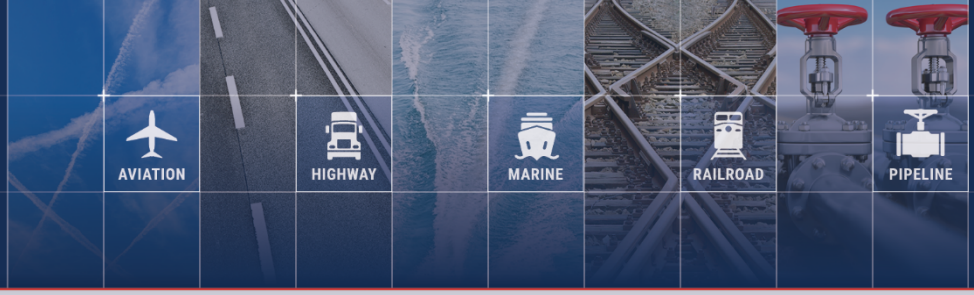

Aviation Investigation Final Report

Location:	Nelson, California	**Accident Number:**	WPR10LA268
Date & Time:	May 31, 2010, 16:45 Local	**Registration:**	N7013K
Aircraft:	Piper PA-20	**Aircraft Damage:**	Substantial
Defining Event:	Aerodynamic stall/spin	**Injuries:**	3 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The purpose of the flight was for the pilot to gain additional flight time towards his commercial pilot certificate; at the time of the accident he had about 50 hours total flight time. The pilot and passengers had no recollection of the circumstances surrounding the accident due to the serious injuries they sustained. The airplane came to rest inverted and semi-submerged in a wet field about five miles from the airplane's home base. Fuselage crush signatures, damage to the airplane's left wing, and twisting deformation to the tail section were consistent with terrain impact following an aerodynamic stall/spin event. A postimpact examination did not reveal any anomalies with the airframe or engine 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 loss of aircraft control during an undetermined phase of flight, which resulted in an aerodynamic stall/spin and subsequent collision with terrain.

Findings

Aircraft	Directional control - Not attained/maintained
Personnel issues	Aircraft control - Pilot

Factual Information

History of Flight

Unknown	Aerodynamic stall/spin (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On May 31, 2010, about 1645 Pacific daylight time, a Piper PA-20, N7013K, collided with terrain in a rice field near Nelson, California. The pilot operated the airplane under the provisions of Title 14 Code of Federal Regulations Part 91. The certificated private pilot and two passengers were seriously injured. The airplane sustained substantial damage to the forward fuselage and both wings. The local personal flight departed from a private strip owned by PM Dusters Flying Service in Chico, California, about 1600. Visual meteorological conditions prevailed, and no flight plan had been filed.

The airplane came to rest inverted and semi-submerged in a 12-inch-deep water-logged rice field, about 5 miles southwest of the PM Dusters airstrip. A ground disruption was observed in the mud bed about 20 feet south of the main wreckage; the left main landing gear was located within the disruption.

The pilot and passengers sustained injuries during the accident that prevented their recollection of the immediate events leading up to the impact. The passenger located in an aft seat recalled that they departed from the airplane's home base at PM Dusters earlier in the day. They then flew locally at an altitude of about 700 to 800 feet above ground level and landed at a dirt airstrip. He recalled that during the subsequent departure the airplane began a right turn; his next recollection was of being upside down on the ground and trapped within the airplane fuselage. He stated that prior to the accident the airplane was performing normally, and the engine was running.

The accident occurred within the immediate vicinity of multiple dirt airstrips, and as such, the exact departure location could not be determined.

PERSONNEL INFORMATION

The 19-year-old pilot, and both passengers who were not pilots, aged 19 and 16, were non-pilot employees of PM Dusters. According to family members and associates of the pilot, he had purchased the airplane earlier in the year, with the intention of using it to build flight time towards a commercial pilot's license. Family members also reported that his career intention was to fly as a crop duster.

The pilot reported a total flight time in all aircraft of 88.8 hours, with 46.9 hours as pilot-in-command, and 35.4 hours in the accident airplane type.

A review of Federal Aviation Administration (FAA) airman records revealed that the pilot held a private pilot certificate with ratings for airplane single-engine land, issued March 11, 2010, and a third-class medical certificate issued in August 2009, with no limitations or waivers.

AIRCRAFT INFORMATION

Maintenance records indicated that an annual inspection was performed on September 19, 2009, at a total airframe time of 3,355.5 hours. At the time of the inspection, the recorded tachometer time was 1,843.0 hours; the tachometer at the accident site indicated 1,879.2 hours. Examination of the engine data plate revealed a Textron Lycoming O-320, serial number 2959-27.

WRECKAGE AND IMPACT INFORMATION

The inverted fuselage came to rest oriented on a south heading, and had sustained crush damage from the firewall through to the center cabin. The damage was oriented at a 45-degree angle relative to the longitudinal axis, indicating a nose-down collision with terrain. The left wing sustained crush and fragmentation damage along its entire length. The right wing remained relatively intact, had become bent about 30 degrees aft, and was still attached to the fuselage at the lift spars and wing root. The right main landing gear was undamaged, and remained attached to the fuselage structure. Aft of the rear seat, the tail cone had sustained torsional damage midspan; the empennage remained attached, and appeared undamaged.

An FAA inspector who responded to the accident site observed a sheen in the water surrounding the airplane, the odor of which was consistent with aviation gasoline.

TESTS AND RESEARCH

The engine and airframe were recovered from the accident site and examined by the NTSB investigator-in-charge, and representatives from the FAA and Piper Aircraft.

Airframe

The rudder and elevator control cables were continuous from the pilot controls through to their respective control surface horns. The right wing control cables were continuous from the aileron attach horns through to the pilot controls, and had been cut at the wing root during recovery. The aileron balance cable had separated midspan, with broomstraw failure features consistent with overload. Aileron control cable continuity was confirmed in the left wing from the pilot controls through to the wing mounted bellcrank. Impact damage prevented determination of the flap positions.

The fuel selector valve was observed set to the right tank position. Damage to the forward fuselage and firewall precluded confirmation of the fuel system continuity. The elevator trim actuator was observed with 6 exposed threads, which the Piper representative reported was consistent with a slight nose up trim setting, with 8 exposed threads corresponding to the neutral position.

Engine

External examination of the engine revealed no indications of holes or perforations in the case. The mounts and support structure had bent inward becoming imbedded within the airplane firewall. The exhaust system was observed to have sustained ductile bending and crushing, with the number 2 exhaust manifold separated at the cylinder mounting flange.

The carburetor had become fractured into three sections in a manner consistent with engine mount contact. The flange remained securely attached to the inlet manifold. The fuel bowl had become exposed, revealing a brass type float that exhibited crush damage to its aft surfaces. The throttle, fuel mixture, and carburetor heat cables remained firmly affixed at their respective control arms and cabin controls. The inlet air filter assembly remained attached to the carburetor, the filter element was mud caked. The gascolator assembly had become fragmented; the screen was located and was free of debris.

The ignition harnesses remained attached from both magnetos to their respective spark plugs. The magnetos remained securely attached to their respective mounts. The flywheel had become separated from the crankshaft due to impact forces, and as such, magneto timing could not be confirmed.

Both magnetos were removed in order to test their internal continuity via hand rotation. The left magneto was rotated and the impulse couplings audibly appeared to operate with 'spring-back' resistance noted during rotation; no sparks were observed at any of the posts. The right magneto was rotated by hand, and no sparks were observed at any of the posts.

Both magnetos were disassembled and examined. Removal of their cases revealed quantities of water contamination consistent with post accident submersion. The exposed electrical wiring, magneto coil terminals, and rotor shaft were damp, and exhibited signatures of fresh corrosion. The points and cam lobes were intact and appeared to have little wear; the gear teeth were intact.

The bottom spark plugs were removed; no mechanical damage was noted, and the electrodes and posts exhibited gray coloration, which corresponds to normal operation according to the Champion Aviation Check-A-Plug AV-27 Chart. Removal of the top spark plugs revealed the electrodes to be coated with an oil film and water, consistent with the engine being inverted and submerged after the accident. The exhaust outlet exhibited light grey discoloration to its internal surface consistent with normal operation, and was free of oily deposits.

Rotation of the engine by hand via the propeller confirmed internal mechanical continuity through to the accessory case. Thumb compression was achieved on all cylinders, and lift action occurred at each rocker assembly. Visual inspection of the combustion chambers was accomplished through utilization of a borescope through the spark plug bores; no evidence of foreign object damage, and no indication of piston to valve contact or failure was observed. Four quarts of translucent oil were present in the crankcase, and all four rocker box areas were oil wetted and free of thermal discoloration.

The two bladed propeller remained attached to the crankshaft flange, which had become bent at the front crankshaft bearing. Both blades exhibited outboard leading edge nicks varying in width between 1/8 and 1/4 inch. One blade exhibited forward bending; the nose of the propeller spinner had become compressed inwards into a 'bowl' shape, the base of which had become deformed around the propeller hub bolts.

No evidence of pre-mishap mechanical malfunctions were observed during the examination of the engine and airframe.

Pilot Information

Certificate:	Private	**Age:**	19,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 Without waivers/limitations	**Last FAA Medical Exam:**	August 31, 2009
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 11, 2010
Flight Time:	89 hours (Total, all aircraft), 36 hours (Total, this make and model), 47 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N7013K
Model/Series:	PA-20	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	20-119
Landing Gear Type:	Tailwheel	**Seats:**	4
Date/Type of Last Inspection:	September 19, 2009 Annual	**Certified Max Gross Wt.:**	2000 lbs
Time Since Last Inspection:	36 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3356 Hrs as of last inspection	**Engine Manufacturer:**	LYCOMING
ELT:	C91A installed, activated, did not aid in locating accident	**Engine Model/Series:**	O-320 SERIES
Registered Owner:	On file	**Rated Power:**	150 Horsepower
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:	OVE,192 ft msl	**Distance from Accident Site:**	8 Nautical Miles
Observation Time:	16:53 Local	**Direction from Accident Site:**	110°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	Broken / 10000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	140°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.9 inches Hg	**Temperature/Dew Point:**	24°C / 11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Chico, CA (PVT)	**Type of Flight Plan Filed:**	None
Destination:	Chico, CA (PVT)	**Type of Clearance:**	None
Departure Time:	16:00 Local	**Type of Airspace:**	

Airport Information

Airport:	PM Dusters Private Airstrip PVT	**Runway Surface Type:**	
Airport Elevation:	132 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Serious	**Latitude, Longitude:**	39.550556,-121.890556

Administrative Information

Investigator In Charge (IIC):	Simpson, Eliott
Additional Participating Persons:	Brook B Stewart; Federal Aviation Administration FSDO; Sacramento, CA Charles Little; Piper Aircraft Inc.; Vero Beach, FL
Original Publish Date:	March 16, 2011
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=76156