Aviation Investigation Final Report

Location:	Salem, Oregon	**Accident Number:**	WPR15FA208
Date & Time:	July 4, 2015, 08:10 Local	**Registration:**	N5608Q
Aircraft:	Mooney M20E	**Aircraft Damage:**	Substantial
Defining Event:	Abnormal runway contact	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot was attempting to land the airplane after conducting a local flight. A witness reported that he observed the airplane approach from the south for landing and that the approach looked normal. He added that the engine power sounded normal with the throttle being reduced as the airplane glided down to the runway. The airplane touched down, and shortly thereafter, the tail dipped down toward the runway, and the nose pitched up. The airplane then began a series of "ballooning oscillations," and each time the nose pitched up, the ballooning became more severe. During the third oscillation, the airplane descended nose first, impacted the runway, and then appeared to be launched about 6 to 8 ft into the air. The witness reported that the engine sound increased but that it sounded as if it were running at low rpm. The witness added that the pilot appeared to regain control of the airplane and that it remained airborne about 10 to 12 ft above runway. Another witness reported that it remained airborne for a distance of about 1,000 ft, entered a shallow climb at a low airspeed, and then reached an altitude of about 100 ft. Another witness reported that, shortly thereafter, he observed the airplane make a gradual left turn, which was followed by an increasing left bank, before it stalled and impacted terrain. A postcrash fire consumed the wreckage. A postaccident examination of the airplane and engine revealed no anomalies that would have precluded normal operation.

Based on the witnesses' statements, it is likely that the approach was shallow or that the pilot was not managing airspeed control, which resulted in the airplane porpoising down the runway. It is also likely that the pilot realized too late that the airplane was not in the proper attitude and applied excessive back-elevator pressure, which exacerbated the bounces; the third porpoise likely resulted in the propeller striking the runway; however, it is unknown whether the damage to the propeller would have affected the ability of the airplane to climb and maintain airspeed. When the pilot eventually applied power to execute the aborted landing, the airspeed was likely close to stall speed. His subsequent initiation of the turn at a low altitude resulted in the airplane exceeding its critical angle-of-attack and a subsequent stall with insufficient altitude from which to recover.

Probable Cause and Findings

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

The pilot's unstabilized approach and delayed remedial action, which resulted in a porpoise during landing. Also causal to the accident was the pilot's exceedance of the airplane's critical angle-of-attack during the subsequent aborted landing, which resulted in a low altitude stall/spin.

Findings

Aircraft	Landing flare - Not attained/maintained
Personnel issues	Delayed action - Pilot
Personnel issues	Aircraft control - Pilot
Aircraft	Angle of attack - Not attained/maintained

Factual Information

History of Flight

Landing-flare/touchdown	Abnormal runway contact (Defining event)
Landing-aborted after touchdown	Attempted remediation/recovery
Approach-VFR go-around	Aerodynamic stall/spin
Uncontrolled descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On July 4, 2015, about 0810 Pacific daylight time, Mooney M20E, N5608Q, collided with terrain after an aborted landing and attempted go-around at McNary Field (SLE), Salem, Oregon. The private pilot, who was the sole occupant and part owner of the airplane, was fatally injured. The airplane was substantially damaged from impact forces and a postcrash fire. Visual meteorological conditions prevailed for the flight, which was being operated in accordance with 14 Code of Federal Regulations Part 91, and a flight plan was not filed. The pilot reportedly departed SLE on the local flight about an hour prior to the accident.

The tower controller reported that just past 0800, the pilot called inbound for landing from the south and was given a clearance to land on runway 34. The controller stated that the approach appeared normal, and that the landing gear appeared to be "down and in place". The airplane came down over the aiming point 10 to 20 feet above the runway, but the airplane continued to "float" 10 feet above the runway for the next 1,000 feet. The controller added that at mid-field the airplane began a shallow climb at a low airspeed, and was observed to have ascended to about 100 feet above ground level (AGL) by the time it reached the departure end of runway 34. The airplane then began a left turn, followed by a loss of control and impact with terrain.

An additional witness, who was located at the southeast corner of the airport, reported that he observed an airplane approach from the south for landing, and that the approach looked and sounded normal, with the throttle being reduced as the airplane glided down to the runway. The witness further reported that he heard the sound of the airplane's wheels touch down on the runway, and shortly thereafter observed the tail of the airplane dip down towards the runway and the nose pitch up; at this time the airplane began a series of "ballooning oscillations", and each time the nose pitched up the ballooning became more severe. The witness stated that the third and most severe of the oscillations resulted in the airplane having descended nose first striking the runway, and producing a "metallic striking sound" or "thud"; the airplane then appeared to be launched into the air about 6 to 8 feet above the runway. The witness described hearing the engine "come back" as if power were being applied again, however, the engine sounded "bad", as if it were running at a low RPM, but the pilot appeared to regain control and remained flying about 10 to 12 feet above the runway surface.

A third witness reported observing the airplane in a shallow climb at a low airspeed, reaching an altitude of about 100 feet agl with its landing gear and flaps retracted; however, the engine sounded as if it were at a low rpm and misfiring. Shortly thereafter, the airplane was observed making a gradual left turn, which was followed by an increasing bank angle to the left, as it appeared the airplane was attempting to return to the runway. Subsequently, the airplane impacted terrain and "cartwheeled" on to its left side.

PERSONNEL INFORMATION

The pilot, age 60, held a private pilot certificate with an airplane single-engine land and instrument airplane rating. A third-class airman medical certificate was issued to the pilot on April 16, 2015, with the limitation "Must wear corrective lenses." The pilot reported that he had accumulated a total of 250 flight hours at the time of his most recent airman medical application, however on a 2007 application for his medical certificate, the pilot reported a total of 500 hours. The pilot's logbook was not located during the investigation, which precluded the determination of the pilot's exact number of flight hours. Records revealed that the pilot's most recent flight review was conducted on June 24, 2014, and his instrument proficiency check was performed on May 4, 2015.

AIRCRAFT INFORMATION

The four-seat, low-wing, retractable gear airplane, serial number 660, was manufactured in 1965. It was powered by a Lycoming IO-360 A1A engine, serial number, RL-31540-51E, rated at 200 horsepower. The airplane was also equipped with a McCauley B3D36C424-E constant speed propeller. Review of the airplane's logbooks revealed that the most recent annual inspection was completed on June 4, 2015, at a tach time of 406.7 hours, and a total time of 2,799.1 hours on the airframe.

METEOROLOGICAL INFORMATION

At 0756, the SLE automated surface observation system reported wind 300 degrees at 3 knots, visibility 10 miles, sky clear, temperature 20 degrees C, dew point 10 degrees C, and an altimeter setting of 29.88 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

An initial survey of the accident site by National Transportation Safety Board and Federal Aviation Administration investigators revealed that the wreckage was confined to an area which measured 72 feet in length by 48 feet in width, and about 100 yards northeast of the departure end of runway 31. All components necessary for flight were accounted for at the accident site. Flight control continuity was established, however, engine control continuity was not established due to post impact fire. The throttle control was observed in a pulled out/idle position, and the mixture and propeller controls were fully pushed in to a full rich mixture and high rpm position respectively. The landing gear appeared to be in a retracted position. All flight instruments exhibited thermal damage from the postimpact fire and were unreadable.

The forward fuselage and passenger cabin sustained severe damage from the postimpact fire. The right wing remained completely intact and attached to fuselage. The upper surface of the right wing closest to fuselage had an approximately 2 foot by 4 foot area of fire damage from the postimpact fire. The leading edge of the right wing starting at the fuel cap and extending to the wing tip was bent upwards and back towards the trailing edge of the wing in an accordion shape. This compression type damage was

observed more severe toward the right wing tip, and extended back toward the right aileron. The right fuel tank appeared to have remained intact, not breached, and with no observed fuel leakage.

The left wing was largely intact with 3 major fractures in the wing structure and surface**.** The entire left wing showed signs of impact damage; the aft half of the left wing remained attached to the airplane's fuselage, although the forward half of the wing root was detached and bent back and away from the fuselage. The leading edge of the left wing was crumpled and bent up and backward toward its trailing edge. Approximately two-thirds of the length of the left wing from the wing root, the wing was observed broken and partially detached from the inner portion of the wing. The wing tip was crushed and partially detached from impact forces. A total of 8 and 3 gallons of fuel, "bluish in color" (which is consistent with 100LL), was recovered from both the left and right wings respectively.

The empennage was largely separated aft of the passenger cabin, and only remained attached by a small amount of sheet metal. The vertical and horizontal stabilizers remained attached to the empennage. Both the rudder and elevators exhibited crushing damage from impact forces.

MEDICAL AND PATHOLOGICAL INFORMATION

A postmortem examination was conducted by the Marion County medical examiner's office on July 5, 2015. The medical examiner determined that the cause of death was blunt force trauma.

The FAA's Civil Aerospace Medical Institute performed forensics toxicology on specimens from the pilot. The results indicated that no drugs of abuse were detected.

TEST AND RESEARCH

Airframe Examination

On August 20, 2015, under the supervision of the NTSB IIC, an examination of the airframe was performed by a Mooney International Corporation air safety investigator.

The examination of the airframe revealed no anomalies that would have precluded normal operation of the airplane. The landing gear was in a retracted position. Flap position was not able to be determined due to hydraulic bleed down. The right wing showed compression crushing along the leading edge, most severe out toward the wingtip. The left flap and aileron were both detached. The empennage was mostly intact with all control surfaces attached and movable. The tail skid was intact and undamaged. The bottom of the empennage showed minimal scraping but no dents. The "clamshell" at the bottom of the rudder was crushed. The empennage fairing was removed. A measurement of the distance between the hinge points was observed to be about 3 1/8 inch, and counting the visible threads to be 5, it was determined that the longitudinal trim setting was approximately that for a takeoff trim setting. The cabin area was extensively fire damaged. The "Johnson bar" was broken and loose in the wreckage.

Engine Examination

On August 20, 2015, under the supervision of the NTSB IIC, an examination of the airplane's engine was performed by a Lycoming Engines air safety investigator.

The recovered engine, a Lycoming IO-360-A1A, serial number RL-31540-51E, remained intact and exhibited thermal damage to the accessory section. The magnetos, propeller governor, engine driven fuel pump, starter, alternator, vacuum pump, and oil filter remained attached. However, all exhibited signs of thermal damage from the postimpact fire exclusive of the vacuum pump, right magneto, alternator and starter. The propeller governor was broken from its mounting pad due to impact forces, but remained attached to the engine by an oil line.

The rocker box covers were removed. All intake and exhaust rocker arms were intact. The engine crankshaft was rotated by hand using a hand tool attached to the propeller flange. Rotational continuity was established throughout the engine and valve train. Thumb compression and suction was obtained on cylinders #1, 3, and 4. Compression was not obtained on cylinder #2 due to impact damage, which prevented the #2 cylinder intake valve spring from fully extending to seat and allow compression. The cylinders were borescoped with no anomalies noted.

The two-piece fuel injector nozzles were removed and found to be free of debris. All fuel injector lines remained secure to their respective nozzles and the fuel flow divider. The fuel flow divider diaphragm was intact with no tears or signs of damage. The engine driven fuel pump was removed and tested by hand and found to be operational. The fuel servo was broken free from the engine on impact, and was not available for the exam.

The right magneto when rotated by hand produced a visible spark on all four spark plug leads. The left magneto exhibited substantial thermal damage and the part of the mounting flange was broken from the magneto but remained attached to the engine. Resistance was noticed when attempting to rotate the left magneto by hand and no spark was visibly observed from the spark plug leads. The ignition harness exhibited signs of impact damage. The top spark plugs were removed from all four cylinders for examination; electrodes were undamaged and exhibited normal wear as compared to the Champion Aviation Check a Plug Chart AV-27.

The throttle body remained attached to the engine but was fractured at its mounting flange from impact force. The throttle control line was severed from the throttle body during the wreckage recovery. Additionally, the oil cooler exhibited signs of impact damage and was separated from the engine during recovery of the airplane. The oil pickup screen was found to be clear of debris.

Propeller blades #1 and #2 remained attached and free to rotate in the propeller hub. Propeller blade #3 was detached from the propeller hub due to impact forces. All three propeller blades displayed leading edge gouges, twisting and deep chord wise scaring on the front side of the propeller blades. Propeller blade #3 displayed substantial leading edge gouging at the tip of the propeller blade, additionally blade #3 was bent slightly forward and aft at half the length of the blade forming a slight "S" shape. Propeller blade #2 suffered the most severe blade tip gouging. Blade #2 was bent aft at half the blade length.

Propeller blade #1 exhibited an aft bend at the approximate outer 1/3rd of the propeller. The propeller hub was broken free from the crankshaft.

ADDITIONAL INFORMATION

The Mooney pilot operating handbook for the accident airplane contains a caution that states, "Under no circumstances should the aircraft be allowed to touch down in a nose-low attitude or at too high an

airspeed. Either of these conditions will allow the nose wheel to contact the runway first, which may cause the aircraft to porpoise and damage the landing gear."

Pilot Information

Certificate:	Private	**Age:**	60,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	April 16, 2015
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 500 hours (Total, all aircraft), 500 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N5608Q
Model/Series:	M20E	**Aircraft Category:**	Airplane
Year of Manufacture:	1965	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	660
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	June 4, 2015 Annual	**Certified Max Gross Wt.:**	2575 lbs
Time Since Last Inspection:	114 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	2799.1 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C91A installed, not activated	**Engine Model/Series:**	IO-360-A1A
Registered Owner:	On file	**Rated Power:**	
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	SLE,214 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	07:56 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	300°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.87 inches Hg	**Temperature/Dew Point:**	20°C / 10°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Salem, OR (SLE)	**Type of Flight Plan Filed:**	None
Destination:	Salem, OR (SLE)	**Type of Clearance:**	None
Departure Time:	07:00 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	McNary Field SLE	**Runway Surface Type:**	Asphalt
Airport Elevation:	214 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	34	**IFR Approach:**	None
Runway Length/Width:	5145 ft / 100 ft	**VFR Approach/Landing:**	Go around;Straight-in

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	44.919166,-123.007225

Administrative Information

Investigator In Charge (IIC):	Little, Thomas
Additional Participating Persons:	John S Fisher; Federal Aviation Administration; Hillsboro, OR Robert Collier; Mooney ; Kerrville, TX Troy Helgeson ; Lycoming ; Millliken , CO
Original Publish Date:	July 25, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=91492