# National Transportation Safety Board
# Aviation Accident Final Report

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| **Location:** | Wells, TX | **Accident Number:** | CEN13FA073 |
| **Date & Time:** | 11/26/2012, 2124 CST | **Registration:** | N67SR |
| **Aircraft:** | CESSNA 421C | **Aircraft Damage:** | Substantial |
| **Defining Event:** | Windshear or thunderstorm | **Injuries:** | 1 Fatal |
| **Flight Conducted Under:** | Part 91: General Aviation - Business | | |

## Analysis

While in cruise flight, the twin-engine airplane encountered a severe thunderstorm that likely contained hail up to 1.25 inches in diameter. After penetrating the thunderstorm, the airplane's structure failed, which was evidenced by the pieces of the airplane being found up to 0.6 mile away from the main wreckage. The horizontal tail, which was found 0.25 mile from the main wreckage, had dents on the upper surface that were consistent with in-flight hail damage. The left horizontal stabilizer had failed in an upward direction, and the right horizontal stabilizer had failed in a downward direction, consistent with an extreme left roll rate. In addition, both left and right outboard wing sections were partially separated from the remainder of the wing. Although there was no record of the pilot having obtained a FAA weather briefing, it was not possible to determine if the pilot used other sources to obtain weather information prior to the flight. Records of in-flight communications indicated that the pilot was advised of adverse weather, including thunderstorms and moderate, heavy, and extreme precipitation about 15 minutes before his last transmission. At that time, the airplane was 40 miles from the storm. In addition, the pilot confirmed during communications that the airplane was equipped with on-board weather radar (which provided real-time weather), and the controller authorized him to deviate course, if necessary.

## 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 an area of extreme weather, which led to the in-flight encounter with a thunderstorm and structural failure of the wings and tail.

## Findings

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| **Aircraft** | Wing structure - Failure<br>Empennage structure - Failure |
| **Personnel issues** | Decision making/judgment - Pilot (Cause) |
| **Environmental issues** | Thunderstorm - Effect on equipment (Cause)<br>Thunderstorm - Decision related to condition (Cause)<br>Thunderstorm - Effect on operation (Cause)<br>Hail - Effect on equipment |

## Factual Information

HISTORY OF FLIGHT

On November 26, 2012, about 2124 central standard time, a Cessna 421C airplane, N67SR, was substantially damaged during an in-flight encounter with weather, in-flight separation of airframe components, and subsequent impact with the ground near Wells, Texas. The private pilot, who was the sole occupant, was fatally injured. The airplane sustained impact and fire damage to all major airframe components. The aircraft was registered to H-S Air LP and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a business flight. Instrument meteorological conditions prevailed for the flight, which operated on an instrument flight rules (IFR) flight plan. The flight originated from the West Houston Airport (IWS), Houston, Texas, about 2040 and was bound for the Richard Lloyd Jones Jr. Airport (RVS), Tulsa, Oklahoma.

Witnesses near the accident site reported hearing an explosion and then seeing a fireball descending through the clouds to the ground.

Radar track data for the last portion of the flight depicted the airplane on a 7720 transponder code. The track showed the airplane initially on a heading of about 20 degrees at 23,000 feet. The track continued in this direction until 2120:03.73 when the airplane began a right turn. The right turn continued for about 30 seconds during which time the altitude remained constant and the heading changed to about 90 degrees. After 2120:45.86, the track showed an erratic steep descent that continued to the end of the data. The final data location was received at 2122:15.53 at an altitude of 2,800 feet. The accident location was 0.86 miles and 94 degrees from the last recorded radar position.

PERSONNEL INFORMATION

The pilot held a private pilot certificate with airplane single-engine land, airplane multiengine land, and instrument airplane ratings. He was issued a third-class airman medical certificate, with a restriction for corrective lenses, on May 8, 2012. According to Federal Aviation Administration (FAA) records, the pilot reported having 2,500 hours total flight experience with 75 hours in the six months preceding his most recent medical examination. The pilot's flight logbook was not recovered during the investigation.

AIRCRAFT INFORMATION

The airplane was a Cessna model 421C, bearing serial number 421C-0257. It was a twin-engine propeller driven monoplane with a retractable tricycle landing gear. Different seating arrangements could be employed with the capability of seating 8 occupants including the 2 flight crew seats. The exact seating configuration of the accident airplane could not be determined due to the extensive impact and fire damage. The airplane was constructed mainly of aluminum alloy materials and had a cantilever main wing arrangement and a pressurized fuselage. Two Continental GTSIO-520-L engines, serial numbers 825011-R and 292480-R, were mounted on each wing and were each capable of producing 375 horsepower.

Maintenance records for the airplane showed that it had accumulated 6736.2 hours total time in service as of its most recent annual inspection dated October 13, 2012. The left and right engines had accumulated 1,039.1 hours, and 1215.1 hours respectively since overhaul as of the date of the annual inspection.

METEOROLOGICAL INFORMATION

No record of the pilot having obtained a Flight Service Station (FSS), or Direct User Access Terminal System (DUATS), weather briefing was found for the accident flight. However, no determination could be made as to whether the pilot obtained weather information from other sources prior to the flight.

An Area Forecast (FA) that included Texas was issued at 2045. The portion of the FA directed toward the southeastern quarter of the northeastern portion of Texas forecasted for times until 0100 the next day: ceiling broken at 3,000 feet msl with cloud tops to 8,000 feet msl and broken cirrus, isolated thunderstorms and light rain with cumulonimbus tops to 38,000 feet. No thunderstorms were forecast for other portions of northeastern Texas.

No Airmen's Meteorological Information (AIRMET) advisories were issued for the accident location at the most recent AIRMET issuance times prior to the accident. The accident site was, however, close to an active AIRMET for IFR conditions issued at 2045.

The Aviation Weather Center in Kansas City, Missouri, issued several Convective Significant Meteorological Information (SIGMET) advisories at 1955 and 2055 that were valid until 2155 and 2255 respectively. These SIGMETs were active for a line of thunderstorms in eastern Texas. The boundaries of the SIGMETs were all near to the accident site. The most recent SIGMET (5C) boundary depicted a 35 mile wide line of thunderstorms that stretched from 30 miles south-southeast of the BELCHER Very High Frequency Omni-Directional Radio Range Tactical Air Navigation Aid (VORTAC), near Shreveport, Louisiana, to 40 miles east of the CENTEX VORTAC near Austin, Texas. The thunderstorm had cloud tops to 45,000 feet and was moving eastward at 20 knots. The accident site was within the boundaries described in the SIGMET.

The National Weather Service (NWS) Surface Analysis Chart for 2100 depicted a low-pressure center at the northwestern Louisiana border with Texas. Associated with the low-pressure center was a cold front that stretched southwestward through the accident region to Mexico, a warm front that stretched southeastward to the Mississippi Gulf coast, and a stationary front that stretched east-northeast.

Station models depicted the wind as northerly behind the cold front in northeast Texas with magnitudes ranging from approximately 10 to 20 knots. Ahead of the cold front the wind was generally southerly with magnitudes near 5 knots. Most station models across eastern Texas depicted clear skies. Temperatures near to and immediately ahead of the cold front were near 70° Fahrenheit (F) with dew point depressions as low as 2°F.

A regional Next-Generation Radar (NEXRAD) mosaic obtained from the National Climatic Data Center (NCDC) for 2120 CST identified a broken line of high (>50 dBZ) values of reflectivity that stretched from central east Texas to northwestern Louisiana. A part of this line was coincident with the accident location.

WSR-88D Level-II base reflectivity weather radar data from Shreveport, Louisiana was obtained. Three-dimensional presentations of base reflectivity isosurfaces from the volume scan initiated at 2116:35 indicated that the accident aircraft penetrated the highest values of reflectivity (> 50 dBZ) during the final portion of its flight and just before its rapid descent. The eastern portion of the 50 dBZ isosurface that rose to a higher altitude was consistent with a convective updraft that may have contained hail. An algorithm utilized by the program GR2Alanlyst (a Nexrad Level II analysis application) to estimate hail stone diameter indicated

the potential for 1.25 inch hail in that portion of the storm, and GR2Analyst identified the probability of severe hail (POSH) as high as 84.6 percent.

## COMMUNICATIONS

Summaries and transcripts of communications between the airplane and various controlling facilities were obtained from the FAA.

At 2033, the pilot contacted the Houston Intercontinental Airport (IAH) Terminal Radar Approach Control (TRACON), Satellite Clearance Delivery position using his airplane's radio and was issued an IFR clearance from IWS to RVS. The airplane subsequently departed IWS at 2040. The pilot maintained communications with the IAH TRACON until 0257 when he was handed off to the Houston Air Route Traffic Control Center (ARTCC).

At 2057, the pilot checked in with the Houston ARTCC. After establishing communications, the controller cleared the pilot to climb and maintain 23,000 feet. The pilot inquired regarding reports of the cloud tops for the weather he was approaching. The controller advised the pilot that other aircraft were deviating around the weather and that he was working on a route for the airplane to avoid the weather. At 2058, the controller advised the pilot that there were no cloud top reports and then cleared the airplane direct to Longview, Texas, and then direct to Tulsa, Oklahoma. At 2059, the controller disseminated convective SIGMETs 5C and 6C. At 2102, the controller advised the pilot that 23,000 feet would be his final altitude. At 2107, the controller advised the pilot of moderate, heavy, and extreme precipitation 40 miles ahead of the airplane and moving east, and that if the pilot needed to deviate further to the right to let him know. The pilot responded that he was looking at the weather and would let the controller know if he needed to deviate further to the right. Subsequently, at 2113, the pilot requested a 10 degree deviation to the right, which the controller approved. At 2119, the pilot was provided a frequency and advised to contact the Fort Worth ARTCC.

At 2120:28, the Fort Worth controller established communication with N67SR and queried the pilot as to whether the airplane was equipped with a weather radar system on-board. The pilot confirmed having weather radar. The controller then advised the pilot of moderate to heavy precipitation ten miles directly ahead of the airplane's flight path. The pilot acknowledged saying "yes sir", which was the final transmission received from the airplane.

## WRECKAGE AND IMPACT INFORMATION

The airplane came to rest in a wooded area near Wells, Texas, in an inverted position with the fuselage oriented in a 220 degree direction. The fuselage and both wings suffered extensive fire damage. The lower fuselage was almost completely consumed by fire. The upper fuselage was recognizable but also had significant fire damage. The landing gear was observed in the retracted position. A baggage door from the nose of the airplane was located about 0.6 miles southeast of the main wreckage.

The vertical stabilizer had impacted a tree on its lower leading edge. It remained attached to the aft fuselage and was predominately intact. The majority of the rudder was not located at the accident scene. The horizontal stabilizer and elevators were separated from the airframe and were located about 0.25 miles south-southwest of the main wreckage. The horizontal stabilizer showed no evidence of fire damage. The left stabilizer was bent in a leading edge upward direction. The forward spar was separated at a location approximately where the fuselage side would have met the spar. The leading one-third of the upper surface of the left stabilizer had numerous dents with a fore-aft component that were consistent with an in-flight encounter

with hail. A large portion of the left elevator was missing and was not located at the accident scene. The right stabilizer was bent in a leading edge downward direction and had large portions of its structure missing. Those missing pieces were not located during the on-scene investigation. The remaining structure exhibited evidence of tearing of the outer skin and underlying substructure. The right elevator was predominately intact and remained attached to its hinge locations.

The remains of the outboard right wing came to rest adjacent to the right engine nacelle. The entire wing structure had suffered significant fire damage and was almost completely consumed by fire. The wing tip was positioned next to the engine nacelle while the root portion of the outboard wing was positioned approximately where the wing tip would have normally been. The wing was resting with its upper surface on the ground, the leading edge facing aft, and the trailing edge facing forward relative to the fuselage. The aileron hinge fittings were identified in their normal location. The aileron tip and root were found as was the curved leading edge. The portion of the aileron between the tip and root was not found and is presumed to have been consumed by fire. Examination of the inboard wing spars showed damage consistent with overload failure in a downward direction.

A portion of the outboard left wing was found lying atop the left engine nacelle. A large portion of the left wing was not located; however, the retractable landing light that was located near the wing tip was identified in the wreckage. The missing portions of the left wing were presumed to have been consumed by fire.

Several cuts were made to the control cables by first responders to the accident scene and were discounted during the control system examination. The rudder cables were continuous from the tail cone to their attachment points on the rudder bar bellcranks. One bellcrank on the right rudder bar was separated from the tube at the weld. The break was consistent with the bellcrank arm having been pulled from the tube during the impact sequence. The elevator control cables were continuous from the tail cone to the cockpit. The aft ends of the cables remained attached to the elevator bellcrank attachment points; however the bellcrank itself was fractured. The forward ends of the control cables still had the swaged balls that would have engaged the pulley sector on the forward elevator torque tube within the cockpit. The pulley sector, which is made from aluminum, was partially melted due to fire damage. One cable still remained attached to the remnants of the pulley sector and the other half of the pulley sector was not located and was presumed to have been consumed by fire. One aileron cable remained attached to the interconnect chain, and the cable that would attached to the opposite end of the chain was embedded in melted and re-solidified aluminum within the cockpit. The cables from the interconnect chain were continuous to the bellcrank position located in the center fuselage. The bellcrank was not found and is presumed to have been consumed by fire. Both right side control cables were separated at a location approximately near the outboard side of the engine nacelle. The inboard ends of these cables were continuous to the bellcrank position located in the center fuselage. The outboard ends of these cables were intact and one cable remained attached to the bull-wheel at the aileron. The other cable had been pulled loose from the bull-wheel. The cable separations were consistent with overload failure. The left side control cables were continuous from the bellcrank position in the center fuselage to the outboard ends of the cables. The bull-wheel was not found and is presumed to have been consumed by fire.

The left engine was examined and an attempt was made to rotate the engine. The engine could not be rotated. Subsequently, the engine was disassembled and all internal components

examined. The forward engine case near the gear reduction drive was fractured. None of the internal engine components exhibited any preimpact anomalies that would have prevented normal engine operation. The spark plugs exhibited normal burn signatures. The magnetos had impact damage and could not be rotated.

The right engine was examined and the crankshaft was able to be rotated. Compression and suction were verified on all cylinders. The rocker covers were removed and valve action was verified on all cylinders. The spark plugs exhibited normal burn signatures. Both magnetos had impact damage and could not be rotated. No preimpact anomalies were noted that would have precluded normal operation.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy of the pilot was performed by Forensic Medical of Texas, Tyler, Texas, on November 28, 2012. The pilot's death was attributed to injuries received in the accident.

Toxicology testing was performed by the FAA Civil Aerospace Medical Institute (CAMI). Testing results were negative for all substances in the screening profile except Atorvastatin detected in Liver. According to CAMI drug information, Atorvastatin is a member of the drug class known as statins, used for lowering blood cholesterol.

## History of Flight

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| **Enroute-cruise** | Windshear or thunderstorm (Defining event) |

## Pilot Information

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| **Certificate:** | Private | **Age:** | 64 |
| **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:** | 05/08/2012 |
| **Occupational Pilot:** | No | **Last Flight Review or Equivalent:** | |
| **Flight Time:** | 2500 hours (Total, all aircraft) | | |

## Aircraft and Owner/Operator Information

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| **Aircraft Make:** | CESSNA | **Registration:** | N67SR |
| **Model/Series:** | 421C | **Aircraft Category:** | Airplane |
| **Year of Manufacture:** | | **Amateur Built:** | No |
| **Airworthiness Certificate:** | Normal | **Serial Number:** | 421C0257 |
| **Landing Gear Type:** | | **Seats:** | 8 |
| **Date/Type of Last Inspection:** | 10/13/2012, Annual | **Certified Max Gross Wt.:** | |
| **Time Since Last Inspection:** | | **Engines:** | 2 Reciprocating |
| **Airframe Total Time:** | 6736 Hours as of last inspection | **Engine Manufacturer:** | Continental |
| **ELT:** | Installed, not activated | **Engine Model/Series:** | GTSIO-520 |
| **Registered Owner:** | H-S AIR LP | **Rated Power:** | 375 hp |
| **Operator:** | On file | **Operating Certificate(s) Held:** | None |

## Meteorological Information and Flight Plan

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| **Conditions at Accident Site:** | Instrument Conditions | **Condition of Light:** | Night/Dark |
| **Observation Facility, Elevation:** | LFK, 296 ft msl | **Distance from Accident Site:** | 20 Nautical Miles |
| **Observation Time:** | 2135 CST | **Direction from Accident Site:** | 145° |
| **Lowest Cloud Condition:** | | **Visibility** | 10 Miles |
| **Lowest Ceiling:** | Broken / 3500 ft agl | **Visibility (RVR):** | |
| **Wind Speed/Gusts:** | 7 knots / | **Turbulence Type Forecast/Actual:** | / |
| **Wind Direction:** | 330° | **Turbulence Severity Forecast/Actual:** | / |
| **Altimeter Setting:** | 30.02 inches Hg | **Temperature/Dew Point:** | 20°C / 16°C |
| **Precipitation and Obscuration:** | In the Vicinity - Thunderstorms - No Precipitation | | |
| **Departure Point:** | Houston, TX (IWS) | **Type of Flight Plan Filed:** | IFR |
| **Destination:** | Tulsa, OK (RVS) | **Type of Clearance:** | IFR |
| **Departure Time:** | 2040 CST | **Type of Airspace:** | |

## Wreckage and Impact Information

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| **Crew Injuries:** | 1 Fatal | **Aircraft Damage:** | Substantial |
| **Passenger Injuries:** | N/A | **Aircraft Fire:** | In-Flight and On-Ground |
| **Ground Injuries:** | N/A | **Aircraft Explosion:** | In-Flight and On-Ground |
| **Total Injuries:** | 1 Fatal | **Latitude, Longitude:** | 31.470556, -94.940556 |

## Administrative Information

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| **Investigator In Charge (IIC):** | John M Brannen | **Report Date:** | 06/23/2014 |
| **Additional Participating Persons:** | Christopher Doherty; FAA-Dallas FSDO; Irving, TX<br>Andrew Hall; Cessna Aircraft; Wichita, KS<br>Kurt Gibson; Continental Motors, Inc.; Mobile, AL | | |
| **Publish Date:** | 06/23/2014 | | |
| **Investigation Docket:** | http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=85671 | | |