bench test, but was somewhat rich.

Technicians noted mechanical damage to the throttle lever, regulator housing, and the manual mixture control lever assembly. The fuel inlet screen was clear. Dirt and dust covered the exterior, the throat, and venture of the unit. Discrepancies noted included dirt on the impact side of the air diaphragm, and minor damage to the edge of the diaphragm during disassembly. Two washers under the center body bellows had corrosion along 180 degrees of the sides of the washers. The fuel diaphragm had two washers with corrosion along 180 degrees of the circumference. Technicians found a large piece of black contamination on the unmetered side of the diaphragm. The venture had some dirt behind the suction slots. The nozzles sent with the servo passed all production functional checks.

A review of the airplane's logbooks revealed an overhaul of the injection system at the same time as an engine overhaul in November 1998. A logbook entry dated January 17, 2000, noted an ultrasonic cleaning of the fuel nozzles.

The owner did not submit a Pilot/Operator Aircraft Accident Report (NTSB Form 6120.1/2).

Pilot Information

Certificate:	Commercial	**Age:**	54,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:**	No
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	November 17, 1999
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	900 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N201CE
Model/Series:	M20J M20J	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	24-006
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	January 17, 2000 Annual	**Certified Max Gross Wt.:**	2740 lbs
Time Since Last Inspection:	60 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3345 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	IO-360-A1B6D
Registered Owner:	WILLIAM C. HOBBS	**Rated Power:**	200 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	RNO,4412 ft msl	**Distance from Accident Site:**	19 Nautical Miles
Observation Time:	12:56 Local	**Direction from Accident Site:**	345°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	11 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	270°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	32°C / 4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	CARSON CITY, NV (CXP)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	12:41 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	CARSON CITY CXP	**Runway Surface Type:**	Asphalt
Airport Elevation:	4697 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	27	**IFR Approach:**	None
Runway Length/Width:	5900 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	3 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 Serious	**Latitude, Longitude:**	39.192222,-119.734443

Administrative Information

Investigator In Charge (IIC):	Plagens, Howard
Additional Participating Persons:	REID WALBURG; Federal Aviation Administration-Reno FSDO; RENO, NV MARK PLATT; TEXTRON LYCOMING; Williamsport, PA
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Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=51211