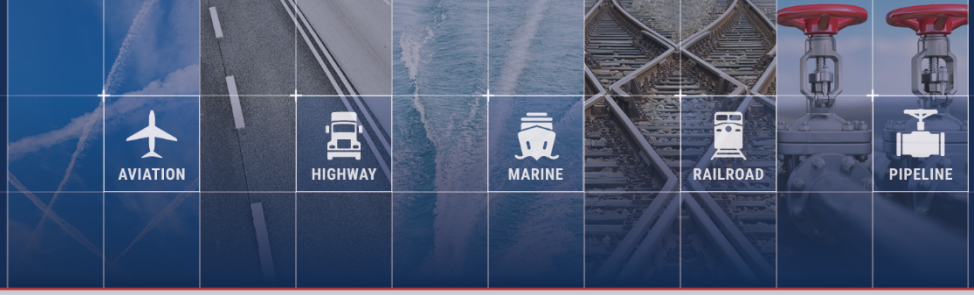

Aviation Investigation Final Report

Location:	Saltville, Virginia	**Accident Number:**	ERA15FA215
Date & Time:	May 18, 2015, 12:38 Local	**Registration:**	N5816S
Aircraft:	Beech 95 B55 (T42A)	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The airplane departed on an instrument flight rules flight; it was equipped with a weather receiver and was capable of displaying XM Weather information through a subscription service. It was not equipped with weather radar in the nose cone of the airplane. The airplane was in cruise flight about 9,000 ft mean sea level (msl) when the pilot contacted an air traffic approach controller who issued the altimeter setting. The controller then asked the pilot his on-course heading, and the pilot responded 356 degrees. The controller advised the pilot of "areas of weather, ah 12 o'clock and ah about four zero miles, just scattered areas, type and intensity unknown." The pilot stated he would "like to deviate east if we could," and the controller approved deviations left and right as necessary; he also told the pilot to maintain 9,000 ft. The controller switched the pilot to an Air Route Traffic Control Center (ARTCC) and the pilot acknowledged. The pilot never contacted the ARTCC, and there were no further communications between the accident airplane and air traffic control. Radar data depicted an easterly deviation off course and a gradual descent before the radar target disappeared. A search was initiated, and the airplane wreckage was discovered in heavily wooded, mountainous terrain on the following day.

The pilot obtained preflight weather briefings, but only reviewed the information for the southern half of his route, and not for the northern half, which included the accident site. The briefings included forecasts for thunderstorm activity. A significant meteorological information (SIGMET) for thunderstorms was issued for the area surrounding the accident site 10 minutes after the accident.

An NTSB Weather Study also depicted the weather images that were likely available before the accident time. The XM Weather radar images just before the accident displayed light echoes to the west and north of the accident site with only very light echoes approaching the southwest corner of the accident site region at the time of the accident; the majority of the moderate-to-heavy rain showers and thunderstorms were depicted north and west of the accident flight track. It is likely that the accident airplane flew into a developing rain shower and updraft around the accident time. Given that the rain shower development right near the accident site occurred right at the accident time, it would be very

difficult for either XM Weather or FIS-B regional NEXRAD data to pick up the newest rain shower development because of the inherent delay in the image depiction.

Probable Cause and Findings

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

The pilot's flight into developing rain showers and updrafts, which resulted in a loss of airplane control and collision with terrain. Contributing to the accident were the pilot's continued flight into forecast adverse weather conditions, and his reliance on weather technologies with known limitations and processing delays.

Findings

Environmental issues	Thunderstorm - Contributed to outcome
Personnel issues	Identification/recognition - Pilot
Personnel issues	Aircraft control - Pilot
Personnel issues	Decision making/judgment - Pilot
Personnel issues	Use of equip/system - Pilot
Personnel issues	Weather planning - Pilot

Factual Information

History of Flight

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

On May 18, 2015, at 1238 eastern daylight time, a Beech 95-B55 (T42A), N5816S, was destroyed during a collision with terrain near Saltville, Virginia. The commercial pilot and passenger were fatally injured. The airplane departed Spruce Creek Airport (7FL6), Daytona Beach, Florida, about 0920, and was destined for Mansfield Lahm Regional Airport (MFD), Mansfield, Ohio. Instrument meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan was filed for the personal flight conducted under the provisions of 14 Code of Federal Regulations Part 91.

Information from the Federal Aviation Administration (FAA) revealed that at 1214:05, the airplane was in cruise flight at an altitude about 9,000 feet mean sea level (msl) when the pilot contacted Tri-Cities approach control (TRI), and the controller issued the altimeter setting. At 1220:02, the controller asked the pilot his on-course heading, and the pilot responded "356 degrees." The controller advised the pilot of "areas of weather, ah 12 o'clock and ah about four zero miles, just scattered areas, type and intensity unknown." The pilot stated he would "like to deviate east if we could," and the controller approved deviations left and right as necessary, and to maintain 9,000 feet. At 1232:16, the TRI controller switched the pilot to the Indianapolis Air Route Traffic Control Center (ZID) and the pilot acknowledged. The pilot never contacted ZID, and there were no further communications between the accident airplane and air traffic control.

Radar data depicted an easterly deviation off course, along with a gradual descent, before the radar target disappeared.

A search was initiated and the airplane wreckage was discovered in heavily wooded, mountainous terrain on May 19, 2015.

Pilot Information

Certificate:	Commercial	**Age:**	75,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
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:**	July 2, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	December 11, 2014
Flight Time:	2998.3 hours (Total, all aircraft), 167.6 hours (Total, this make and model), 1.6 hours (Last 90 days, all aircraft), 0.8 hours (Last 30 days, all aircraft), 3.2 hours (Last 24 hours, all aircraft)		

The pilot held a commercial pilot certificate with a rating for airplane single-engine land, multiengine land, and instrument airplane. His most recent FAA second-class medical certificate was issued July 2, 2013. A review of the pilot's logbook revealed he had accumulated 2,852.3 total hours of flight experience, 167 hours of which were in the accident airplane make and model.

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N5816S
Model/Series:	95 B55 (T42A)	**Aircraft Category:**	Airplane
Year of Manufacture:	1965	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	TC-941
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	August 15, 2014 Annual	**Certified Max Gross Wt.:**	5000 lbs
Time Since Last Inspection:	21 Hrs	**Engines:**	2 Reciprocating
Airframe Total Time:	4119 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-470
Registered Owner:	On file	**Rated Power:**	260
Operator:	On file	**Operating Certificate(s) Held:**	None

According to FAA records, the airplane was manufactured in 1965. While the airplane maintenance logs were not recovered, detailed records and invoices from the airplane's maintainer revealed its most recent

annual inspection was completed August 15, 2014, at 4,094.9 total airframe hours.

The airplane was equipped with an EWR50 Weather Receiver, which was capable of displaying XM Weather information.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	JFZ,2650 ft msl	**Distance from Accident Site:**	8 Nautical Miles
Observation Time:	16:35 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Scattered / 2900 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 8000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/ Unknown
Wind Direction:	210°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.26 inches Hg	**Temperature/Dew Point:**	24°C / 18°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Daytona Beach, FL (7FL6)	**Type of Flight Plan Filed:**	IFR
Destination:	Mansfield, OH (MFD)	**Type of Clearance:**	IFR
Departure Time:	08:27 Local	**Type of Airspace:**	Class E

At 1235, the weather recorded at Tazewell County Airport, 8 nautical miles north of the accident site, included scattered layers at 2,900 feet, 3,600 feet, and a broken ceiling at 8,000 feet with 10 miles visibility. The wind was from 210 degrees at 5 knots. The temperature was 24 degrees C, and the dew point was 18 degrees C. The altimeter setting was 30.26 inches of mercury.

The accident pilot received two official weather briefings from Direct User Access Terminal Service (DUATS) and one briefing text via ForeFlight Mobile prior to the flight.

The weather briefing information contained the closest departure and destination meteorological aerodrome report (METAR) observations, the terminal aerodrome forecast (TAF) for the destination, which mentioned thunderstorm activity possible by 1400, airmen's meteorological information (AIRMETs) valid for IFR and mountain obscuration, Center Weather Advisories valid for low IFR conditions, TAF and METAR information for surface stations along the route of flight, and wind aloft information.

Review of the accident pilot's DUATS sessions revealed that he reviewed the Area Forecast information for North Carolina and points southward, but did not review the Area Forecast information for points north of the North Carolina border. The 0445 Area Forecast for points north of the North Carolina border forecasted scattered to a broken ceiling around 5,000 feet msl, with scattered rain shower and thunderstorm activity as early as 1500 in southwestern Virginia, as early as 1100 in northern West Virginia, as early as 1400 in southern West Virginia, and as early as 1100 in southern Ohio. There is no record of the accident pilot receiving or retrieving any other weather information before the accident flight.

At 1248, 10 minutes after the accident, a significant meteorological information (SIGMET) for thunderstorms was issued for the area surrounding the accident site.

An NTSB Senior Meteorologist completed a Weather Study, which discussed the forecast weather along the route of flight, the actual weather encountered, and the limitations of FIS-B NEXRAD and XM Weather composite radar data. The Study also depicted the weather images available around and before the accident time.

The XM Weather radar images from 1220 through 1235 displayed light echoes to the west and north of the accident site with only very light echoes approaching the southwest corner of the accident site region by 1235, with the majority of the moderate to heavy rain showers and thunderstorms north and west of the accident flight track.

The accident airplane's flight track obtained from air traffic control was also plotted on a Google Earth image for a time comparison with WSR-88D base reflectivity images taken from elevation scans initiated at 1240 and 1245. The images depicted the accident site within greater than 5 dBZ values at 1240, with that area of greater than 5 dBZ expanding in coverage and height by 1245.

According to the Study, it was likely that the accident airplane flew into a developing rain shower and updraft around the accident time. In addition, given that the rain shower development near the accident site occurred at the accident time it would have been very difficult for either XM Weather or FIS-B regional NEXRAD data to pick up the newest rain shower development, especially given the FIS-B regional NEXRAD and XM Weather were using composite weather radar data.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	36.939167,-81.767219

The wreckage was examined at the accident site, and all major components were accounted for at the scene. The initial impact points were in a tree and a deep ground scar collocated near the peak of Flat Top Mountain. The airplane fragmented outside the crater, and was contained in an arc that reached about 50 feet beyond the crater and widened to about 60 feet at its widest point.

Control continuity could not be established due to extensive impact damage, however; parts associated with the wings, flaps, and ailerons were identified. Sheet metal and cabling associated with the empennage, horizontal and vertical stabilizers, as well as the elevators were identified.

The propeller systems were separated from their respective engines, and all propeller blades exhibited

similar twisting, bending, leading edge gouging, and chordwise scratching. One tree trunk displayed deep, angular cuts with paint transfers consistent with the paint on the propeller blades.

The engines were each severely damaged by impact. Engine cylinders were separated from each engine and scattered around the crash site. The engines to which the cylinders had been installed could not be determined.

The magnetos were separated from each engine, and two magnetos were not located. The engines to which the remaining two magnetos were mounted on could not be determined. Later, two magnetos were discovered by recovery personnel. They were identified and matched to the right engine by serial number. None of the four magnetos were functionally tested due to impact damage.

Examination of the engines and engine accessories revealed no preimpact mechanical anomalies that would have precluded normal operation.

Some personal electronic devices were recovered for examination at the NTSB Recorders Laboratory in Washington, DC, however; the severity of the damage to each precluded any data recovery.

Medical and Pathological Information

The Office of the Chief Medical Examiner, Roanoke, Virginia, performed a post mortem examination on the pilot.

The FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma performed toxicological testing on the pilot.

Additional Information

NTSB Safety Alert SA-011, Thunderstorm Encounters, included:

"Severe weather avoidance is primarily [the pilot's] responsibility."

"Approach control radar systems provide near-real-time weather depiction. En route centers receive weather radar information from National Weather Service NEXRAD sites that refresh the color precipitation data on ATC displays every 4 to 5 minutes. Be aware that en route weather displays may be a few minutes behind the storm and allow extra distance from reported intense precipitation, especially in front of fast-moving convective activity. Also be aware that cockpit NEXRAD data can be 15 to 20 minutes older than indicated on the cockpit display."

"ATC radar systems depict only precipitation. Controllers cannot use radar to warn of turbulence, icing, freezing rain, or other hazards to flight. However, the presence of substantial precipitation implies the existence of thunderstorm hazards such as severe turbulence and hail."

NTSB Safety Alert SA-017, In-Cockpit NEXRAD Mosaic Imagery – Actual Age of NEXRAD Data Can Differ Significantly From Age Indicated on Display, included:

"Weather radar "mosaic" imagery created from Next Generation Radar (NEXRAD) data is available to pilots in the cockpit via the flight information service-broadcast (FIS-B) and private satellite weather service providers."

"The age indicator associated with the mosaic image on the cockpit display does not show the age of the actual weather conditions as detected by the NEXRAD network. Instead, the age indicator displays the age of the mosaic image created by the service provider. Weather conditions depicted on the mosaic image will ALWAYS be older than the age indicated on the display."

"Although such situations are not believed to be typical, in extreme latency and mosaic-creation scenarios, the actual age of the oldest NEXRAD data in the mosaic can EXCEED the age indication in the cockpit by 15 to 20 minutes."

Preventing Similar Accidents

In-Cockpit NEXRAD Mosaic Imagery (SA-017)

The Problem

Weather radar "mosaic" imagery created from Next Generation Radar (NEXRAD) data is available to pilots in the cockpit via the flight information service-broadcast (FIS-B) and private satellite weather service providers. A mosaic image presents radar data from multiple radar ground sites on a single image on the cockpit display. When a mosaic image is updated, it may not contain new information from each ground site. The age indicator associated with the mosaic image on the cockpit display **does not** show the age of the actual weather conditions as detected by the NEXRAD network. Instead, the age indicator displays the age of the mosaic image created by the service provider. Weather conditions depicted on the mosaic image will **ALWAYS be older than the age indicated on the display**. Due to latencies inherent in processes used to detect and deliver the NEXRAD data from the ground site to the service provider, as well as the time intervals used for the mosaic-creation process set by the service provider, NEXRAD data can age significantly by the time the mosaic image is created.

Although such situations are not believed to be typical, in extreme latency and mosaic-creation scenarios, the actual age of the oldest NEXRAD data in the mosaic can **EXCEED** the age indication in the cockpit by **15 to 20 minutes**. Even small time differences between the age indicator and actual conditions can be important for safety of flight, especially when considering fast-moving weather hazards, quickly developing weather scenarios, and/or fast-moving aircraft. The general issue of latency with in-cockpit NEXRAD is discussed in pilots' guides, in industry literature, and on service providers' websites. However, the NTSB has not found that such guidance contains details about the potential time difference between the age indicator and actual conditions.

What can you do?

- Remember that the in-cockpit NEXRAD display depicts where the weather **WAS**, not where it **IS**. The age indicator does not show the age of the actual weather conditions but rather the age of the mosaic image. The actual weather conditions could be up to 15 to 20 minutes OLDER than the age indicated on the display. You should consider this potential delay when using in-cockpit NEXRAD capabilities, as the movement and/or intensification of weather could adversely affect safety of flight.
- Understand that the common perception of a “5-minute latency” with radar data is not always correct.
- Get your preflight weather briefing! Having in-cockpit weather capabilities does not circumvent the need for a complete weather briefing before takeoff.
- Use all appropriate sources of weather information to make in-flight decisions.
- Let your fellow pilots know about the limitations of in-cockpit NEXRAD.

See https://www.ntsb.gov/Advocacy/safety-alerts/Documents/SA-017.pdf for additional resources.

The NTSB presents this information to prevent recurrence of similar accidents. Note that this should not be considered guidance from the regulator, nor does this supersede existing FAA Regulations (FARs).

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian
Additional Participating Persons:	Greg Travis; FAA/FSDO; Charleston, WV Paul Yoos; Textron Aviation; Wichita, KS Mike Council; Continental Motors Inc; Mobile, AL
Original Publish Date:	October 26, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=91199