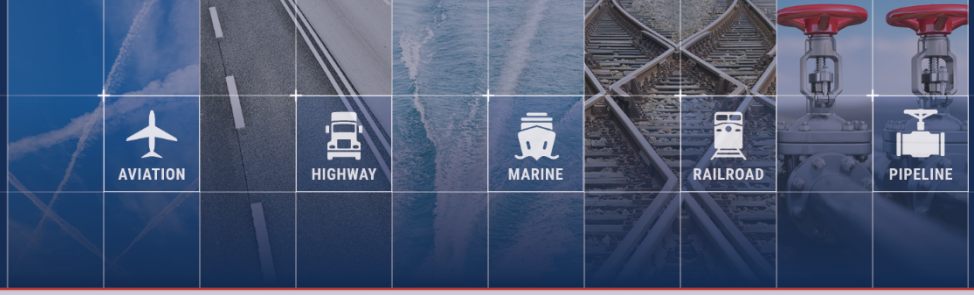

Aviation Investigation Final Report

Location:	Nephi, Utah	**Accident Number:**	WPR12FA378
Date & Time:	August 30, 2012, 16:15 Local	**Registration:**	N651AM
Aircraft:	AIRCRAFT MFG & DEVELOPMENT CO CH 2000	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

Witnesses observed the airplane operating in the airport traffic pattern. As the airplane turned from a crosswind to a downwind leg, witnesses estimated that the airplane was about 150 feet above ground level at a slow speed when it suddenly pitched downward and descended into the ground. Witnesses further stated that at the time of the accident, thunderstorms with strong wind, heavy rain, and lightning were arriving in the area.

A regional radar mosaic for about the time of the accident depicted several scattered weather echoes with one defined cell of moderate-to-strong intensity just over the accident site. Archived lightning data for the time revealed seven in-cloud and cloud-to-ground lightning flashes within a 50-mile radius of the accident site; however, no cloud-to-ground lightning strikes were detected within 15 miles. The detection of lightning confirmed the presence of a cumulonimbus cloud in the area.

Wreckage and impact signatures were consistent with a right-wing-low and nose-low impact. Postaccident examination of the airframe, flight control system, and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. Based on the witness observations and recorded weather data, it is likely that, as a result of the approaching thunderstorm, the airplane encountered a microburst or downdraft that exceeded the airplane's climb performance and resulted in a loss of airplane control.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's inability to maintain airplane control due to an encounter with a microburst/downdraft that exceeded the climb performance capabilities of the airplane.

Findings

Aircraft	Climb capability - Capability exceeded
Personnel issues	Aircraft control - Pilot
Environmental issues	Thunderstorm - Contributed to outcome
Environmental issues	Microburst - Effect on operation

Factual Information

History of Flight

Approach-VFR pattern downwind	Windshear or thunderstorm
Approach-VFR pattern downwind	Loss of control in flight (Defining event)
Approach-VFR pattern downwind	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On August 30, 2012, about 1615 mountain daylight time, an Aircraft MFG & Development Company, CH 2000, N651AM, was substantially damaged when it impacted terrain while in the traffic pattern at the Nephi Municipal Airport (U14) near Nephi, Utah. The airplane was registered to private individuals and operated by the pilot under the provisions of Title 14 Code of Federal Regulations Part 91. The certified flight instructor (CFI) and private pilot receiving instruction were fatally injured. Visual meteorological conditions prevailed, and no flight plan was filed for the instructional flight. The local flight originated from the Provo Municipal Airport near Provo, Utah, about 1500.

According to witnesses located adjacent to the accident site, the airplane was observed on a southerly heading south of U14 before it turned left to a northerly heading at an altitude of about 150 feet above ground level (agl). Multiple witnesses reported that the airplane seemed to be traveling at a slow speed when it suddenly pitched downwards and descended into the ground. One witness stated that prior to the sound of impact the engine seemed to be at a high power setting. Witnesses further stated that at the time of the accident, a thunderstorm with strong wind, heavy rain, and lighting were present in the area.

PERSONNEL INFORMATION

The flight instructor, age 45, held a commercial pilot certificate with an airplane single-engine land and instrument airplane ratings. He also held a flight instructor certificate with airplane single-engine land and instrument ratings. A second-class airman medical certificate was issued on April 16, 2012, with no limitations stated. The pilot reported on his most recent medical certificate application that he had accumulated 950 total flight hours.

The pilot receiving instruction, age 59, held a private pilot certificate with an airplane single-engine land rating, which was issued on August 29, 2012, based upon his Canadian private pilot certificate, which was issued on February 19, 2011. A third class airman medical certificate was issued to the pilot on March 23, 2010, with the limitation of "glasses must be worn." Review of the pilot's logbook revealed that as of the most recent logbook entry dated

March 12, 2012, he had accumulated a total of 94.8 hours of flight time.

AIRCRAFT INFORMATION

The two-seat, low-wing, fixed-gear airplane, serial number (S/N) 20-1021, was manufactured in 2003. It was powered by a Lycoming O-235-N2C engine, serial number L-255755-15, rated at 116 horse power. The airplane was also equipped with a Sensenich fixed pitch propeller. The airplane was recently purchased by the pilot receiving instruction and another individual.

Review of the airplane's maintenance log books revealed an annual inspection was accomplished on August 17, 2012 with a tachometer time of 215.7 hours. The airplane underwent an export control examination by an FAA designated airworthiness representative on August 22, 2012 with a tachometer time of 216.0 hours and a hobbs/airplane total time of 242.5 hours. The tachometer indicated 217.6 hours at the accident site.

METEOROLOGICAL INFORMATION

A National Transportation Safety Board (NTSB) staff meteorologist prepared a factual report for the area and timeframe surrounding the accident.

The National Weather Service Surface Analysis Chart for 1500 depicted the synoptic conditions over the region prior to the accident, which included a low pressure system over Wyoming with a cold front extending southwestward into northern Colorado and was a stationary front into Utah and Nevada. A high pressure system was located immediately west of the low and north of the front over western Wyoming. The station models surrounding the accident site depicted north-northwest wind at 10 to 15 knots, scattered clouds, with temperatures ranging from 88 degrees to 89 degrees Fahrenheit (F), with dew points between 45 degrees and 48 degrees F.

The NWS Storm Prediction Center's Convective Outlook expected a general risk of thunderstorms over the region during the period. A review of the NWS regional radar mosaic for 1615 depicted several scattered weather echoes over the region southeast through south of Provo, Utah, with one area over the Nephi area with the maximum reflectivity's near 45 dBZ. The accident site was located under the area of echoes.

Nephi Municipal Airport (U14) is equipped with an Automated Weather Observation System (AWOS) for broadcasting local weather, however, it does not disseminate the observations to the FAA or NWS. The data obtained from MesoWest surrounding the period indicated that prior to the accident at 1559, Nephi reported a westerly wind from 260 degrees at 6 knots gusting to 19 knots, with scattered clouds at 11,000 feet, a temperature 88 degrees F, dew point 43 degrees F, relative humidity of 21 percent, altimeter 29.97 inches of mercury. The calculated density altitude was 8,029 feet.

After the accident at 1659, the wind had shifted to the east and was reported from 080

degrees at 12 knots with gusts to 19 knots. There was also a 6 degree F decrease in temperature during the hour with rising dew point temperature, and falling pressure and subsequent rising pressure.

The sounding parameters were for a warm dry low–level environment with a Lifted Index of -0.9, indicating a conditionally unstable environment favorable for scattered high based thunderstorm development. The Vertical Totals (VT) index of 37.1 indicated the potential for strong thunderstorms. The WINDEX or microburst potential measure of the downdraft instability estimated outflow winds near 37 knots, while the GOES Hybrid Microburst Index (HMI) algorithm of 29 indicated a strong potential for dry microbursts. Other indices such as the Microburst Day Potential Index (MDPI) of 0.3 indicated a low potential for microburst activity. The gust potentials ranged from 54 to 57 knots.

The sounding wind profile indicated a surface wind from 345 degrees at 8 knots, with wind from the north through 4,000 feet agl, with winds backing to the southwest with height.

Review of the observations and the satellite images from Provo at 1600 indicated that they were on the edge of the clouds with lightning being detected to the southeast. As the system moved northward with time, rain showers were reported from these cumulus congestus type clouds. Delta, Utah was also located under some high level cloud cover during the period, but not from the cloud mass that was identified over the accident site. Delta reported cumulonimbus type clouds in all quadrants during the period with blowing dust to the south and west, and rain showers after the accident. Price, Utah also on the eastern edge of the cloud area reported lightning activity to the west prior to the accident, and also indicated convective clouds

WSR-88D base reflectivity images of the 0.5° elevation scan were completed at 1610:35, 1613:46, 1616:57, 1620:08, and 1623:20 respectively. The images depicted several scattered echoes develop across the region with one defined cell immediately south of the airport and over the accident site, that moved northeastward during the period around the time of the accident. The echoes observed were of moderate to strong intensity.

Archived lightning data from 1600 through 1620 identified 7 in-cloud and cloud-to-ground lightning flashes within a 50 mile radius of the accident site. No cloud-to-ground lightning were detected within 15 miles of the accident site during the period. In-cloud lightning is typically observed during the towering cumulus or cumulus congestus stage of a developing thunderstorm, and continues into the dissipating stage. The detection of lightning confirms that the area of weather encountered by the accident airplane was associated with a cumulonimbus cloud, although a low topped one without the defined anvil outflow.

For further information, see the Weather Study report within the public docket.

AIRPORT INFORMATION

The Nephi Municipal Airport (U14) is a non-towered airport that operates under class G airspace. The reported field elevation for the airport was 5,022 feet msl. The airport is equipped with one asphalt runway (17/35). Runway 17/35 is 6,300 feet in length and 100-feet wide with a 0.7 percent negative gradient. The standard traffic pattern for runway 17 is oriented for left turns.

WRECKAGE AND IMPACT INFORMATION

Examination of the accident site revealed that the airplane impacted terrain about 1.7 miles southeast of U14 at an elevation of 4,867 feet mean sea level (msl). The aft section of the fuselage and empennage was partially separated and came to rest inverted. The forward part of the fuselage, left and right wings, and engine were found upright. The main wreckage came to rest on a magnetic heading of about 326-degrees. The wreckage debris remained within an approximate 50 foot radius of the main wreckage.

The first identified point of contact (FPIC) with terrain was a ground scar impression of about a foot in width and about 12 feet in length. The first portion of the ground scar contained fragments of green lens material, consistent with the right wing navigational light. Extending from the end of the impression, a deep ground scar was contained to an area of about 4 by 4 feet with disturbed dirt, which contained plexiglass and fiberglass. The main wreckage came to rest about 8 feet beyond the FPIC. The right main landing gear wheel assembly separated from its strut and was located between the FPIC and the main wreckage.

Examination of the wreckage revealed that the engine, firewall, and instrument panel had impact damage and was distorted forward of the leading edges of both wings. A section of the instrument panel separated.

The left and right wings remained partially attached at the fuselage area. The ailerons and flaps remained attached to the wing structure. The leading edges of both wings were crushed aft and upwards. The outboard portion of the right wing was crushed upward from about mid span. Additionally, the wing exhibited approximate 45-degree crush angles from mid-span to the wingtip.

The cabin and fuselage area were partially consumed by fire. Both wing tanks were crushed and torn open.

Flight control continuity was established from the cockpit controls to all primary flight controls.

The engine was partially attached to the airframe, and the mounting assembly exhibited impact damage. The exhaust assembly was crushed and partially separated. The right magneto, vacuum pump, oil filter housing cap, and oil dip stick assembly were separated from the engine. The crankshaft was rotated by hand through the upper accessory gear; cylinder compression and valve continuity were obtained on all four cylinders.

Both the left and right magnetos produced spark on all posts respectively when the magneto driveshafts were rotated by hand. The top spark plugs exhibited normal operating signatures.

The propeller remained attached to the engine crankshaft and exhibited "S" bending and was curled opposite the direction of rotation. Additionally, the blade exhibited leading edge polishing in the outboard 8 to 10 inches of the blade. The opposing propeller blade exhibited a slight aft bend originating from about 8 inches inboard of the blade tip.

For further information, see the Accident Site, Airframe, and Engine Exam Summary Report within the public docket for this accident.

MEDICAL AND PATHOLOGICAL INFORMATION

The Utah State Medical Examiner conducted an autopsy on the CFI on August 31, 2012. The medical examiner determined that the cause of death was “...blunt force injuries.”

The FAA's Civil Aeromedical Institute (CAMI) in Oklahoma City, Oklahoma, performed toxicology tests on the CFI. According to CAMI's report, carbon monoxide, cyanide, volatiles, and drugs were tested, and had negative results.

The Utah State Medical Examiner conducted an autopsy on the pilot receiving instruction on August 31, 2012. The medical examiner determined that the cause of death was “...blunt force injuries.”

The FAA's Civil Aeromedical Institute (CAMI) in Oklahoma City, Oklahoma, performed toxicology tests on the pilot receiving instruction. According to CAMI's report, carbon monoxide, cyanide, volatiles, and drugs were tested, and had negative results.

Pilot Information

Certificate:	Private	**Age:**	59,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	March 23, 2010
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	February 19, 2011
Flight Time:	94 hours (Total, all aircraft)		

Flight instructor Information

Certificate:	Commercial; Flight instructor	**Age:**	45,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 None	**Last FAA Medical Exam:**	April 16, 2012
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	950 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	AIRCRAFT MFG & DEVELOPMENT CO	**Registration:**	N651AM
Model/Series:	CH 2000	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	20-1021
Landing Gear Type:		**Seats:**	2
Date/Type of Last Inspection:	August 17, 2012 Annual	**Certified Max Gross Wt.:**	1692 lbs
Time Since Last Inspection:	2 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	244 Hrs at time of accident	**Engine Manufacturer:**	LYCOMING
ELT:	Installed, not activated	**Engine Model/Series:**	O-235
Registered Owner:	Peter Mrowiec and Li Yu	**Rated Power:**	115 Horsepower
Operator:	Peter Mrowiec	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PVU,4497 ft msl	**Distance from Accident Site:**	30 Nautical Miles
Observation Time:	15:59 Local	**Direction from Accident Site:**	10°
Lowest Cloud Condition:	Scattered / 8000 ft AGL	**Visibility**	15 miles
Lowest Ceiling:	Broken / 12000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	11 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	310°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.95 inches Hg	**Temperature/Dew Point:**	32°C / 11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Provo, UT (PVU)	**Type of Flight Plan Filed:**	None
Destination:	Provo, UT (PVU)	**Type of Clearance:**	None
Departure Time:	15:00 Local	**Type of Airspace:**	

Airport Information

Airport:	Nephi Municipal Airport U14	**Runway Surface Type:**	
Airport Elevation:	5022 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Traffic pattern

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	39.736389,-111.870002(est)

Administrative Information

Investigator In Charge (IIC):	Cawthra, Joshua
Additional Participating Persons:	Kent Gibbons; Federal Aviation Administration; Salt Lake City, UT
Original Publish Date:	June 12, 2013
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=84865