



National Transportation Safety Board Aviation Accident Final Report

Location:	Crozet, VA	Accident Number:	ERA18FA127
Date & Time:	04/15/2018, 2054 EDT	Registration:	N525P
Aircraft:	CESSNA 525	Aircraft Damage:	Destroyed
Defining Event:	Loss of control in flight	Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The instrument rated private pilot was drinking alcohol before he arrived at the airport. Before the flight, he did not obtain a weather briefing or file an instrument flight rules flight plan for the flight that was conducted in instrument meteorological conditions. The pilot performed a 3-minute preflight inspection of the airplane and departed with a tailwind (even though he had initially taxied the airplane to the runway that favored the wind) and without communicating on the airport Unicom frequency. After departure, the airplane climbed to a maximum altitude of 11,500 ft mean sea level (msl), and then the airplane descended to 4,300 ft msl (which was 1,400 ft below the minimum safe altitude for the destination airport) and remained at that altitude for 9 minutes. Afterward, the airplane began a descending left turn, and radar contact was lost at 2054. The pilot did not talk to air traffic control during the flight and while operating in night instrument meteorological conditions.

During the flight, the airplane flew through a line of severe thunderstorms with heavy rain, tornados, hail, and multiple lightning strikes. Before the airplane's descending left turn began, it encountered moderate-to-heavy rain. The airplane's high descent rate of at least 6,000 ft per minute and impact with a mountain that was about 450 ft from the last radar return, the damage to the airplane, and the distribution of the wreckage were consistent with a loss of control and a high-velocity impact. Examination of the airplane revealed no evidence of any preimpact mechanical anomalies.

Based on the reported weather conditions at the time the flight, the pilot likely completed the entire flight in night instrument meteorological conditions. His decision to operate at night in an area with widespread thunderstorms and reduced visibility were conducive to the development of spatial disorientation. The airplane's descending left turn and its high-energy impact were consistent with the known effects of spatial disorientation.

The pilot was not aware of the conditions near and at the destination airport because he failed to obtain a weather briefing and was not communicating with air traffic control. Also, the pilot's decision to operate an airplane within 8 hours of consuming alcohol was inconsistent

with the Federal Aviation Administration's regulation prohibiting such operations, and the level of ethanol in the pilot's toxicology exceeded the level allowed by the regulation. Overall, the pilot's intoxication, combined with the impairing effects of cetirizine, affected his judgment; contributed to his unsafe decision-making; and increased his susceptibility to spatial disorientation, which resulted in the loss of control of the airplane.

Probable Cause and Findings

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

The pilot's loss of control while operating in night instrument meteorological conditions as a result of spatial disorientation. Contributing to the accident was the pilot's decision to operate an airplane after consuming alcohol and his resulting intoxication, which degraded the pilot's judgment and decision-making.

Findings

Aircraft	Performance/control parameters - Not attained/maintained (Cause)
Personnel issues	Aircraft control - Pilot (Cause)
	Spatial disorientation - Pilot (Cause)
	Decision making/judgment - Pilot (Factor)
	Alcohol - Pilot (Factor)
Environmental issues	Low visibility - Effect on operation (Cause)
	Dark - Decision related to condition (Factor)
	Low visibility - Contributed to outcome
	Low visibility - Awareness of condition

Factual Information

History of Flight

Enroute-cruise	Loss of visual reference Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On April 15, 2018, at 2054 eastern daylight time, a Cessna 525, N525P, was destroyed after it impacted terrain near Crozet, Virginia. The private pilot was fatally injured. The airplane was owned by a private individual and was being operated under the provisions of Title 14 *Code of Federal Regulations (CFR)* Part 91 as a personal flight. Night instrument meteorological conditions prevailed at the time of the accident, and no flight plan was filed for the flight, which departed Richmond Executive–Chesterfield County Airport (FCI), Richmond, Virginia, about 2035 and was destined for Shenandoah Valley Regional Airport (SHD), Weyers Cave, Virginia.

According to a friend of the pilot, the pilot had "a couple of drinks" while they were preparing dinner. The pilot left her home about 1930. The pilot's friend thought that the pilot would be going to a hotel because it was getting dark, but FCI security video showed that the pilot arrived at the airport at 2002 and walked to the airplane at 2004. The pilot then walked around the airplane for about 3 minutes, boarded the airplane, closed the main cabin door, and initiated the engine start sequence at 2017. About 2 minutes later, the airplane began to taxi to the departure end of runway 15 and then taxied back to the departure end of runway 33. The takeoff roll began on runway 33 at 2033. The airport security video showed the windsock, which indicated that the wind favored a departure from runway 15. According to an airport line service employee, the airplane departed with a tailwind. The employee also stated that the pilot did not communicate on the Unicom frequency.

According to air traffic control data provided by the Federal Aviation Administration (FAA), a radar target identified as the accident airplane departed FCI and reached a maximum altitude of about 11,500 ft mean sea level (msl) at 2040. The airplane then began to descend and, at 2044, leveled off at an altitude of about 4,300 ft (which was below the minimum safe altitude of 5,700 ft msl for SHD). The airplane remained at 4,300 ft until 2053, when it began a descending left turn. The last two radar returns were 5 seconds apart and showed the airplane at 3,300 ft and 2,800 msl, which indicated that the airplane was descending about 6,000 ft per minute. Radar contact was lost at 2054. Throughout the flight, the pilot did not have any contact with air traffic control.

According to a witness near the accident location, he heard the "screaming of the engines" and then felt the terrain shake when the airplane impacted the ground. He stated that, at the time of the accident, the cloud ceiling was "really low," the winds were moderate, and heavy rain was occurring.

Pilot Information

Certificate:	Private	Age:	51, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
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:	11/30/2016
Occupational Pilot:	No	Last Flight Review or Equivalent:	04/15/2018
Flight Time:	737.9 hours (Total, all aircraft), 13.5 hours (Last 90 days, all aircraft), 13.5 hours (Last 30 days, all aircraft)		

According to FAA airman records, the pilot held a private pilot certificate with ratings for airplane single-engine land, multiengine land, and instrument airplane. In addition, the pilot had a Cessna CE-525S type rating. The pilot was issued a third-class medical certificate on November 30, 2016. At that time, he reported 1,900 hours of total flight experience, of which 25 hours were within the previous 6 months.

According to the pilot's logbook, he had a total of 737.9 hours of flight time, of which 13.5 hours were in the 30 days before the accident. In addition, he reported 1.4 hours of instrument time in the previous 90 days, which included 9 instrument approaches. Since 2014, the pilot had flown 165.4 hours in the accident airplane. According to family members, the pilot flew to Richmond, Virginia, the day before the accident to perform a flight review on the afternoon of the accident date.

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	Registration:	N525P
Model/Series:	525 UNDESIGNAT	Aircraft Category:	Airplane
Year of Manufacture:	1996	Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	525-0165
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	03/01/2017, Continuous Airworthiness	Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	2 Turbo Jet
Airframe Total Time:	3311.6 Hours as of last inspection	Engine Manufacturer:	Williams International
ELT:	C126 installed, not activated	Engine Model/Series:	FJ44-1A
Registered Owner:	On file	Rated Power:	1900 lbs
Operator:	On file	Operating Certificate(s) Held:	None

According to FAA airworthiness records, the airplane was manufactured in 1996 and was equipped with two Williams International FJ44-1A engines, each of which produced 1,900 lbs of thrust. According to the maintenance logbooks, the most recent continuous airworthiness inspection was recorded on March 1, 2017; at that time, the airframe had accumulated 3,311.6 total hours of operation.

According to FAA airworthiness records, the airplane was equipped with a multifunction display and a Garmin MX20, which displayed satellite weather information. According to the Garmin MX20 description, the display had a built-in terrain elevation database that color-coded relevant ground features in relation to an aircraft's altitude and could alert the pilot to rising terrain. The MX20 was also integrated with various onboard weather radar, lightning, traffic awareness, and datalink systems that enabled uploading of graphical weather information and Next Generation Weather Radar depictions.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	Condition of Light:	Night
Observation Facility, Elevation:	CHO, 644 ft msl	Distance from Accident Site:	13 Nautical Miles
Observation Time:	2057 EDT	Direction from Accident Site:	79°
Lowest Cloud Condition:	Thin Broken / 700 ft agl	Visibility	2.5 Miles
Lowest Ceiling:	Broken / 700 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	4 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	20°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.79 inches Hg	Temperature/Dew Point:	11 °C / 11 °C
Precipitation and Obscuration:	Moderate - Mist; Moderate - Rain		
Departure Point:	RICHMOND, VA (FCI)	Type of Flight Plan Filed:	None
Destination:	Weyers Cave, VA (SHD)	Type of Clearance:	None
Departure Time:	2035 EDT	Type of Airspace:	

The recorded weather conditions at FCI about the time of departure indicated wind from 140° at 12 knots, 10 miles visibility, and broken cloud ceilings at 3,200 and 4,000 ft above ground level (agl).

The 2057 recorded weather observation at Charlottesville-Albemarle Airport (CHO), Charlottesville, Virginia, which was about 13 miles northeast of the accident location, included wind from 020° at 4 knots, visibility 2 ½ miles, rain and mist, broken clouds at 700 ft agl, overcast clouds at 1,500 ft agl, temperature 11°C, dew point 11°C, and an altimeter setting of 29.79 inches of mercury. The remarks section indicated that lightning was detected northeast and south of the airport.

The 2035 recorded weather observation at SHD, which was about 15 miles northwest of the accident site, indicated wind from 350° at 12 knots, 7 miles visibility, moderate rain, scattered clouds at 900 ft agl, broken ceiling at 4,700 ft agl, overcast clouds at 5,000 ft agl, temperature 11°C, dew point 11°C, and an altimeter setting of 29.77 inches of mercury. The remarks section stated that the station had a precipitation discriminator and provided the following information: lightning distant (beyond 10 miles but less than 30 miles from the center of the airport) southeast, 0.29 inch of precipitation since 1955, temperature 11.1°C, and dew point 10.5°C.

The 2035 recorded automated weather observation at Eagles Nest Airport (W13), Waynesboro, Virginia, which was about 12 miles southwest of the accident location, indicated wind from 040° at 3 knots, 7 miles visibility, scattered clouds at 600 ft agl, broken ceiling at 1,600 ft agl, overcast clouds at 4,400 ft agl, temperature 14°C, dew point 14°C, and an altimeter setting of 29.74 inches of mercury. The remarks indicated that the station did not have a precipitation discriminator and provided the following information: 0.14 inch of precipitation since 1955,

temperature 13.7°C, and dew point 13.6°C.

According to Lockheed Martin Flight Services, for the accident flight, the pilot did not obtain a weather briefing or use the direct user access terminal service.

According to reviewed radar data, reflectivity values between 25 and 35 dBZ were located above the accident site at 2053 (see figure 1), which corresponded with the surface observation precipitation reports from W13, SHD, and CHO. The reflectivity bands were moving from south-southwest to north-northeast between 2004 and 2103. The reflectivity targets indicated of moderate-to-heavy rain moving northward across the accident site at the accident time.

The accident airplane flew through a thunderstorm line between 2042 and 2047. There were no lightning strikes within 10 miles of the accident site about the accident time.

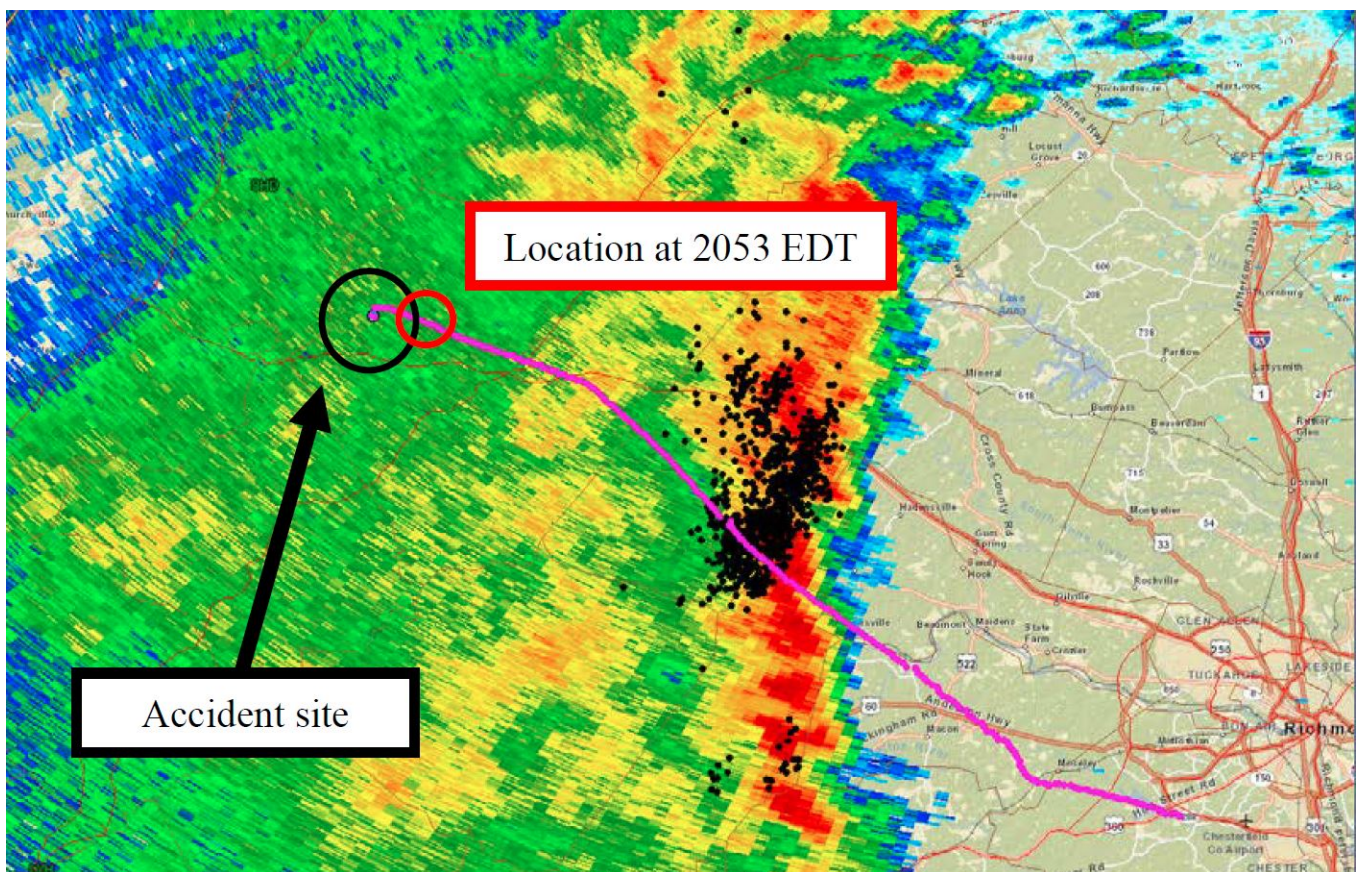


Figure 1. Radar reflectivity at 2053 with the accident site marked with a black circle, the accident flight track in pink, the airplane's position at 2053 marked with a red circle and the lightning flashes represented by the black dots.

Further, two convective SIGMET advisories were valid for the accident site at the accident time. SIGMET 31E, issued at 1855 and valid through 2055, warned of a line of severe thunderstorms moving from 210° at 40 knots with cloud tops to FL420 (about 42,000 ft) with

tornadoes, hail with a size up to 1 inch, and wind gusts to 60 knots possible. SIGMET 36E, issued at 1955 and valid through 2155, contained the same severe thunderstorm information as SIGMET 31E except that the cloud tops were to FL410 (about 41,000 ft).

AIRMETs Sierra, Tango, and Zulu were valid for the accident site at the accident time. The AIRMETs warned of instrument flight rules conditions due to precipitation and mist; mountain obscuration conditions due to clouds, precipitation, and mist; moderate turbulence below FL180 (about 18,000 ft), low-level wind shear conditions, and moderate icing below FL240 (about 24,000 ft).

In addition, there were three urgent pilot reports for the area near CHO within the 2 hours that preceded the time of the accident. All three reports were from Bombardier CRJ-200 airplanes. The reports stated that there was moderate turbulence in the vicinity, and one of the reports stated that the cloud bases were overcast at 1,500 ft msl.

According to the Astronomical Applications Department at the US Naval Observatory, for the area of the accident, sunset was at 1951, and the end of civil twilight was at 2018. Moonrise was at 0644, and the phase of the moon was a new moon at 2157.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal	Latitude, Longitude:	38.097778, -78.722500

The airplane impacted three 40-ft trees about 15 ft before impacting terrain at an elevation of 1,520 ft msl. The impact location was about 450 ft from the last radar return. The initial impact crater was about 4 ft deep, and a scent similar to Jet A fuel was noted at the accident site. The airplane was highly fragmented, with all major components of the airplane located at the accident site. The debris path emanated from a 120° heading, and the accident site was on a 25° incline.

All flight control cables and bellcranks remained attached in their appropriate locations and showed evidence of overstress failures.

The standby attitude indicator was located along the debris field and was disassembled. The gyro housing exhibited rotational scoring.

The left engine had separated due to impact forces and was located in the initial impact crater. The compressor turbine blades were damaged by the impact, and rotational scoring was noted on the blades. The turbine blade bases exhibited rotational scoring.

The right engine had separated due to impact forces and was located about 60 ft beyond the initial impact location. The engine was partially consumed by fire. The compressor fan blades exhibited rotational scoring, and several blades were bent forward. In addition, the compressor turbine blade housing exhibited rotational scoring, and the blades were bent the opposite direction of travel.

Medical And Pathological Information

The Commonwealth of Virginia Department of Health, Office of the Chief Medical Examiner, Richmond, Virginia, performed the autopsy of the pilot. The autopsy report indicated that the pilot died as a result of multiple blunt force injuries.

Toxicology testing performed at the FAA's Forensic Sciences Laboratory identified ethanol (0.080 gm/hg, which equates to 0.080 gm/dl) and cetirizine in the pilot's muscle tissue. Ethanol is the intoxicant commonly found in beer, wine, and liquor. It acts as a central nervous system depressant and impairs judgment, psychomotor functioning, and vigilance. The effects of ethanol on aviators are generally well understood: it significantly impairs a pilot's performance, even at very low levels. Title 14 *CFR* 91.17(a) prohibits any person from acting or attempting to act as a crewmember of a civil aircraft while having 0.040 gm/dl or more ethanol in the blood. In addition, the regulation states that no person can act as a crewmember of an aircraft within 8 hours after the consumption of any alcoholic beverage. Ethanol can also be produced in body tissues postmortem.

Cetirizine is a sedating antihistamine available over the counter and by prescription. It carries this warning for patients: "when using this product...drowsiness may occur...avoid alcoholic drinks...alcohol, sedatives, and tranquilizers may increase drowsiness...be careful when driving a motor vehicle or operating machinery."

Additional Information

FAA Airplane Flying Handbook

The handbook provided the following information about an airplane's attitude and spatial disorientation:

The pilot must believe what the flight instruments show about the airplane's attitude regardless of what the natural senses tell. 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 the 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):	Heidi Kemner	Report Date:	05/19/2020
Additional Participating Persons:	Ken Bain; FAA/FSDO; Richmond, VA Andrew Hall; Textron Aviation; Wichita, KS Jeremy Anderson; Williams International; Walled Lake, MI		
Publish Date:	05/19/2020		
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=97036		

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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](#).