Aviation Investigation Final Report

Location:	Louisburg, North Carolina	**Accident Number:**	ERA19FA113
Date & Time:	March 1, 2019, 19:21 Local	**Registration:**	N26617
Aircraft:	Cessna 182	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot had planned to conduct a personal, instrument flight rules (IFR) flight in night instrument meteorological conditions (IMC). The clearance that the pilot received from air traffic control stipulated that after departure, the airplane was to turn about 50° left of the runway heading. Radar data showed that the airplane instead climbed along the departure runway heading for about 1 minute, and witnesses described that the airplane entered IMC around 200 to 300 feet above the ground. When the airplane reached an altitude of about 860 ft above ground level (agl), it entered a right turn. The airplane reached the top of its climb about 930 ft agl, and continued a tightening right turn while descending at an estimated rate of about 6,000 feet per minute. The pilot did not contact air traffic control and radar contact was lost in the vicinity of the accident site. Postaccident examination of the airplane revealed no preimpact mechanical anomalies that would have precluded normal operation.

About 1 hour before the airplane departed, the pilot obtained an online weather briefing from a commercial vendor. The information in the briefing indicated that the airplane would be operating in IFR conditions with severe turbulence reported along the anticipated route of flight. The restricted visibility and low-level instrument meteorological conditions at night were conducive to the development of spatial disorientation. In addition, the airplane's flight track, which included altitude and directional changes that were inconsistent with the flight's clearance instructions, and the rapidly descending right turn, were consistent with the known effects of spatial disorientation. It is likely that the pilot developed spatial disorientation during the flight, which led to a loss of control.

A sedating, over-the-counter antihistamine (Cetirizine) was found in postaccident toxicology specimens taken from the pilot; however, the levels of the drug measured were three times below the therapeutic level. Additionally, ethanol was also detected in the some of the pilot's blood specimens but was not detected in the pilot's brain or muscle specimens. As a result, the ethanol detected was most likely from sources other than ingestion; thus, the pilot's use of cetirizine and the identified ethanol did not contribute to this accident.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's spatial disorientation and loss of airplane control following takeoff in night instrument meteorological conditions.

Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Spatial disorientation - Pilot
Environmental issues	Below VFR minima - Effect on operation
Environmental issues	Dark - Effect on operation

Factual Information

History of Flight

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

On March 1, 2019, at 1921 eastern standard time, a Cessna 182S, N26617, was destroyed when it collided with terrain after takeoff from Triangle North Executive Airport (LHZ), Louisburg, North Carolina. The private pilot and two passengers were fatally injured. Night instrument meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan was filed for the personal flight which was conducted under the provisions of Title 14 *Code of Federal Regulations* Part 91.

Information obtained from the Federal Aviation Administration (FAA) and a commercial vendor revealed that the pilot obtained a weather briefing and filed an IFR flight plan through a commercial on-line site at 1819. According to LHZ security records, the pilot's truck passed through the gate onto the airport at 1852.

The pilot obtained his IFR clearance by telephone before departure. The clearance instructed the pilot to depart from runway 23, fly a heading of 180°, and climb to an altitude of 3,000 ft mean sea level (msl). After takeoff, a radar target identified as the accident airplane was acquired at 1920:03 over the runway at 425 ft msl (about 60 ft above ground level [agl]) and 91 knots groundspeed. The airplane maintained the approximate runway heading until 1920:56, when the airplane entered a right turn while at 1,225 ft msl (about 860 ft agl) and 99 knots groundspeed. At 1921:02, the airplane reached the top of its climb at 1,300 ft msl (about 930 ft agl) while in the turn. Afterward, the airplane entered a descending right turn while its groundspeed began to accelerate. The airplane's last target, at 1921:17, showed the airplane at an altitude of 625 ft (about 260 ft agl) and a groundspeed of 145 knots, in the vicinity of the accident site. Interpolation of the radar data toward the bottom of the descent revealed an descent rate of about 6,000 ft per minute. Communication between the pilot and air traffic control was never established.

Two airport employees witnessed the takeoff and reported that they heard the airplane's engine "power up," which surprised them because they had not noticed the airplane taxi past them or heard the pilot perform an engine run-up. The airplane's lights were not clearly visible in the fog and had a "halo" appearance. The witnesses also reported that the airplane accelerated and that the sound of the engine was smooth and continuous throughout the takeoff roll and the takeoff. The witnesses lost sight of the airplane when it was about 200 to 300 ft above the runway, which was about the same time that the airplane entered the clouds.

One of the airport employees described the weather conditions as "foggy in moderate rain." The other airport employee indicated that there were "low clouds and a lot of rain" and that he wondered "who would want to fly in this [weather]?"

Several witnesses who lived near the airport provided written statements. These witnesses stated that they heard the airplane just after it took off flying "low overhead" and that the engine "went in full throttle" when the sounds of impact were heard. One witness stated that "it was raining so hard" at the time of the accident that it disabled his satellite television signal.

Pilot Information

Certificate:	Private	**Age:**	45,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	February 20, 2018
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	1422 hours (Total, all aircraft), 1383 hours (Total, this make and model)		

The pilot held a private pilot certificate with ratings for airplane single engine land and instrument airplane. His most recent FAA third-class medical certificate was issued February 20, 2018, and he reported 1,270 total hours of flight experience on that date. On August 28, 2018, the pilot declared 1,422 total hours of flight experience on an insurance application form.

The pilot obtained his private pilot certificate with a rating for airplane single engine land on January 9, 2013. He added his instrument airplane rating about 15 months later.

A commercial pilot and flight instructor who flew with the accident pilot recreationally and in the Coast Guard Auxiliary stated that the pilot was "proficient" but was a "heavy user" of the autopilot and that he would routinely depart, set up the autopilot, and then contact air traffic control. When asked about the pilot's mission planning and operational risk management assessments for flights with the Coast Guard Auxiliary, the commercial pilot/flight instructor stated that the accident pilot was "proficient" in those skills. When asked how those skills transferred to the accident pilot's personal flying habits, the commercial pilot/flight instructor stated that the accident pilot "abandoned" those practices when he flew for personal business or pleasure.

The aircraft broker who sold the airplane to the pilot in December 2012 was also based at LHZ. The broker stated that he had watched the pilot depart in the airplane under visual flight rules (VFR) into instrument meteorological conditions (IMC) on numerous occasions before the pilot acquired an instrument rating. The broker also stated that, after the accident pilot acquired his instrument rating, he departed in conditions that the broker considered challenging for a small single-engine airplane. The broker added that he had cautioned the accident pilot "numerous" times about flying VFR into IMC and about overall risk management and risk decisions when flying into IMC, when measured against the equipment one operated, but that "there was no getting through to him."

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N26617
Model/Series:	182 S	**Aircraft Category:**	Airplane
Year of Manufacture:	1998	**Amateur Built:**	
Airworthiness Certificate:	Normal; Restricted (Special)	**Serial Number:**	18280330
Landing Gear Type:	Tricycle	**Seats:**	
Date/Type of Last Inspection:	November 12, 2018 Annual	**Certified Max Gross Wt.:**	2348 lbs
Time Since Last Inspection:	48 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3709 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C91A installed, activated	**Engine Model/Series:**	IO-540 SER
Registered Owner:		**Rated Power:**	300 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

According to FAA records, the airplane was owned by the pilot and manufactured in 1998. Its most recent annual inspection was completed November 12, 2018, at 3,709 total aircraft hours.

The airplane was equipped with Aspen EFD1000 Flight Displays. While research indicated that Aspen Mandatory Service Bulletin SB2018-1, and FAA Airworthiness Directive (AD) 2019-01-02 were current for Aspen EFD1000 Flight Displays, neither applied to the accident airplane based on their installation and configuration. According to the FAA airworthiness inspector assigned to the investigation who researched the installation and both documents, "By not activating the RS-232 ports ADS-B functions were not available" and therefore, the Service Bulletin and the AD did not apply to the accident airplane.

The flight instructor/commercial pilot, who was the friend and colleague of the pilot, stated the airplane's flight displays "blanked out" and were hot to the touch when he flew the airplane on a cross country flight in July 2018. Aspen representatives there suggested it might be a cooling issue and to open the cockpit vents for the return flight. With the vents open, the unit did not malfunction on the return flight. According to the instructor, the pilot/owner stated he had made numerous warranty claims and had several components of the Aspen system replaced. He further stated that the pilot/owner had an air-conditioning system installed in the airplane (in August 2018) to address the issue of cooling the avionics. According to Aspen Avionics, a search of company records revealed that the pilot/owner made no warranty claims to them, and that no replacement parts or components were shipped or otherwise attributed to the accident airplane.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	LHZ,369 ft msl	**Distance from Accident Site:**	
Observation Time:	00:20 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered / 300 ft AGL	**Visibility**	5 miles
Lowest Ceiling:	Broken / 600 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	Convective / Convective
Wind Direction:	20°	**Turbulence Severity Forecast/Actual:**	Severe / Severe
Altimeter Setting:	30.07 inches Hg	**Temperature/Dew Point:**	4°C / 4°C
Precipitation and Obscuration:	Moderate - None - Rain		
Departure Point:	Louisburg, NC (LHZ)	**Type of Flight Plan Filed:**	IFR
Destination:	Hilton Head, NC (HXD)	**Type of Clearance:**	IFR
Departure Time:	19:19 Local	**Type of Airspace:**	

At 1920, the weather recorded at LHZ included scattered clouds at 300 ft, a broken ceiling at 600 ft, an overcast ceiling at 1,100 ft and winds from 020°at 4 knots. Visibility was 5 statute miles in rain. The temperature was 4°C, and the dew point was 4°C. The altimeter setting was 30.08 inches of mercury.

Weather radar base reflectivity images taken from the Raleigh/Durham, North Carolina WSR-88D, located about 21 miles southwest of the accident site, indicated that reflectivity values between 20 and 35 dBZ (light to moderate precipitation) were located above the accident site at the time of the accident. The reflectivity bands were moving from west to east.

About 1 hour before departure, the pilot obtained an on-line weather briefing from a commercial vendor (ForeFlight) that included terminal area forecasts for low IFR conditions, AIRMETs for low-level wind shear, and a pilot report for severe turbulence along the airplane's proposed route of flight. According to the vendor, the pilot did not view any weather imagery before the flight or obtain any updates or additional weather information before or during the accident flight.

Airport Information

Airport:	Triangle North Executive LHZ	**Runway Surface Type:**	Asphalt
Airport Elevation:	367 ft msl	**Runway Surface Condition:**	
Runway Used:	23	**IFR Approach:**	None
Runway Length/Width:	5498 ft / 100 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	36.001945,-78.354721(est)

The airplane came to rest partially submerged on the southwest side of a creek about 1.5 miles beyond the departure end of the runway. Several pieces of angularly cut wood were found below damaged treetops on the northeast bank of the creek.

The wreckage was destroyed by impact forces and displayed no evidence of pre- or postimpact fire. All major components were accounted for at the scene except for most of the right wing structure, including the right flap and flap actuator. Those parts were later recovered when the creek water receded.

Components of the avionics suite were examined at the accident site but were not retained due to impact and water immersion damage.

Engine control continuity was confirmed from the instrument panel to the engine. Flight control continuity could not be confirmed due to multiple cable breaks and fractures. All breaks and fractures exhibited signatures consistent with overload failure.

The engine was separated from its mounts but was still attached by wires and cables. Two of the three propeller blades were recovered and exhibited similar twisting, bending, and chordwise scratching. One blade exhibited significant leading edge gouging.

The engine crankshaft was manually rotated at the propeller flange, and powertrain continuity was confirmed through the accessory section. Valvetrain continuity could not be confirmed due to impact-damaged pushrods. An internal borescope examination revealed signatures consistent with normal wear and lubrication. Both magnetos were intact in their mounts. When they were removed and tested, each produced spark at all of the terminal leads.

Examination of the airplane revealed no preimpact mechanical anomalies that would have precluded normal operation.

Medical and Pathological Information

The North Carolina Department of Health and Human Services, Office of the Chief Medical Examiner, Raleigh, North Carolina, performed an autopsy of the pilot. His cause of death was blunt force injuries.

Toxicology testing performed at the Federal Aviation Administration (FAA) Forensic Sciences Laboratory detected ethanol (0.033 gm/dL) and ceterizine (0.0738 µg/mL) in the pilot's cavity blood specimens. Ceterizine was also detected in the pilot's liver specimens.

Cetirizine (commonly marketed as Zyrtec) is a sedating, over-the-counter antihistamine, that is used to relieve allergy symptoms. Cetirizine may cause drowsiness. The therapeutic range is between 0.190 and 1.450 µg/mL; the elimination half-life is between 6.5 and 10 hours.

Ethanol is a social drug commonly consumed by drinking beer, wine, or liquor. It acts as a central nervous system depressant; it impairs judgment, psychomotor functioning, and vigilance. After absorption, ethanol quickly and uniformly distributes throughout the body's tissues and fluids. Ethanol can also be produced after death by microbial activity.

ADDITIONAL INFORMATION

The FAA Civil Aerospace Medical Institute's publication, "Introduction to Aviation Physiology," defines spatial disorientation as a "loss of proper bearings; state of mental confusion as to position, location, or movement relative to the position of the earth." Factors contributing to spatial disorientation include changes in acceleration, flight in IMC, frequent transfer between visual meteorological conditions and IMC, and unperceived changes in aircraft attitude.

The FAA's *Airplane Flying Handbook* (FAA-H-8083-3A) describes hazards associated with flying when the ground or horizon are obscured. The handbook states, in part, the following:

The vestibular sense (motion sensing by the inner ear) can and will confuse the pilot. Because of inertia, the sensory areas of the inner ear cannot detect slight changes in airplane attitude, nor can they accurately sense attitude changes that occur at a uniform rate over a period of time. On the other hand, false sensations are often generated, leading the pilot to believe the attitude of the airplane has changed when, in fact, it has not. These false sensations result in the pilot experiencing spatial disorientation.

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian
Additional Participating Persons:	Jeffrey Burch; FAA/FSDO; Greensboro, NC Peter Basile; Textron Aviation; Wichita, KS Mike Childers; Lycoming Engines; Williamsport , PA
Original Publish Date:	July 13, 2020
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=99045

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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.