Aviation Investigation Final Report

Location:	Glenwood Springs, Colorado	**Accident Number:**	CEN17FA354
Date & Time:	September 15, 2017, 20:10 Local	**Registration:**	N462SR
Aircraft:	CIRRUS DESIGN CORP SR22	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	4 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The non-instrument-rated private pilot and three passengers departed on a night cross-county flight over mountainous terrain. Radar track data showed that the airplane traveled mainly on a southwesterly heading directly towards its destination with a series of altitude changes. About 5 minutes before the accident, the airplane turned to the northwest, a deviation off the destination course, and continued northwest for about 12 miles. After the turn, a passenger sent a text message to a family member stating that they were "taking the long way around, lots of weather, keep you posted." Shortly thereafter, the airplane entered a gradual left turn to the southwest, descending from 11,500 ft to 11,300 ft, then climbing back to 11,400 ft. The last recorded radar return was about 1/4 mile south of the accident site, which was located at an elevation of 10,800 ft. Postaccident examination of the airframe and engine showed severe fragmentation of the airplane consistent with a high-energy impact and did not reveal any preimpact anomalies that would have precluded normal operation.

The flight was likely operating in instrument meteorological conditions (IMC) at the time of the accident, including light to moderate icing conditions. The airplane likely encountered intermittent IMC beginning about 30 minutes after takeoff, and continued into an area of solid IMC about 3 minutes before the accident occurred.

There was no record of the pilot retrieving preflight weather information from an official, access-controlled source, and what weather information, if any, he obtained before or during the flight could not be determined. Based on the weather forecasts and information valid before the airplane departed and while en route, and the equipment available onboard the airplane, there was sufficient weather information available to the pilot before and during the flight to make informed decisions regarding the weather he would likely encounter.

The night instrument conditions present at the time of the accident were conducive to the development of spatial disorientation and the circumstances of the accident. The non-instrument-rated pilot's continued flight into IMC, the airplane's descending turn depicted on radar, and the fragmentation of the

wreckage due to high-energy impact are all consistent with the known effects of a loss of control due to spatial disorientation. It is likely that, while maneuvering, the pilot experienced spatial disorientation, which resulted in a loss of control and subsequent descent into terrain.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:
The non-instrument-rated pilot's inadequate preflight weather planning, his decision to depart into forecast instrument meteorological conditions along the route of flight, and his continued visual flight into instrument meteorological conditions, which resulted in spatial disorientation and a subsequent loss of airplane control.

Findings

Personnel issues	Weather planning - Pilot
Personnel issues	Decision making/judgment - Pilot
Environmental issues	(general) - Contributed to outcome
Personnel issues	Spatial disorientation - Pilot
Aircraft	(general) - Not attained/maintained
Personnel issues	Recent instrument experience - Pilot

Factual Information

History of Flight

Maneuvering	VFR encounter with IMC
Maneuvering	Loss of control in flight (Defining event)

On September 15, 2017, about 2010 mountain daylight time, a Cirrus SR22 airplane, N462SR, impacted trees and mountainous terrain while maneuvering near Glenwood Springs, Colorado. The non-instrument-rated private pilot and three passengers were fatally injured, and the airplane was destroyed. The airplane was owned by Lind's Plumbing and Heating, Inc., Fort Collins, Colorado, and was being operated by the pilot under the provisions of Title 14 *Code of Federal Regulations (CFR)* Part 91. Night instrument meteorological conditions prevailed at the time of the accident, and a visual flight rules (VFR) flight plan was filed for the personal cross-country flight, which from Fort Collins-Loveland Municipal Airport (FNL), Fort Collins/Loveland, Colorado, about 1920, and was destined for Canyonlands Field Airport (CNY), Moab, Utah.

According to air traffic control information from the Federal Aviation Administration (FAA), the pilot was receiving VFR flight-following services during the flight. Radar track data indicated that the airplane departed and traveled on a southwesterly heading toward the destination. At 1925, the pilot stated to the controller that he was going to climb the airplane to 15,000 ft mean sea level (msl) to "get over the mountains and then back down." At 1928, the airplane turned to a southwesterly direct heading to CNY at an indicated altitude about 10,700 ft msl. By 1932, the airplane had climbed to 13,200 ft and stopped climbing. From 1940 to 2000, radar data showed the airplane on a southwest heading with a series of altitude changes between 13,200 ft and 10,500 ft. At 2004, about 10 miles northeast of Glenwood Springs, Colorado, the airplane turned to the northwest, at an altitude of 11,500 ft msl, and continued northwest for about 12 miles (See Figure 1).

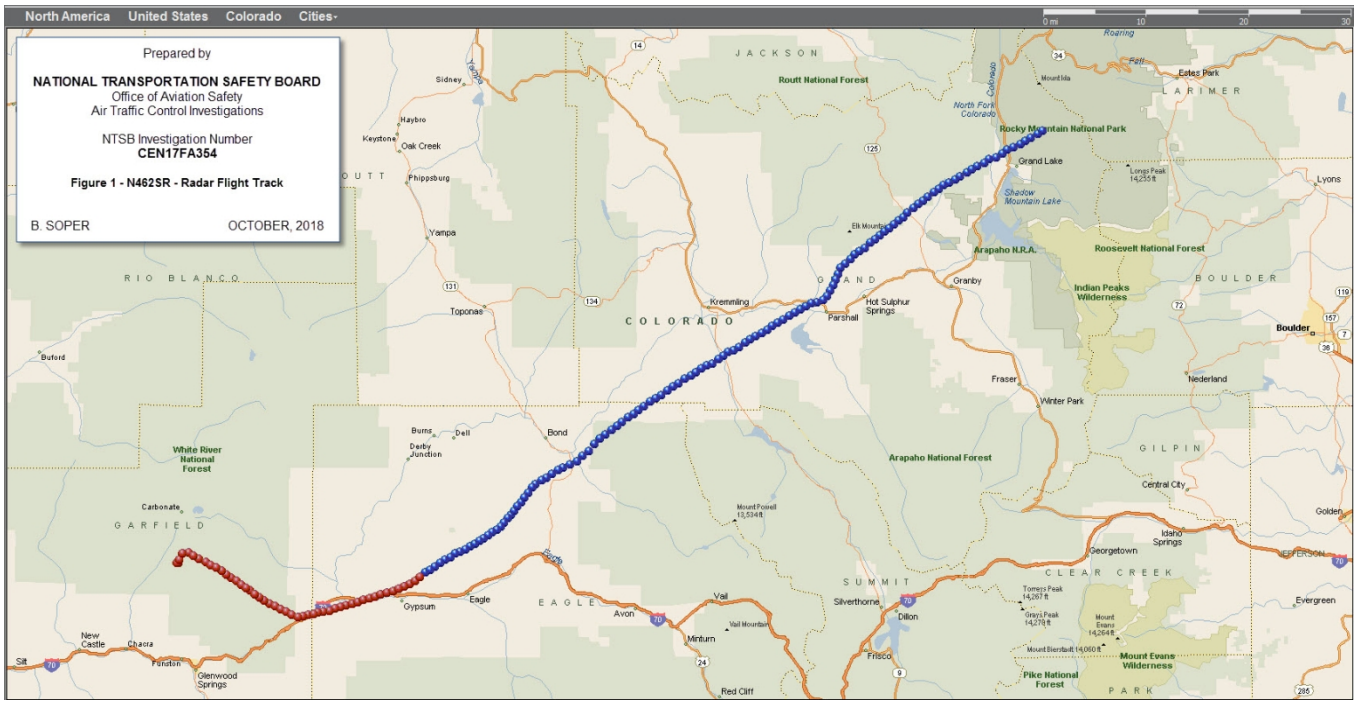

Figure 1 Entire Flight Radar Track

At 2008, a passenger sent a text message to her mother, "Taking the long way around, lots of weather, keep you posted." From 2008:32 to 2009:08, the airplane was in a gradual left turn to the southwest, descending from 11,500 ft to 11,300 ft, then climbing to 11,400 ft. The last recorded radar return was at 2009:32 at an altitude of 11,400 ft msl and about 1/4 mile south of the accident site (See Figure 2).

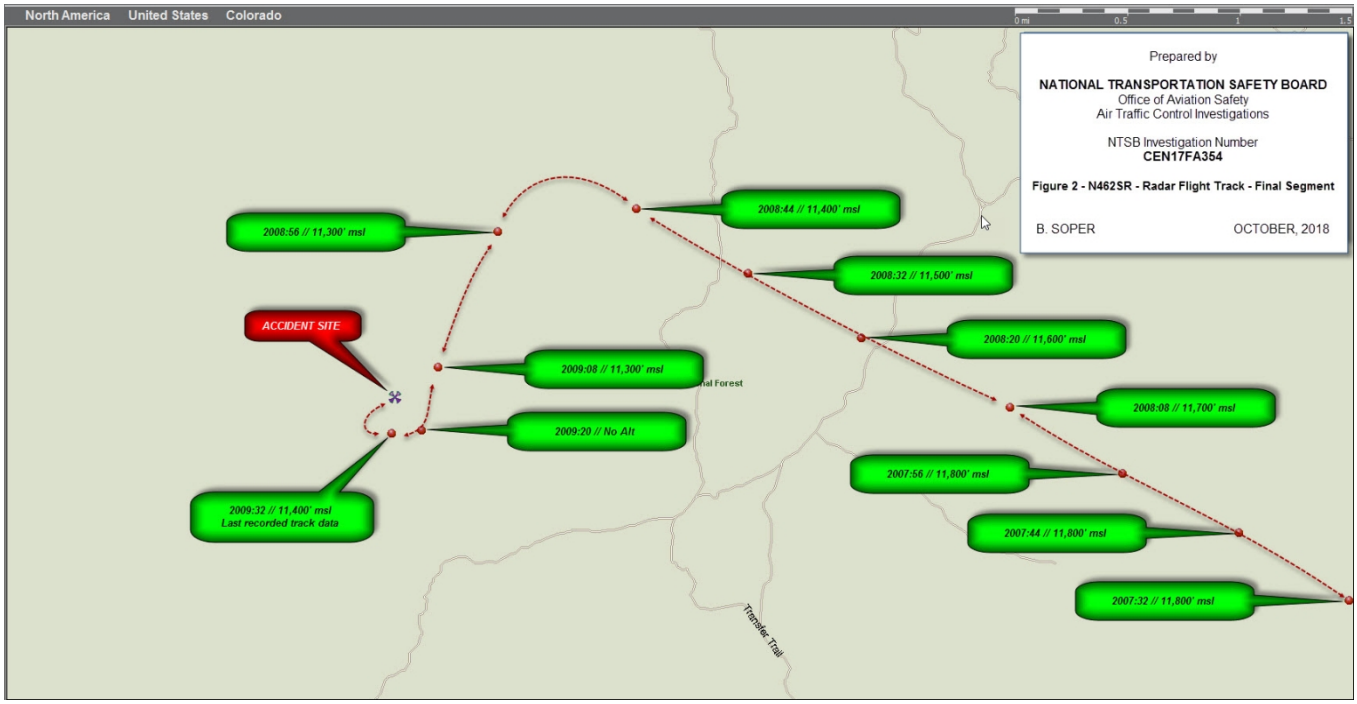

Figure 2 Radar Flight Track - Final Segment

Later that evening, family members reported the airplane was overdue to CNY, and a search was initiated. Search and rescue personnel located the accident site in mountainous terrain at 1137 the following morning.

Pilot Information

Certificate:	Private	**Age:**	47,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	July 14, 2016
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	March 1, 2017
Flight Time:	303.7 hours (Total, all aircraft), 257.7 hours (Total, this make and model), 155.3 hours (Pilot In Command, all aircraft), 55.7 hours (Last 90 days, all aircraft), 3.5 hours (Last 30 days, all aircraft)		

A review of FAA records revealed that the pilot obtained his private pilot certificate on March 1, 2017. The pilot did not hold an instrument rating; his logbook revealed that he had accumulated 2.4 hours in simulated instrument conditions.

The pilot's logbook contained an entry for a flight on May 2, 2017, that contained the pilot's remarks, "First flight over clouds where I could not see the ground (CO Springs)."

According to the pilot's flight instructor, the pilot had recently completed a mountain flying and high altitude operations course sponsored by the Colorado Pilot's Association. A few days before the accident, the flight instructor spoke to the pilot about the planned flight to CNY. The pilot stated that he did not want to leave later than 1800 and that he would use ForeFlight to obtain weather and flight plan information.

According to family members, the pilot's initial plan was to depart for CNY about 1530; however, a business issue resulted in a delayed departure.

Aircraft and Owner/Operator Information

Aircraft Make:	CIRRUS DESIGN CORP	**Registration:**	N462SR
Model/Series:	SR22 NO SERIES	**Aircraft Category:**	Airplane
Year of Manufacture:	2007	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2495
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	May 1, 2017 Annual	**Certified Max Gross Wt.:**	3400 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1468 Hrs as of last inspection	**Engine Manufacturer:**	CONT MOTOR
ELT:	C126 installed, not activated	**Engine Model/Series:**	IO-550-N
Registered Owner:	On file	**Rated Power:**	310 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

The Cirrus SR22 is a single-engine, low-wing airplane with four seats, fixed tricycle landing gear, and dual yoke controls. The accident airplane, serial number 2495, was manufactured in 2007. It was equipped with a 310-horsepower Teledyne Continental Motors IO-550-N six-cylinder, air-cooled, fuel-injected, horizontally opposed reciprocating engine. The three-blade, constant speed propeller was a Hartzell Model PHC-J3YF-1N. The accident airplane was equipped with a Cirrus Airframe Parachute System (CAPS) designed to recover the airplane from catastrophic emergencies in which normal emergency procedures are ineffective. The airplane was also equipped with NEXRAD/XM satellite weather information.

The airplane was registered to the pilot/owner on February 18, 2016.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	5SM,10604 ft msl	**Distance from Accident Site:**	16 Nautical Miles
Observation Time:	20:08 Local	**Direction from Accident Site:**	225°
Lowest Cloud Condition:	Clear	**Visibility**	0.5 miles
Lowest Ceiling:	Overcast / 200 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	11 knots / 23 knots	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	240°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.23 inches Hg	**Temperature/Dew Point:**	2°C / 1°C
Precipitation and Obscuration:	In the vicinity - Showers - Fog		
Departure Point:	Fort Collins, CO (FNL)	**Type of Flight Plan Filed:**	VFR
Destination:	Moab, UT (CNY)	**Type of Clearance:**	VFR flight following
Departure Time:	19:20 Local	**Type of Airspace:**	Class G

According to Leidos Flight Service and Direct User Access Terminal Service (DUATS), the accident pilot did not contact Leidos or DUATS for preflight weather information. A search of archived ForeFlight data revealed no record of the accident pilot accessing weather information; however, with no internet access while in flight, ForeFlight is able to access weather information directly from the FAA, leaving no remote record of such access. Therefore, it is possible that the accident pilot was receiving weather updates during the flight. There was no record of the accident pilot receiving or retrieving any other weather information before the accident flight.

The National Weather Service (NWS) Storm Prediction Center (SPC) Day One convective outlook was issued at 1400 and valid through 0600 the following day. The accident site was included in a "TSTM" area, defined as an area where a 10% or higher probability of thunderstorms is forecast during the valid period.

Rifle Garfield County Airport (RIL), Rifle, Colorado, located 20 miles southwest of the accident site, was the closest official weather station to the accident site. It was at an elevation of 5,537 ft and was equipped with an Automated Surface Observing System (ASOS).

At 1953, the RIL ASOS reported wind from 300° at 5 knots, 10 miles visibility or greater, broken ceiling at 7,500 ft agl, overcast skies at 9,500 ft agl, temperature 12° C, dew point temperature 8° C, and an altimeter setting of 30.04 inches of mercury. Remarks, station with a precipitation discriminator, lightning distant south, rain ended at 1948.

At 2053, the RIL ASOS reported variable wind direction at 3 knots, 10 miles visibility or greater, broken ceiling at 6,000 ft agl, overcast skies at 8,000 ft agl, temperature 12° C, dew point temperature 8° C, and an altimeter setting of 30.07 inches of mercury.

Sunlight Peak (5SM), located 16 miles south of the accident site at an elevation of 10,604 ft, was

equipped with an Automated Weather Observing System (AWOS).

At 1950, the 5SM AWOS reported wind from 240° at 11 knots with gusts to 23 knots, wind direction variable from 210° to 280°, 1/4 mile visibility, thunderstorm with light rain in the vicinity, overcast ceiling at 200 ft agl, temperature 1° C, dew point temperature 1° C, and an altimeter setting of 30.23 inches of mercury.

At 2008, the 5SM AWOS reported wind from 240° at 11 knots with gusts to 23 knots, wind direction variable from 210° to 280°, 1/2 mile visibility, fog, overcast ceiling at 200 ft agl, temperature 2° C, dew point temperature 1° C, and an altimeter setting of 30.24 inches of mercury.

At 2031, the 5SM AWOS reported wind from 240° at 12 knots with gusts to 24 knots, wind direction variable from 180° to 300°, 1 1/4 miles visibility, light rain, overcast ceiling at 200 ft agl, temperature 2° C, dew point temperature 1° C, and an altimeter setting of 30.24 inches of mercury.

The observations from 5SM indicated low instrument flight rules conditions with gusty winds, light rain, distant lightning, and thunderstorms in the vicinity. RIL reported VFR conditions with rain and distant lightning.

Upper air data near the accident site at 2000 indicated a mostly conditionally unstable layer between the surface (10,548 ft) and 18,000 ft. Rawinsonde Observation program indicated that clouds were likely near the surface through 12,000 ft. A small layer of rime icing conditions was indicated about 12,500 ft.

Infrared data from the Geostationary Operational Environmental Satellite number 16 (GOES-16) was obtained. Satellite imagery surrounding the time of the accident was reviewed and indicated cloud cover over the accident site with the cloud cover moving from southwest to northeast. At 2015, the approximate cloud-top heights were 22,000 ft over the accident site (See Figure 3).

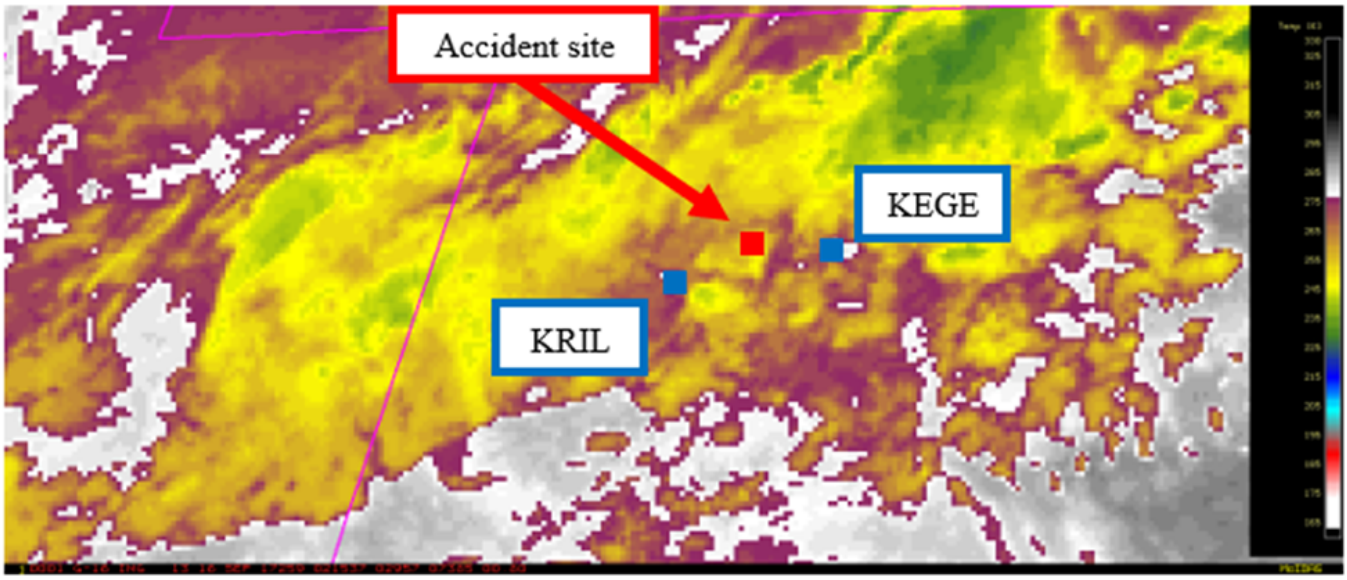

Figure 3 GOES-16 Infrared Image at 2015 MDT

The closest NWS Weather Surveillance Radar-1988, Doppler (WSR-88D), was the Grand Junction, Colorado, radar, located 55 miles southwest of the accident site at an elevation of 9,992 ft. Base reflectivity values between 2007 and 2012 above the accident site corresponded to light precipitation (See Figure 4). No lightning strikes were noted near the accident site at the accident time.

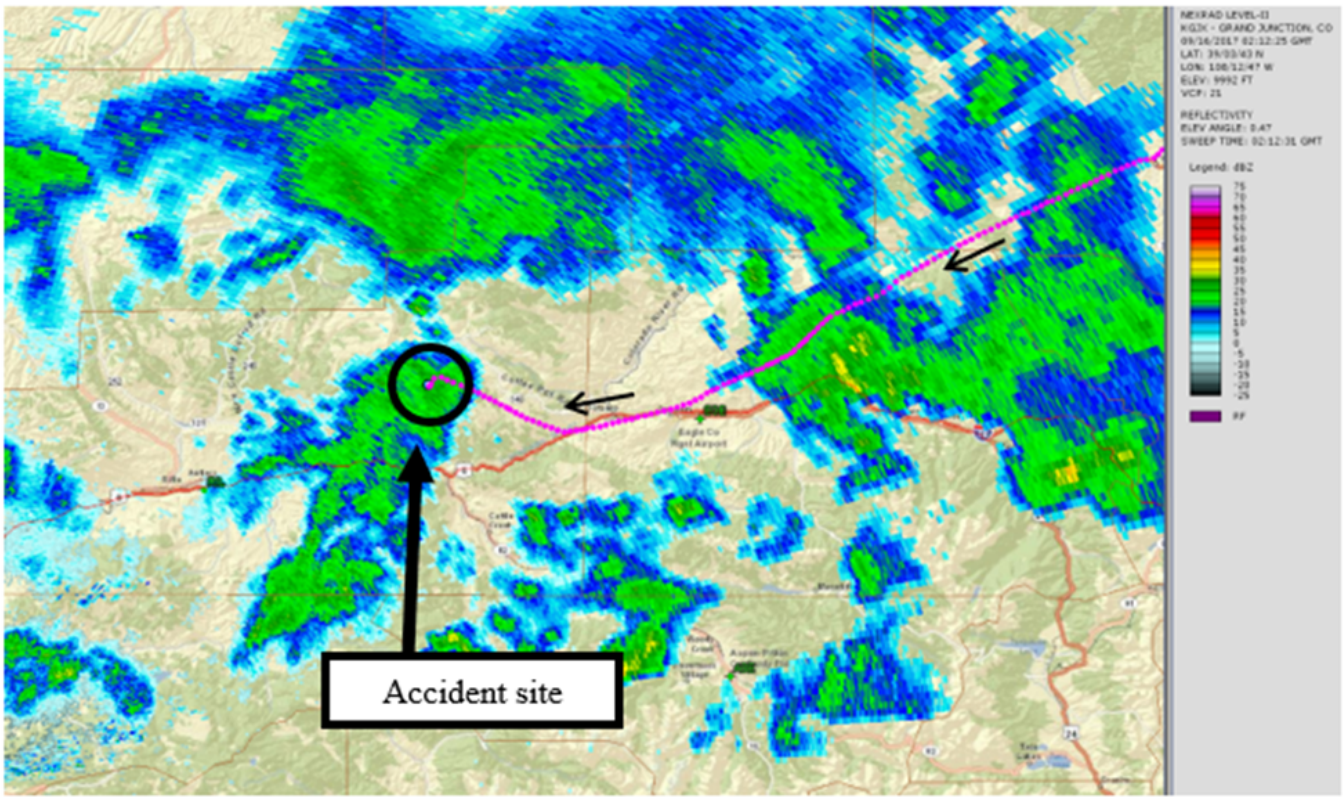

Figure 4 WSR-88D Reflectivity Scan at 2012 MDT

Convective SIGMET advisory 1W was valid for the accident site from 1855 to 2055 and warned of an area of thunderstorms with tops to flight level (FL) 350 with the SIGMET area moving from 250° at 25 kts. Convective SIGMET 10C was valid for the accident site from 1955 to 2155 and warned of an area of thunderstorms with tops to FL370 with the SIGMET area moving from 230° at 20 kts.

AIRMET advisory Tango was issued at 1445 and valid for the accident site at the accident time. The AIRMET forecasted moderate turbulence below 18,000 ft.

The Area Forecast issued at 1345 and valid at the accident time forecast a broken ceiling at 9,000 ft with tops at FL230, isolated thunderstorms with light rain, and thunderstorm tops at FL360. Between 1800 and 2100, conditions were forecast to include a broken cloud ceiling at 8,000 ft with tops at FL270 and isolated thunderstorms with light rain.

The Forecast Icing Potential (FIP) indicated that icing near the accident site would likely be trace to moderate levels at 2000. The FIP did not indicate any Supercooled Large Droplet potential over the accident area at the accident time.

According to the U.S. Naval Observatory, the sunset near the accident site at 1917, and the end of civil twilight was at 1944. The moon was not visible around the accident site at the accident time.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	3 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 Fatal	**Latitude, Longitude:**	39.409999,-107.209999

The accident site was located on rocky, tree-covered mountainous terrain about 10,800 ft msl (See Figure 5). The airplane impacted trees and terrain on a measured magnetic heading about 075°. A postimpact fire consumed a portion of the airplane. The initial impact point contained a portion of a propeller blade, fragments of the engine and engine mount, and forward fuselage structure. Several trees were severed at different heights before the initial impact with terrain. Based on the tree impacts, the calculated bank angle at the initial impact was about 34° right wing low.

Figure 5 Accident Site

The airframe and engine were fragmented and distributed in the debris field. The CAPS components were separated from the airframe and distributed in the debris field. The parachute was fully extended in a folded state with the slider at the base of the parachute canopy and entangled in tree branches. The CAPS rocket was located about 200 ft from the initial impact and was not expended.

Due to snow and terrain conditions, the wreckage was recovered on June 28, 2018. On August 29, 2018, the wreckage was examined by the NTSB investigator-in-charge, and representatives from Cirrus Aircraft and Continental Motors. Examination of the wreckage revealed the fuselage, flight control surfaces, instrument panel, engine, and propeller assembly were fragmented and destroyed. Flight control continuity established to rudder and elevators. Aileron control cables separated in multiple locations, and a portion of the forward aileron control cable was not observed. Control cable and pulley damage was consistent with overload failures. A postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation.

The Avidyne Digital Flight Control (DFC) 90 autopilot unit was recovered and the internal micro SD card removed. The micro SD card was sent the NTSB Vehicle Recorders Laboratory for further

examination and data extraction. Due to damage on the SD card, data recovery was unsuccessful.

Medical and Pathological Information

The Garfield County Coroner's Office, Grand Junction, Colorado, performed autopsies on the pilot and passengers. The cause of death listed for each occupant was multiple blunt force injuries.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicology testing on specimens of the pilot. Testing was not performed for carbon monoxide and cyanide, and testing was negative for ethanol and drugs.

Additional Information

Spatial Disorientation

According to FAA Safety Team literature, pilots flying under both instrument and visual flight rules are subject to spatial disorientation and optical illusions that may cause a loss of aircraft control. 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. Contributing to these phenomena are the various types of sensory stimuli: visual, vestibular (organs of equilibrium located in the inner ear), and proprioceptive (receptors located in the skin, muscles, tendons and joints). Changes in linear acceleration, angular acceleration, and gravity are detected by the vestibular system and the proprioceptive receptors, and then compared in the brain with visual information. In a flight environment, these stimuli can vary in magnitude, direction, and frequency, resulting in a sensory mismatch that can produce illusions and lead to spatial disorientation.

Administrative Information

Investigator In Charge (IIC):	Sauer, Aaron
Additional Participating Persons:	Matt Blad; Federal Aviation Administration; Salt Lake City, UT Brad Miller; Cirrus Aircraft; Duluth, MN Kurt Gibson; Continental Motors Group; Mobile, AL
Original Publish Date:	July 8, 2019
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=96023