



National Transportation Safety Board Aviation Accident Final Report

Location:	Hayden, AL	Accident Number:	ERA17FA136
Date & Time:	03/25/2017, 1433 CDT	Registration:	N6563D
Aircraft:	CESSNA T210	Aircraft Damage:	Destroyed
Defining Event:	Loss of control in flight	Injuries:	4 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The private pilot and three passengers departed on an instrument flight rules cross-country flight. About 2 hours into the flight, the pilot began to deviate around areas of precipitation and climbed the airplane from its previous cruise altitude of 10,000 ft mean sea level (msl) to 12,000 ft msl. Shortly thereafter, the air traffic controller told the pilot that moderate to extreme precipitation was ahead of the airplane and advised the pilot to deviate as necessary around it. Shortly thereafter, the airplane began a series of descending right turns. The controller advised the pilot to climb and maintain 12,000 ft several times; however, the airplane continued to turn and descend, and radar contact was lost at an altitude of about 2,000 ft msl. A witness reported hearing an airplane flying above, then heard a loud "boom" and saw pieces of the airplane falling from the sky. The wreckage path was about 4,550 ft in length, consistent with an in-flight breakup. Examination of the airframe and engine revealed no anomalies that would have precluded normal operation.

The pilot received a weather briefing before departing on the accident flight that included a forecast for scattered severe thunderstorms along the route of flight and marginal visual flight rules conditions at the destination airport, with wind at 20 knots gusting to 30 knots, 4 miles visibility, moderate rain, and an overcast ceiling with thunderstorms in the vicinity. Although there were no hazardous weather advisories or convective SIGMETs active at the time the pilot received his preflight weather information, two of the air traffic controllers who worked the flight broadcast convective SIGMETs while the pilot was on frequency that affected the pilot's intended route of flight and called for thunderstorms with tops exceeding 40,000 ft. One of these SIGMETs was broadcast about 1 hour into the flight, and the second about 2 hours into the flight (about 40 minutes before the accident occurred). The pilot chose to continue along the flight route as weather conditions deteriorated, consistent with a common behavioral trap known as "get-there-itis."

Review of weather and air traffic control radar data indicated that the airplane flew into a line of convective echoes and likely encountered instrument meteorological conditions, icing (including the possibility of supercooled large droplets), and moderate or greater turbulence

about the time the airplane began the series of descending right turns that ultimately resulted in the in-flight breakup. The reduced visibility conditions and likely turbulent airmass encountered by the pilot are conducive to the development of spatial disorientation, and the in-flight breakup is consistent with the known effects of spatial disorientation. Given the severe weather conditions encountered, it is possible that the pilot's spatial disorientation was the result of an in-flight upset and significant challenges maintaining attitude control combined with the limited visibility.

Toxicology testing of the pilot revealed the presence of amphetamine in lung and heart tissue. The pilot reported no conditions on his most recent application for a medical certificate, and whether the pilot was using amphetamine medicinally or illicitly could not be determined based on the available information.

Probable Cause and Findings

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

The pilot's decision to continue the flight into known adverse weather conditions, which resulted in spatial disorientation and a subsequent loss of airplane control and in-flight breakup.

Findings

Aircraft	Performance/control parameters - Capability exceeded (Cause) Dynamic load - Capability exceeded (Cause)
Personnel issues	Decision making/judgment - Pilot (Cause) Spatial disorientation - Pilot (Cause) Aircraft control - Pilot (Cause)

Factual Information

History of Flight

Enroute-cruise	Windshear or thunderstorm
Maneuvering	Loss of control in flight (Defining event) Part(s) separation from AC

On March 25, 2017, about 1433 central daylight time, a Cessna T210L, N6563D, was destroyed during an uncontrolled descent and subsequent in-flight breakup near Hayden, Alabama. The private pilot and three passengers were fatally injured. The airplane was privately owned and was being operated by the pilot as a Title 14 Code of Federal Regulations Part 91 personal flight. Instrument meteorological conditions prevailed and an instrument flight rules (IFR) flight plan was filed for the flight, which originated from Kissimmee Gateway Airport (ISM), Orlando, Florida, about 1150 and was destined for McKellar-Sipes Regional Airport (MKL), Jackson, Tennessee.

According to air traffic control (ATC) radar and voice communication data provided by the Federal Aviation Administration (FAA), after takeoff, the flight proceeded toward the destination at a cruise altitude of 10,000 ft mean sea level (msl). About 1357 and again at 1403, the pilot requested and was approved to deviate right of course due to weather. About 1420, the pilot requested and was approved to climb to 12,000 ft msl; at this time, the controller also issued a frequency change. The pilot subsequently checked in with the next controller, who described moderate to extreme precipitation ahead of the airplane and asked if the pilot needed to deviate. The pilot replied that he would go anywhere the controller thought was the quickest route across the weather. The controller replied that he did not have a better route and allowed the pilot to deviate as necessary, instructing the pilot to proceed to his destination when able. About 1429, the airplane began a series of descending right turns, and the controller instructed the pilot to maintain 12,000 ft. The airplane continued to descend, and the controller again advised the pilot that he was losing altitude; the pilot replied, "I'm doing the best I can." At 1432, the controller advised the pilot that he was descending through 5,800 ft and to check his altitude. There was no response, and radar contact was lost shortly thereafter at an altitude about 2,000 ft msl.

A witness reported that he was standing in his driveway and noticed how windy it was and that the trees were leaning over almost 90°. He said that it was not raining, but he did hear thunder in the distance. He reported hearing an airplane flying above making a "weird" sound. He said he heard a loud "boom" and saw pieces of the airplane falling out of the sky but did not see it break apart. He then saw the fuselage of the airplane, which was spinning through the air, descending toward the ground.

Pilot Information

Certificate:	Private	Age:	45, Male
Airplane Rating(s):	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 2 Without Waivers/Limitations	Last FAA Medical Exam:	08/22/2016
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 288 hours (Total, all aircraft), 288 hours (Total, this make and model)		

The pilot, age 45, held a private pilot certificate with ratings for airplane single-engine land and instrument airplane. He reported a total flight experience of 288 hours, including 16.6 hours during the previous 6 months, on his most recent FAA third-class medical certificate application dated August 22, 2016. At that time, the pilot reported no medical conditions, and the medical certificate indicated no restrictions. The pilot's logbook was not available for review. The pilot's recent flight experience and instrument flight experience could not be determined. A review of the aircraft logbook revealed that the airplane was flown a total of 25.7 hours since the pilot's most recent flight review on July 27, 2016.

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	Registration:	N6563D
Model/Series:	T210 L	Aircraft Category:	Airplane
Year of Manufacture:	1974	Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	21060580
Landing Gear Type:	Tricycle	Seats:	4
Date/Type of Last Inspection:	07/18/2016, Annual	Certified Max Gross Wt.:	3800 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:	4258.5 Hours as of last inspection	Engine Manufacturer:	Continental
ELT:	C91A installed, not activated	Engine Model/Series:	TSIO-520-R
Registered Owner:	RHEIORG CONSULTING LLC	Rated Power:	310 hp
Operator:	On file	Operating Certificate(s) Held:	None

The airplane was manufactured in 1974 and was powered by a Continental TSIO-520-R engine rated at 310 horsepower equipped with a McCauley three-bladed controllable pitch propeller. The most recent annual inspection was completed on July 18, 2016, at a tachometer time of 2,220.8 hours.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	BHM, 650 ft msl	Distance from Accident Site:	22 Nautical Miles
Observation Time:	1453 CDT	Direction from Accident Site:	180°
Lowest Cloud Condition:	Unknown	Visibility	10 Miles
Lowest Ceiling:	Broken / 4600 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	16 knots /	Turbulence Type Forecast/Actual:	/ None
Wind Direction:	260°	Turbulence Severity Forecast/Actual:	/ N/A
Altimeter Setting:	30.09 inches Hg	Temperature/Dew Point:	21° C / 12° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	ORLANDO, FL (ISM)	Type of Flight Plan Filed:	IFR
Destination:	JACKSON, TN (MKL)	Type of Clearance:	IFR
Departure Time:	1250 EDT	Type of Airspace:	Class G

Synoptic Conditions

The southeast section of the National Weather Service (NWS) Surface Analysis Chart for 1300 depicted a low pressure system over Missouri at 1007-hectopascals (hPa) associated with an occluded front. Over northeast Missouri, the occluded frontal system split into a stationary front across northern Missouri eastward across Illinois, Indiana, Ohio, into Pennsylvania, and a cold front extending southward across eastern Missouri through Arkansas and into Louisiana, where the front became stationary and extended southwestward along the Texas Gulf coast. A squall line was depicted ahead of the cold front from southeastern Louisiana into southern Mississippi with an outflow boundary depicted from the end of the squall line northward across western Alabama, immediately west of the accident site at the time of the accident. The accident site was located ahead of the cold front and the outflow boundary, in the warm air sector of the front.

The station models on the surface analysis chart depicted southerly winds sustained at 5 to 15 knots and broken to overcast sky cover in the area of the accident site. One station immediately south-southwest of the accident site and behind the outflow boundary reported a thunderstorm and rain showers. East of the outflow boundary, the station models indicated temperatures in the mid-to-upper 70s°F, while west of the boundary the temperatures were in the low 60s°F.

Dew point temperatures were in the 50s°F to near 60°F near the Gulf Coast.

Regional Radar Mosaic

Weather radar depicted a line of echoes in the immediate vicinity of the accident site, which is enclosed in the red circle (see figure 1), the echoes were immediately west of Birmingham, Alabama at the time. A second more defined line of intense echoes associated with the squall line extended behind the first line from southeast Mississippi, to southeastern Louisiana, and into the Gulf of Mexico. A third area was located behind the two lines west through north of Jackson, Mississippi with an area of intense echoes.

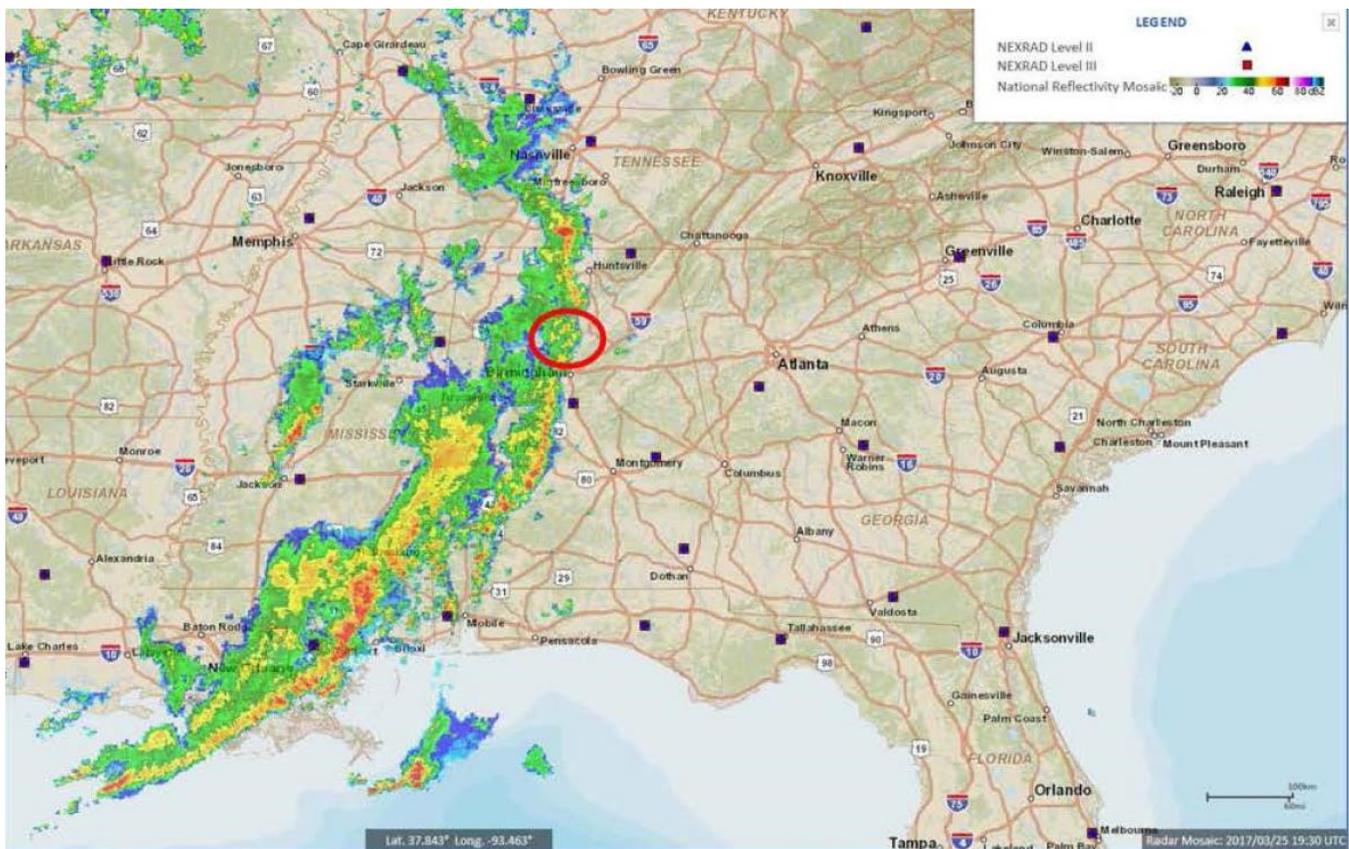


Figure 1: National Radar Mosaic

Convective Outlook

The morning convective outlook chart from the NWS Storm Prediction Center depicted a slight risk of organized severe thunderstorms over western Alabama, eastern Mississippi, and southeastern Louisiana during the period around the accident time, with a marginal area of thunderstorms through western Tennessee and the rest of Alabama. A slight risk indicated that an area of organized severe thunderstorms of scattered coverage was possible across the region, with either short-lived and/or isolated severe storms possible. A marginal risk indicated more isolated severe storm coverage. The convective outlook is typically used in

preflight weather briefings to highlight areas where thunderstorms and severe thunderstorms can be expected.

Surface Observations

The closest weather reporting station was Birmingham-Shuttlesworth International Airport (BHM), located 25 miles south of the accident site at an elevation of 650 ft.

The 1353 observation included wind from 160° at 14 knots gusting to 19 knots, 10 miles visibility, a few clouds at 4,700 ft above ground level (agl), broken ceiling at 6,000 ft agl, temperature 26°C, dew point temperature 13°C, altimeter 30.10 inches of mercury. Remarks included peak wind from 200° at 28 knots at 1307, and distant lightning to the northwest.

The 1453 observation included wind from 260° at 16 knots, 10 miles visibility, broken ceiling at 5,500 feet agl, temperature 21°C, dew point temperature 12°C, altimeter 30.09 inches of mercury.

A special weather observation issued at 1502 included wind from 260° at 17 knots gusting to 22 knots, 10 miles visibility, overcast ceiling at 4,600 ft agl, temperature 20°C, dew point temperature 12°C, altimeter 30.09 inches of mercury. Remarks included wind shift occurred at 1442, and distant lightning to the south and southwest.

Preflight Weather Briefing

The pilot accessed an online weather briefing through ForeFlight and filed an IFR flight plan. He obtained a low-altitude route briefing between Kissimmee, Florida, and Jackson, Tennessee, at 0606 and again at 1134, about 20 minutes before departure. The briefing included all relevant reports and forecasts, advisories, and NOTAMs for the route.

The terminal forecast for BHM, which was along the route of flight, predicted marginal visual flight rules conditions with southeasterly wind at 20 knots gusting to 30 knots, with visibility 4 miles in moderate rain, overcast cumulonimbus clouds at 2,000 ft agl, and thunderstorms. At the time of the briefing, other than the AIRMETs Tango for turbulence, there were no hazardous weather advisories current for the route. A review of the briefing indicated that the convective outlook documented above was included in the information accessed by the pilot.

Although there were no hazardous weather advisories or convective SIGMETs active at the time the pilot received his preflight weather information, two of the air traffic controllers who worked the flight broadcast convective SIGMETs while the pilot was on frequency that affected the pilot's intended route of flight and called for thunderstorms with tops exceeding 40,000 ft. One of these SIGMETs was broadcast about 1 hour into the flight, and the second about 2 hours into the flight (about 40 minutes before the accident occurred).

In-Flight Weather Information

Convective SIGMET

Convective SIGMETs 60C and 61C were issued at 1255 for two areas of thunderstorms over western Alabama, Mississippi, southeastern Louisiana, and for the immediate coastal waters. Convective 60C impacted the route of flight but did not extend over the location of the accident. The advisory was current until 1455.

Three sperate convective SIGMETs were issues at 1355 for portions of southwestern Alabama, southern Mississippi, and Louisiana, which were valid until 1555. In the hour prior to the accident, no Convective SIGMENTS were current for the route of flight, although the outlook area warned of potential issuance of advisories over the region.

Reflectivity

Figure 2 depicts the airplane's flight track overlaid on the Birmingham WSR-88D base reflectivity image for 1432 with reflectively elevation angle scans at 0.44°, 1.23° and 2.35°; respectively. Echoes of 5 to 35 dBZ or light to moderate intensity echoes along the flight track were present at all elevation scans with echoes of 45dBZ or heavy intensity echoes present within 5 miles northwest of the flight track. A strong intensity echo with reflectivity of 55dBZ or extreme intensity echoes south-southwest of the accident site was beginning to develop or surge upwards and move to the north-northeast.



Figure 2: Birmingham WSR-88D Base Reflectivity Images

[For additional weather information, see the NTSB Meteorology Factual Report located in the public docket for this investigation.]

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	3 Fatal	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	4 Fatal	Latitude, Longitude:	33.909167, -86.732778

The wreckage field was about 4,550 ft long, oriented on a true heading about 247°. The left elevator was located at the beginning of the debris field. Continuing along the wreckage path was the inboard right wing and the left wing assembly, including the aileron and flap. Various parts of the airplane continued along the debris path that led to the main wreckage, which was located at the end of the debris path. The main wreckage comprised the engine, fuselage, and empennage. The engine mounts were broken; however, the engine remained attached to the airframe through hoses, wires, and cables. The cockpit and cabin were destroyed; the flight instruments were impact damaged. The empennage remained attached by the rudder and elevator control cables. The horizontal stabilizers were bent upward toward the vertical stabilizer. The rudder remained attached to the vertical stabilizer.

The left wing and center wing section separated from the fuselage and remained intact. The right wing separated outboard of the top and bottom spars. The right wing was separated into 3 large pieces with the aileron still attached to the outboard portion of the wing. An approximate 6-ft section of the middle portion of the right wing, which included the entire right flap, was removed from the accident site before the site could be secured.

Control cable continuity was established from the rudder, elevator, and elevator trim tab to the forward floor assembly area. Control cable continuity was established from the right aileron bellcrank to the wing root area. Control cable continuity was established from the left aileron bellcrank to the wing root area for the drive cable. The left aileron carry-through cable was fractured in tensile overload from the bellcrank. Examination of the airframe did not reveal any pre-accident anomalies that would have precluded normal operation.

Examination of the engine established continuity between the crankshaft, camshaft, connecting rods, and associated components by rotating the crankshaft with a hand tool. All six cylinders displayed thumb compression and suction. The No. 5 cylinder displayed significantly less compression and suction than the other cylinders; a borescope inspection revealed a small piece of wood between the intake valve and the valve seat. All the cylinders were inspected using a lighted borescope; the internal components displayed normal operating and combustion signatures.

The fuel pump remained attached to its installation point and displayed minor impact damage signatures. The fuel pump was removed; the drive coupling was intact and the driveshaft was capable of rotation. The throttle and fuel metering assembly had broken free from its installation point and displayed impact damage. The throttle and mixture control arms remained secured to their shafts and the fuel inlet screen was clear of any contaminants. The manifold valve was undamaged and disassembled. The internal components displayed normal

operation signatures; there were no anomalies noted within the valve housing. The fuel injectors were removed and were clear of obstructions.

Examination of the magnetos revealed that the right magneto had broken free from its mounting pad and the left magneto remained partially attached to its mounting pad. The magnetos were removed and the driveshafts were rotated by hand as well as using an electric drill. Both magnetos produced a spark to each of the posts in the correct order. The ignition harness displayed impact damage signatures to several of the ignition leads.

The top spark plugs were removed and visually inspected; the electrodes displayed normal operating and wear signatures. The bottom spark plug electrodes were inspected using a lighted borescope and displayed normal operating signatures.

The turbocharger remained attached to the exhaust system and displayed impact damage. Continuity was established between the compressor and turbine section and both the compressor and tubing were capable of normal rotation. The compressor and turbine blades displayed normal operating signatures. Examination of the engine revealed no pre-impact anomalies that would have prevented normal operation or production of rated horsepower.

Examination of the propeller revealed that blades No. 1 and No. 2 displayed minor forward-bending deformation and blade No. 3 displayed a significant amount of aft-bending deformation. All blades displayed chordwise scoring and impact damage. No pre-impact anomalies were noted during the examination that would have prevented normal operation.

Medical And Pathological Information

An autopsy was performed on the pilot by the University of Alabama, Birmingham, Department of Pathology; the cause of death was multiple blunt force injuries.

Toxicology testing performed at the FAA Forensic Sciences Laboratory identified N-propanol and ethanol at 0.046 gm/dl in muscle, but no ethanol in liver, and amphetamine in lung and heart tissue (0.114 µg/g).

Ethanol is the intoxicant commonly found in beer, wine, and liquor. It acts as a central nervous system depressant. Because ingested alcohol is distributed throughout the body, levels from different postmortem tissues are usually similar. Ethanol may also be produced in body tissues by microbial activity after death; in this case levels may vary widely.

Amphetamine is a Schedule II controlled substance that stimulates the central nervous system. It is available by prescription for the treatment of attention deficit disorders and narcolepsy. It carries a boxed warning about its potential for abuse and has warnings about an increased risk of sudden death and the potential for mental health and behavioral changes.

Additional Information

According to the FAA's General Aviation Joint Steering Committee, a pilot's sight, supported by other senses, allows a pilot to maintain orientation while flying. However, when visibility is restricted (i.e., no visual reference to the horizon or surface detected), the body's supporting senses can conflict with what is seen. When this spatial disorientation occurs, sensory conflicts and optical illusions often make it difficult for a pilot to tell which way is up.

The FAA Airplane Flying Handbook (FAA-H-8083-3) describes some hazards associated with flying when visual references, such as the ground or horizon, are obscured. The handbook states,

The vestibular sense (motion sensing by the inner ear) in particular tends to confuse the pilot. Because of inertia, the sensory areas of the inner ear cannot detect slight changes in the attitude of the airplane, 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.

FAA Advisory Circular (AC) 60-22, Aeronautical Decision Making, states, "Pilots, particularly those with considerable experience, as a rule always try to complete a flight as planned, please passengers, meet schedules, and generally demonstrate that they have 'the right stuff.'" One of the common behavioral traps that the AC describes is "Get-There-Itis." The text states, "Common among pilots, [get-there-itis] clouds the vision and impairs judgment by causing a fixation on the original goal or destination combined with a total disregard for any alternative course of action."

FAA AC-00-6B, Aviation Weather, describes thunderstorms and the turbulence that is associated with them. The AC stated, in part:

Turbulence is present in all thunderstorms. Severe or extreme turbulence is common. Gust loads can be severe enough to stall an aircraft at maneuvering speed or to cause structural damage at cruising speed. The strongest turbulence occurs with shear between updrafts and downdrafts. Outside the cumulonimbus cloud, turbulence has been encountered several thousand feet above, and 20 miles laterally from, a severe storm.

The Turbulence Reporting Criteria Table in the FAA Aeronautical Information Manual provides the following definitions:

Severe: Turbulence that causes large, abrupt changes in altitude and/or attitude. It usually causes large variations in indicated airspeed. Aircraft may be momentarily out of control.

Extreme: Turbulence in which the aircraft is violently tossed about and is practically impossible to control. It may cause structural damage.

Administrative Information

Investigator In Charge (IIC):	Eric Alleyne	Report Date:	11/06/2019
Additional Participating Persons:	Joel Clark; FAA/FSDO; Birmingham, AL Kurt Gibson; Continental Motors; Mobile, AL Peter Basile; Textron/ Cessna; Whicita, KS		
Publish Date:	11/06/2019		
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=94911		

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](#).