



# Aviation Investigation Final Report

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<b>Location:</b>	Woodinville, Washington	<b>Accident Number:</b>	WPR13FA141
<b>Date &amp; Time:</b>	March 9, 2013, 14:45 Local	<b>Registration:</b>	N17PR
<b>Aircraft:</b>	Maule M5	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Fuel contamination	<b>Injuries:</b>	1 Fatal, 1 Serious
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

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## Analysis

The passenger reported that he could not remember if the pilot checked the fuel before the flight, but he remembered that, during the engine start, the engine turned over several times before it started. About 30 minutes into the flight, the engine started to sputter, and then it stopped; the pilot was unable to restart the engine, and the airplane began to lose altitude. The passenger recalled that he observed the stall warning light illuminate and that the airplane was in a turn, but he did not recall the impact.

One witness reported that he observed the airplane circle and that it appeared very low. Another witness reported hearing a "pop" sound and then a "puff" or a "sputter" and then seeing that the propeller had stopped. A third witness reported that he saw the airplane in a hard banking turn and that he could tell that the airplane "was going down." The airplane impacted a single-family residence about 16 nautical miles northeast of the departure airport.

GPS data revealed that the airplane made several course heading changes at varying altitudes and airspeeds during the flight. During the last 16 seconds of the flight track, the airplane turned left, which was likely indicative of the pilot attempting to make a forced landing to a nearby pond. The last GPS data were recorded when the airplane was at an altitude of 650 feet mean sea level and a groundspeed of 40 knots.

The airplane's previous flight occurred 102 days before the accident. During this period of inactivity, the airplane remained parked outside on an airport ramp exposed to inclement weather conditions conducive to the formation of condensation in the airplane's partially filled fuel tanks. No records were found indicating that the airplane had been refueled before the accident flight. Fuel was recovered from the airplane at the accident site. Analysis of a fuel sample revealed the presence of water. The fuel contamination likely resulted in the loss of engine power and the pilot's inability to restart the engine after the power loss. The pilot likely failed to maintain adequate airspeed following the loss of engine power. A postaccident examination of the airframe and engine revealed no evidence of mechanical anomalies that would have precluded normal operation.

## 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 airspeed following a total loss of engine power due to fuel contamination, which resulted in a stall/spin and subsequent impact with terrain.

### Findings

<b>Aircraft</b>	Airspeed - Attain/maintain not possible
<b>Personnel issues</b>	Aircraft control - Pilot
<b>Aircraft</b>	Water - Fluid condition

## Factual Information

### History of Flight

<b>Enroute-cruise</b>	Fuel contamination (Defining event)
<b>Emergency descent</b>	Off-field or emergency landing
<b>Emergency descent</b>	Aerodynamic stall/spin
<b>Uncontrolled descent</b>	Collision with terr/obj (non-CFIT)

### HISTORY OF FLIGHT

On March 9, 2013, about 1445 Pacific standard time, a Maule M-5-210C, N17PR, was substantially damaged after it impacted a residential house following a loss of control while maneuvering at a low altitude near Woodinville, Washington. The certified private pilot sustained fatal injuries, while the sole passenger was seriously injured. Visual meteorological conditions existed for the local flight, which was being operated in accordance with 14 Code of Federal Regulations Part 91. No flight plan was filed. The local flight departed the Renton Municipal Airport (RNT), Renton, Washington at 1431.

In an interview conducted by the National Transportation Safety Board investigator-in-charge (IIC) and a Federal Aviation Administration (FAA) aviation safety inspector, the right seat passenger who survived the accident, reported that prior to the flight he could not remember if the pilot had checked the fuel or not. The passenger stated that during the initial starting of the engine, the engine did not start right up, but that it turned over several times before it started; he said this was different from the other times he had flown with the pilot. The passenger further stated that after taking off and flying around for what he thought was about 30 minutes, the engine started to sputter, and then it completely stopped. He added that the pilot attempted to restart the engine, but it wouldn't start and that they were losing altitude. The passenger opined that he observed the stall warning light illuminate and that the airplane was in a turn, however, he did not recall the impact or the altitude they were at when the engine quit.

Several witnesses who lived in the residential area where the accident occurred submitted statements to a local law enforcement agency. One witness reported that he observed the airplane circle and that it appeared very low. A second witness stated that she heard a pop sound, then a puff or a sputter, and then nothing. She added that she could see that the propeller had stopped and then heard a thud. A third witness reported that he observed the airplane traveling in a northeast direction and in a hard bank and knew that it was going down. Another witness revealed that he observed the airplane in the distance make a right turn and appeared to be losing altitude; he did not hear or see the airplane impact the terrain.

According to data downloaded from the pilot's handheld GPS device that was recovered from the accident site, the airplane departed RNT at 1431, exited the traffic pattern on a left downwind, and proceeded to the northwest for about 12 nautical miles (nm). It then turned toward the southeast for about 7 nm, made a left turn to the north for about 4.5 nm, then another left turn to the northwest for about 3 nm. This was followed by a right turn to a heading of north, which it flew for about 4 nm. The

airplane's cruising altitude during this portion of the flight, which was about 18 minutes in duration, was between 1,500 to 1,700 feet mean sea level (msl), with an average groundspeed of about 107 knots (kts). The recorded data indicates that about 1449, the airplane made a left turn from heading of north to the southwest, which was in the direction of the departure airport (RNT). At 1449:43, the airplane's heading, altitude, and groundspeed were 245 degrees, 1,400 feet msl, and 92 kts, respectively.

The airplane proceeded on the southwesterly course for about 3.3 nm at an altitude of about 1,500 feet msl, and an average groundspeed of about 95 kts. At 1451:36, while still heading southwest, the airplane's groundspeed had decreased 5 kts to 91 kts, and at 1451:41, 5 seconds later, its groundspeed decreased further to 69 kts; the airplane then began a slow descending turn to the right. The airplane completed the right turn to a northeast heading of 030 degrees, now at an altitude of 1,421 feet msl, and a groundspeed of 62 kts. The airplane then proceeded northeast for about 0.5 nm, having descended to an altitude of about 1,000 feet msl, or about 573 feet above ground level (agl) at 1452:31; its groundspeed was now recorded as 56 knots. At this time the airplane was about 200 feet west laterally of a clearing, which was mostly occupied by a fish pond. The clearing was about 2,150 feet in length (east to west) and about 700 feet in width (north to south). Additionally, at this time that the airplane started a left turn from a heading of 070 degrees, which resulted in the following: at 1452:35, the airplane was 591 feet agl on a heading of 029 degrees, and a groundspeed 57 kts; at 1452:38, altitude 584 feet agl, heading 345 degrees, groundspeed 57 kts; at 1452:41, altitude 579 feet agl, heading 300 degrees, groundspeed 52 kts; at 1452:44, altitude 573 agl, heading 259 degrees, groundspeed 43 kts, and at 1452:47, which was when the final data was recorded, the airplane's altitude was 569 feet agl, its heading was 202 degrees, and its recorded groundspeed was 40 kts.

The main wreckage was located with its engine and cockpit partially inside the garage of a residential home. The airplane initially impacted a van that was parked on the west side of the home's driveway with its left wing. The wing subsequently separated from the fuselage and came to rest about 20 feet west of the main wreckage. The aft fuselage came to rest oriented upwards at about a 30-degree angle oriented in a northwesterly direction, the same direction from which the airplane had approached the residence prior to impact. The aft fuselage was only slightly damaged. The forward cabin and cockpit areas sustained extensive impact damage. The right wing remained attached to the airplane and was found positioned upward at about 45-degree angle and oriented toward the northeast. All airplane components necessary for flight were identified and accounted for at the accident site.

The airplane was recovered to a secured salvage facility for further examination.

## PERSONNEL INFORMATION

The pilot, age 45, held a private pilot certificate with ratings for airplane single-engine land and instrument airplane. He was issued a third-class Federal Aviation Administration (FAA) airman medical certificate on September 25, 2012, without limitations.

A review of the pilot's personal pilot logbooks revealed that as of November 27, 2012, which was the date of the last entry, the pilot had accumulated a total of 946.3 hours, of which 897.3 hours were as pilot-in-command, 110.7 hours were in the same make and model as the accident airplane, and 668 hours of tail wheel time. The pilot successfully completed his most recent flight review on September 7, 2012.

## AIRCRAFT INFORMATION

The single-engine, high-wing, airplane was manufactured in 1975, and was equipped with a Teledyne Continental Motors (TCM) IO-360-D fuel injected engine. It was also equipped with a McCauley constant speed propeller.

A review of the airplane's maintenance records revealed that the most recent annual inspection was performed on July 26, 2011, at an engine total time of 1,802.2 hours, a time since major overhaul of 153.0 hours, and a tachometer time of 3,107.6 hours. At the time of the accident the tachometer read 3,143.7.

The investigation revealed no record of the pilot having flown the accident airplane from the date of his last pilot logbook entry, November 27, 2012, until the day of the accident, March 9, 2013; this accounts for 102 days inactivity. On November 27th, according to the pilot's logbook, he made a local flight of 1.3 hours. A search of fueling records during the investigation revealed that the pilot did not refuel subsequent to the previously referred to flight. It was additionally reported by a family member that the airplane was not stored in a hangar, and remained tied down outside on the ramp at RNT where it was based.

#### METEROROLOGICAL INFORMATION

At 1453, the RNT weather reporting facility, which was located about 16 nautical miles (nm) south-southwest of the accident site, reported wind 170 degrees at 5 knots, visibility 10 miles, sky clear, temperature 13 degrees Celsius (C), dew point 0 degrees C, and an altimeter setting of 30.44 inches of mercury.

At 1453, the weather reporting facility located at Paine Field (PAE), Everett, Washington, which was located about 14 nm northwest of the accident site, reported wind 290 degrees at 5 knots, visibility 10 miles, temperature 9 degrees C, dew point 2 degrees C, and an altimeter setting of 30.43 inches of mercury.

It was revealed during the investigation that the total monthly rainfall for the months of November 2012 through March of 2013 were as follows:

November 2012 - 8.28 inches  
December 2012 - 6.85 inches  
January 2013 - 4.16 inches  
February 2013 - 1.58 inches  
March 2013 - 2.74 inches

#### WRECKAGE AND IMPACT INFORMATION

The airplane came to rest partially inside a garage in a residential area, which was located about 16 nm north-northwest of RNT, the departure airport. The airplane's initial impact was with a personal van that was parked on the adjacent driveway; the airplane had impacted the van with its left wing, which was separated during the impact sequence. The airplane's measured magnetic impact and at rest heading was 110 degrees. The airplane came to rest inverted and partially laying on its right forward cabin area, with the aft fuselage and empennage being supported by the airplane's left elevator and left horizontal stabilizer.

The left wing, which separated from the airplane after impacting a vehicle parked in the residence's driveway, was observed lying inverted about 20 feet west of the main wreckage. The outboard one-third of the wing was observed to have impacted the vehicle, and the leading edge of the wing section was crushed aft. The associated flap remained attached at both attach points, while the inboard 18 inches of the flap was observed bent inward and downward. The flap was also observed deformed at the mid-span area. The left aileron remained attached to the trailing edge of its associated wing at both attach points. The fuel tank was destroyed. The outboard fuel cap was observed in place and secure, while the main fuel cap was not observed.

The right wing, which remained attached to the fuselage at all root attach points, was observed wrinkled on both the top and bottom surfaces. The associated flap and aileron both remained attached to the wing at all attach points, and exhibited minimal damage. The right wing tip was bent and twisted due to impact forces. Neither the inboard fuel tank nor the outboard auxiliary fuel tank were breached. Both fuel caps were secure and in place. About 5 gallons of fuel was captured from the fuel tanks for analysis.

The airplane's empennage sustained only slight damage. The left elevator remained attached to the left horizontal stabilizer at all attach points, and the stabilizer remained attached to the fuselage at all attach points. Additionally, the right elevator remained attached to the right horizontal stabilizer at all attach points, and the stabilizer remained attached to the fuselage at all attach points, with no damage observed to any of the components. The airplane's rudder remained attached to the vertical stabilizer and was not damaged. There was also no damage noted to the vertical stabilizer. The rudder trim tab was observed deflected full right, not damaged, and attached to the rudder at all attach points. The tail wheel assembly was observed intact and not damaged.

The airplane's engine came to rest just inside the garage of the subject residence, upright and laying slightly on its left side. The engine was subsequently recovered and examined at a secured storage facility

An onsite examination of all control cables revealed that each remained attached to their respective control surfaces. Control continuity from the control surfaces to the cockpit controls was confirmed.

## MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the King County Medical Examiner's Office, Seattle, Washington. The cause of death was attributed to blunt force injury to head, torso, and extremities.

Forensic toxicology was performed on specimens obtained from the pilot by the FAA Forensic Toxicology Research Team CAMI, Oklahoma City, Oklahoma. The toxicology report states that tests for cyanide were not performed. No ethanol was detected in urine, no carbon monoxide detected in blood, and no drugs detected in urine.

## TESTS AND RESEARCH

### Engine Examination

The engine was recovered from the accident site, and examined by the NTSB IIC and a representative from Continental Motors, Inc. The examination revealed the following:

The accessory end of the engine was displaced aft into the aircraft firewall. All accessories remained attached to the accessory section though they sustained varying degrees of impact-related damage. The oil sump sustained impact-related scraping damage. The oil cooler remained intact and attached to the aft end of the engine. The oil filler cap was found free from the filler neck but remained attached to the connecting chain. The filler neck was displaced forward due to deformation damage to the cooling baffling. Removal of the oil quantity dipstick revealed about 4 quarts of oil remained in the oil sump. There was no evidence of a pre-impact oil leak on the engine or the airframe.

All of the cylinders remained attached and secured to the engine crankcase. The #6 cylinder sustained impact damage to the cylinder head exposing the intake and exhaust valve springs. The exhaust riser for the #6 cylinder was also separated from the cylinder. The left side exhaust system displayed impact-related deformation.

There was no external evidence of a catastrophic damage. Rotation of the propeller resulted in thumb compression in all six cylinders; confirming crankshaft continuity. Rotation of the propeller also resulted in camshaft continuity as all of the rocker arms and valves operated normally, with the exception of the #6 cylinder's exhaust and intake valves. A borescope examination of each of the cylinders revealed no evidence of operational anomalies.

The fuel system, from the gascolator filter to the fuel manifold, was examined. The gascolator drain was fractured from the base of the gascolator bowl. The bowl was removed and a fine, sand-like debris was adhering to one side of the cylindrical wall. The laminated disk filter element was intact and did not show any visual signs of blockage. When electric power was supplied to the electric boost pump, the pump could be heard operating and a residual spray of fuel could be observed exiting the pump outlet. The fuel line between the electric boost pump and the engine-driven fuel pump was empty. The engine-driven fuel pump remained attached and secured to the front right side of the crankcase. The mixture cable was separated from the mixture control lever on the fuel pump and the mixture lever was in the idle-cutoff position. Blue discoloration was noted at the base of the low pressure relief valve adjustment screw. Fuel was present in the line between the fuel pump and the fuel metering unit on the throttle body; the fuel was drained into a glass jar. Fuel was also present in the line between the metering unit and the manifold valve. Fuel was also found in the manifold valve. A water detection paste was placed in the fuel found in the manifold valve, with no change in paste coloration noted. The manifold valve plunger and plunger seal contained a small amount of beige sludge. The screen was not covered with the sludge.

The fuel recovered from the engine fuel supply lines was tinted blue, but also displayed a fine, charcoal grey sedimentation that did not settle out of the fuel sample. There was also a small drop of beige water found in the fuel sample.

The engine-driven fuel pump was removed from its mounting pad and its drive coupling was found intact. Manual rotation of the coupling while installed in the fuel pump resulted in rotation of the pump with no binding noted. The bronze mixture control lever remained secured to its control shaft.

The throttle body remained intact and attached to the topside of the engine crankcase. The manifold pressure reference line to the cockpit instrumentation remained intact. The metering unit remained attached to the throttle body and the throttle control lever remained connected to the control cable and to

the throttle shaft. The throttle valve was found in the full open position. Manual manipulation of the throttle control cable resulted in a corresponding movement of the throttle valve.

## Fuel Testing

About 5 gallons of aviation fuel was recovered from the right wing's fuel tanks for analysis. The fuel testing was performed by an independent, third-party laboratory. A copy of the fuel test report for a fuel sample from the accident airplane was submitted to the NTSB Materials Laboratory for review by an NTSB chemist. The chemist's analysis revealed the following:

All tests were found to be within specification with three exceptions: 1) Potential Gum (ASTM D873) which was found to be higher than the specification; 2) Reid Vapor Pressure (ASTM D5191) which was found to be lower than the specification and 3) Distillation (D86) temperature at 10% evaporated volume was found to be higher than the specification. These out-of-range results are consistent with aged fuel or fuel that had been exposed to air for a period of time (i.e. sitting in an aircraft fuel tank). The low Reid vapor pressure could also have been a result of the sample container.

In addition, the fuel was tested for interstitial (absorbed) water using ASTM D6304 (Water by Karl Fischer). This test does not have a pass/fail range. The result for the accident sample found 113 milligrams per kilogram (mg/kg) of water present within the fuel sample. The presence of water within fuel can become an issue when the absorbed water separates from the fuel. Changes in temperature can cause absorbed water to separate out and can lead to icing within the fuel system under the certain environmental conditions. (Refer to Materials Laboratory Factual Report No. 13-077 for the fuel testing review and attached reports, which is appended to the docket for this accident.)

## Garmin GPSMAP 496 Device

The device was taken into custody by the NTSB IIC at the accident and subsequently sent to the NTSB Vehicle Recorder Division, Washington, D.C., for examination by a Vehicle Recorder Specialist. The Specialist reported the following:

The Garmin GPSMAP 496 is a battery-powered portable 12-channel GPS receiver. A flight record is triggered when groundspeed exceeds 30 knots and altitude exceeds 250 feet, and ends when groundspeed drops below 30 knots for 10 minutes or more.

The Specialist reported that upon arrival, an exterior examination revealed that the unit had sustained impact damage which compromised the LCD screen. Data was extracted using the manufacturer's software normally and without difficulty.

The Specialist's report indicated that the recorded data ended at 1452:47 PST, at 650 feet GPS altitude. Local altitude at the last recorded GPS position location was 569 feet as reported by Google Earth. Groundspeed was computed by the download software using time-tagged position location information. The average groundspeed between the last two recorded GPS track points was 40 knots. Ninety seconds prior to the last recorded position update, and just after the track crossed a road named Tolt Pipeline Train, aircraft ground speed began decaying from a steady cruise speed of approximately 97 knots.



## Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	45
<b>Airplane Rating(s):</b>	Single-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 3 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	September 25, 2012
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	946 hours (Total, all aircraft), 111 hours (Total, this make and model), 897 hours (Pilot In Command, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Maule	<b>Registration:</b>	N17PR
<b>Model/Series:</b>	M5 210C	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1979	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	6205C
<b>Landing Gear Type:</b>	Tailwheel	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	July 26, 2011 Annual	<b>Certified Max Gross Wt.:</b>	2300 lbs
<b>Time Since Last Inspection:</b>	36.1 Hrs	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	7948.7 Hrs at time of accident	<b>Engine Manufacturer:</b>	CONTINENTAL
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	IO360
<b>Registered Owner:</b>	Uventures LLC	<b>Rated Power:</b>	
<b>Operator:</b>	Jay R. Uusitalo	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	PAE,606 ft msl	<b>Distance from Accident Site:</b>	14 Nautical Miles
<b>Observation Time:</b>	14:53 Local	<b>Direction from Accident Site:</b>	315°
<b>Lowest Cloud Condition:</b>	Clear	<b>Visibility</b>	10 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	5 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	290°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	30.43 inches Hg	<b>Temperature/Dew Point:</b>	9°C / 2°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	Renton, WA (RNT )	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Renton, WA (RNT )	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	14:31 Local	<b>Type of Airspace:</b>	Class G

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	1 Serious	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal, 1 Serious	<b>Latitude, Longitude:</b>	47.727779,-122.030555

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Little, Thomas
<b>Additional Participating Persons:</b>	Bruce Kitelinger; Federal Aviation Administration; Renton, WA Nicole Charnon; Continental Motors, Inc.; Mobile, AL
<b>Original Publish Date:</b>	September 8, 2014
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	The NTSB traveled to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=86383">https://data.nts.gov/Docket?ProjectID=86383</a>

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](#).