National Transportation Safety Board
Aviation Accident Final Report

Location:	Palo Alto, California	**Accident Number:**	WPR10FA136
Date & Time:	February 17, 2010, 07:54 Local	**Registration:**	N5225J
Aircraft:	Cessna 310R	**Aircraft Damage:**	Substantial
Defining Event:	Collision with terr/obj (non-CFIT)	**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot departed the airport in near-zero visibility instrument meteorological conditions, and shortly after takeoff, struck a power pole and power lines before impacting terrain. Review of recorded air traffic control tower (ATCT) transmissions revealed that the pilot was initially given his instrument flight rules (IFR) clearance to turn right to a heading of 060 degrees and climb to 3,000 feet. Shortly after verifying his IFR clearance, the pilot received his IFR release from the ATCT controller and was informed that the runway was not visible to the controller. The controller further informed the pilot that takeoff was at his own risk. Shortly after, the controller notified the pilot that he had two minutes for his IFR release, before it expired. The pilot stated that he did not hear a "cleared for takeoff" instruction from the controller. The controller responded that he could not clear the pilot for takeoff, due to not having the runway environment in sight and that "the release is all yours and it's at your own risk sir." The pilot acknowledged the transmission and proceeded to take off. One witness, who was adjacent to the accident site, reported that she observed an airplane “suddenly appear from the fog” left of her position. The witness stated that she continued to watch the airplane fly in a level or slightly nose up attitude until it impacted power lines.

Accident site evidence was indicative of a level impact with a power pole about 50 feet above ground level (agl) and at a high airspeed. All major structural components of the airplane were located within the wreckage debris path. Examination of the airframe, engines and propellers disclosed no evidence of any preimpact mechanical anomaly. Weather conditions reported five minutes prior to the accident were wind variable at 5 knots, visibility 1/8th mile, fog, and vertical visibility of 100 feet agl. Weather conditions recorded by the ATCT 11 minutes after the time of the accident were visibility 1/16th mile, fog, and a vertical visibility of 100 feet agl.

Local law enforcement provided recordings from a sound recording system, which captured the accident sequence. The recordings were coupled with airport surveillance radar to interpolate a

flightpath for the airplane. The interpolated flightpath indicated an approximate 45-degree left turn shortly after departure to the area of initial impact with the power pole and power lines. A sound spectrum study determined both engines were operating near full power.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure follow the standard instrument departure as instructed, and his failure to attain a sufficient altitude to maintain clearance from power lines during takeoff in instrument meteorological conditions.

Findings

Personnel issues	Use of equip/system - Pilot
Personnel issues	Incorrect action sequence - Pilot
Aircraft	Altitude - Not attained/maintained
Environmental issues	Low visibility - Contributed to outcome

Factual Information

HISTORY OF FLIGHT

On February 17, 2010, about 0754 Pacific standard time, a Cessna 310R airplane, N5225J, was substantially damaged when it impacted multiple residential structures and terrain following an in-flight collision with power lines and a power line tower shortly after takeoff from the Palo Alto Airport (PAO), East Palo Alto, California. The commercial pilot and his two passengers were killed. There were no reported ground injuries. The airplane was registered to Air Unique Inc., Santa Clara, California, and operated by the pilot under the provisions of Title 14 Code of Federal Regulations Part 91 as a personal flight. Instrument meteorological conditions prevailed and an instrument flight rules (IFR) flight plan was filed for the cross-country flight. The flight was originating at the time of the accident with an intended destination of Hawthorne, California.

Review of recorded air traffic control tower communications between the pilot and controller revealed that the pilot was issued his IFR clearance at 0741, which cleared the pilot to Hawthorne Airport via a right turn to a heading of 060 degrees within one mile of Palo Alto, vectors San Jose, Salinas as filed, climb and maintain 3,000 feet, expect 9,000 feet five minutes after departure. The pilot acknowledged the IFR clearance by reading it back to the controller. At 0746, the pilot contacted the air traffic control tower controller, stating he was "ready three one, IFR to Hawthorne." The controller responded, telling the pilot to hold for IFR release.

At 0749, the controller transmitted that information November was current, wind variable at 5 knots, visibility 1/8th mile, fog, vertical visibility of 100 feet above ground level (agl). At 0751, the controller transmitted to the pilot that he had his IFR release and stated "the runway is not visible, so it's at your own risk." The pilot responded shortly thereafter, "[I] understand." At 0752, the controller informed the pilot that he had two minutes for his IFR release. The pilot responded that he did not hear a "cleared for takeoff." The controller responded that "I cannot clear you for takeoff because I don't have visibility on the runway, so ah, the release is all yours and it's at your own risk sir." The pilot responded "ok, 25 Juliet, rolling." No further radio communications were heard from the pilot.

Multiple witnesses located adjacent to the accident site reported observing portions of the accident sequence. One witness, who was walking on a levee near the accident site, reported that she observed an airplane “suddenly” emerge from the fog to the left of her position. The witness stated that she continued to watch the airplane fly in a level or slightly nose up attitude from her left to her right at a low altitude until it impacted power lines shortly thereafter.

PERSONNEL INFORMATION

The pilot, age 56, held a commercial pilot certificate with airplane single-engine land, multi-engine land, and instrument airplane ratings. The pilot also possessed a flight instructor certificate with airplane single-engine and multi-engine ratings. A second-class airman medical certificate was issued on November 12, 2009, with the limitation “Must wear corrective lenses

for near and distant vision." The pilot reported on his most recent medical certificate application that he had accumulated 2,900 total flight hours. Review of the pilot's logbook revealed that from May, 2009 to September 23, 2009, only dates were recorded with no flight time or aircraft information. No entries were recorded from September 23, 2009 to the most recent entry, dated January 27, 2010. The most recent logbook entry noted 1.8 hours of flight time, of which 1 hour was simulated instrument flight time and 0.2 hours in actual instrument conditions, flight time that was part of the pilot's most recent instrument competency-check. The pilot's most recent flight review was completed on November 11, 2009.

AIRCRAFT INFORMATION

The six-seat, low-wing, fixed-gear airplane, serial number (S/N) 310R0807, was manufactured in 1977. It was powered by two Teledyne Continental Motors (TCM) IO-550-A (8) engines, rated at 300 horse power and equipped with McCauley variable-pitch propellers.

Review of copies of the aircraft maintenance logbook records recovered from the wreckage revealed that an annual inspection was completed on April 27, 2009, at a recorded tachometer reading of 743 hours, airframe total time of 6,350 hours, left engine total time since new of 150 hours, and right engine total time since new of 150 hours. The factory new left and right engines were installed on the airframe on August 25, 2004, at an airframe total time of 6,191 hours.

METEOROLOGICAL INFORMATION

A review of recorded data from the automated weather observation station located at PAO revealed that at 0654, wind was variable at 4 knots, visibility (M)1/4 mile, fog, vertical visibility of 100 feet agl, and an altimeter setting of 30.03 inches of Mercury. At 0742, the ATCT controller at PAO reported wind variable at 5 knots, visibility 1/8th mile, fog, and a vertical visibility of 100 feet agl. Review of a weather log for the Palo Alto Air Traffic Control Tower revealed that at 0805, visibility was 1/16th mile, fog, and a vertical visibility of 100 feet agl.

At 0853, the weather observation station at PAO reported wind variable at 4 knots, visibility 1/8th mile, fog, and a vertical visibility of 100 feet agl.

WRECKAGE AND IMPACT INFORMATION

Examination of the accident site by representatives from Cessna Aircraft Company and Teledyne Continental Motors under the supervision of the Federal Aviation Administration (FAA) and NTSB investigator-in-charge (IIC) revealed that the First Identified Point of Contact (FIPC) was an electrical tower located about 0.41 nautical miles northwest of the departure end of runway 31. Examination of the tower revealed that the airplane struck the tower and power lines about 40 to 50 feet agl. Wreckage debris from the aircraft was spread throughout the approximate 897-foot long wreckage energy path, which was oriented on a magnetic heading of about 237 degrees.

Two left propeller blade tips were located adjacent to the FIPC. Remains of the left engine cowling, nose cowling, left main gear door, and left gear door hinge were located near the FIPC.

The outboard portion of the left wing (left fuel tank, left aileron, and a portion of the left flap) was located adjacent to a residential structure about 462 feet southwest of the FIPC and exhibited thermal damage. The inboard portion of the left wing (top left engine cowling, left engine nacelle, inboard portion of the left flap, left main gear) was located 560 feet from the FIPC and in a partially inverted position. The left main gear was observed secured within the wheel well. Forty-five degree striations were observed on the top middle area of the nacelle baggage door.

Three impact marks were observed on the street curb about 686 feet from the FIPC. The impact marks observed were consistent with propeller blade strikes. An impact mark on the adjacent sidewalk was consistent with engine impact. Additional scoring was observed on the sidewalk within the area of the propeller strike marks and was consistent with the main fuel tank impact.

About 15 feet beyond the strike marks on the curb, a portion of a landscaping retaining wall was displaced and extended towards the main wreckage. The main wreckage was observed adjacent to a residential structure, remaining partially on the residence driveway, yard, sidewalk, and street. Within the main wreckage, three vehicles and a light standard were observed. The main wreckage consisted of remains of the fuselage, cockpit structure, empennage, horizontal stabilizer, elevators, vertical stabilizer, rudder, right wing, and right engine. The main wreckage, vehicles, and light standard exhibited severe thermal damage.

The left and right engine and left and right propellers were shipped to their respective manufacturers for further examination.

MEDICAL AND PATHOLOGICAL INFORMATION

The San Mateo County Coroner’s Office conducted an autopsy on the pilot on February 18, 2010. The medical examiner determined that the cause of death was “…Multiple Blunt Injuries.”

The FAA's Civil Aeromedical Institute (CAMI) in Oklahoma City, Oklahoma, performed toxicology tests on the pilot. According to CAMI's report, carbon monoxide, cyanide, volatiles, and drugs were tested. The report noted the following positive results: "0.011 (ug/ml, ug/g) Diphenhydramine detected in Blood, Diphenhydramine detected in Urine, Metoprolol detected in Urine, Metoprolol detected in Blood."

TESTS AND RESEARCH

The left and right engines were examined at the facilities of Teledyne Continental Motors (TCM) under the supervision of the Safety Board IIC on March 1, 2, and 3, 2010. The examination of the left and right engines revealed no preimpact mechanical anomalies that would have precluded normal operation.

A handheld Garmin GPS was located within the wreckage debris path. The GPS was sent to the NTSB Vehicle Recorders Laboratory, Washington, DC for further examination. The recovered recorded data revealed that on the day of the accident, a data track was observed from the

parking area of PAO to runway 31. No further data was recovered from the GPS unit.

Examination of both recovered propellers was conducted at the facilities of McCauley Propeller Systems, Wichita, Kansas, on February 23, 2011, under the supervision of an NTSB investigator. The McCauley Propeller Systems representative reported that the examination found that propeller damage was a result of impact forces and no indications of propeller failure prior to impact were found. Both propellers were rotating at the time of impact and that neither propeller was at or near the feathered position at the time of impact. The representative further reported that both propellers were being operated under conditions of power at the time of impact, of which the exact amount of power was not determined.

Local law enforcement provided recordings from a Shotspotter recording system. The Shotspotter system is an array of acoustic sensors deployed in high-crime areas that are triggered by impulsive events such as explosions or gunshots in order to alert and provide information to law enforcement. Review of the audio recording system revealed that multiple recording sites recorded the accident sequence. The captured recordings were sent to the NTSB Vehicle Recorders Laboratory for further examination.

According to the NTSB Vehicle Recorders Laboratory specialist's report, the accident triggered five Shotspotter sensors. A sound spectrum study was performed to determine if any engine operating parameters such as RPM could be established. Five audio files approximately 2 minutes in length were provided to the Safety Board for analysis. The recordings, coupled with Airfield Surveillance Radar at Moffett Field, southeast of Palo Alto, which briefly tracked N5225J after departure, captured four radar targets, each approximately 4.5 seconds apart. When plotted, the first target appeared to the right of the runway. The radar data was corrected to place the aircraft on the runway during the takeoff roll. Using the initial impact point in addition to the four radar targets, a flight path was interpolated in one second intervals. The interpolated flight path showed an approximate 45-degree left turn shortly after departure to the FPIC.

A sound spectrum study was performed to determine the engine speed from recorded audio from 4 sensors on the ground at the time of the accident. Because the aircraft was moving at over 200 knots over the ground at the time of the accident, the Doppler frequency shift had to be calculated. The study determined that both engines were operating near full power. See the Sound Spectrum Study within the public docket for more details.

History of Flight

Initial climb	Collision with terr/obj (non-CFIT) (Defining event)
Initial climb	Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Information

Certificate:	Commercial; Flight instructor	**Age:**	56,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Unknown
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	November 12, 2009
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	November 11, 2009
Flight Time:	2900 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N5225J
Model/Series:	310R	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	310R0807
Landing Gear Type:		**Seats:**	6
Date/Type of Last Inspection:	April 27, 2009 Annual	**Certified Max Gross Wt.:**	5500 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	6350 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	Installed, not activated	**Engine Model/Series:**	IO-550-A
Registered Owner:		**Rated Power:**	310 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PAO,4 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	08:53 Local	**Direction from Accident Site:**	280°
Lowest Cloud Condition:	Unknown	**Visibility**	0.12 miles
Lowest Ceiling:	Indefinite (V V) / 100 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:	East Palo Alto, CA (PAO)	**Type of Flight Plan Filed:**	IFR
Destination:	Hawthorne, CA	**Type of Clearance:**	IFR
Departure Time:	07:53 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	37.461112,-122.114997(est)

Administrative Information

Investigator In Charge (IIC):	Cawthra, Joshua
Additional Participating Persons:	Wilbert J Robinson; Federal Aviation Administration; San Jose, CA Andrew Swick; Teledyne Continental Motors; Mobile, AL Mike Koonce; Cessna Aircraft Company; Wichita, KS Tom Knopp; McCauley Propellers Inc.; Wichita, KS
Original Publish Date:	November 22, 2011
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=75372

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available here.