



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

December 9, 2021

Specialist's Factual Report

METEOROLOGY

CEN21LA471

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A. ACCIDENT

Location: West Cobb, Arkansas
Date: September 29, 2021
Time: 1400 central daylight time
1900 Coordinated Universal Time (UTC)
Aircraft: Just Aircraft LLC Highlander; Registration: N419SD

B. METEOROLOGIST

Paul Suffern
Senior Meteorologist
Operational Factors Division (AS-30)
National Transportation Safety Board

C. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's (NTSB) Meteorologist did not travel for this investigation and gathered the weather data for this investigation from official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources and also from the National Centers for Environmental Information (NCEI). This Specialist's Factual Report contains the meteorological factors pertinent to the weather surrounding the accident time. All times are central daylight time (CDT) and are based upon the 24-hour clock, where local time is - 5 hours from UTC. Directions are referenced to true north and distances are in nautical miles. Heights are above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles. NWS station identifiers use the standard International Civil Aviation Organization 4-letter station identifiers versus the International Air Transport Association 3-letter identifiers, which deletes the initial country code designator "K" for U.S. airports.

The accident site was located at latitude 35.677288° N, Longitude 93.732683° W, with an approximate elevation of 800 feet (ft).

D. FACTUAL INFORMATION

1.0 Synoptic Situation

The synoptic or large-scale migratory weather systems influencing the area were documented using standard NWS charts issued by the National Center for Environmental Prediction and the Weather Prediction Center, located in College Park, Maryland. These are the base products used in describing synoptic weather features and in the creation of forecasts and warnings for the NWS. Reference to these charts can be found in the joint NWS and Federal Aviation Administration (FAA) Advisory Circular "Aviation Weather Services", AC 00-45H.¹

¹

https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1030

1.1 Surface Analysis Chart

The NWS Surface Analysis Chart centered over the central United States for 1300 CDT is provided as figure 1 with the location of the accident site within the red circle. The chart depicted a frontal boundary from North Carolina northward into the Upper Midwest with another frontal boundary stretching from South Dakota southward into central Texas. Low-pressure systems with pressures of 1004-, 1008-, and 1008-hectopascals (hPa) were located along the frontal boundary from South Dakota southward into central Texas. The accident site was located south and east of the frontal systems on the warm side of the fronts in an area of southerly winds.

The station models around the accident site depicted air temperatures in the low 80's degrees Fahrenheit (°F), dew point temperatures in the mid to upper 60's °F with temperature-dew point spreads of 13°F or more, partly cloudy skies, and south to east winds at 10 knots.

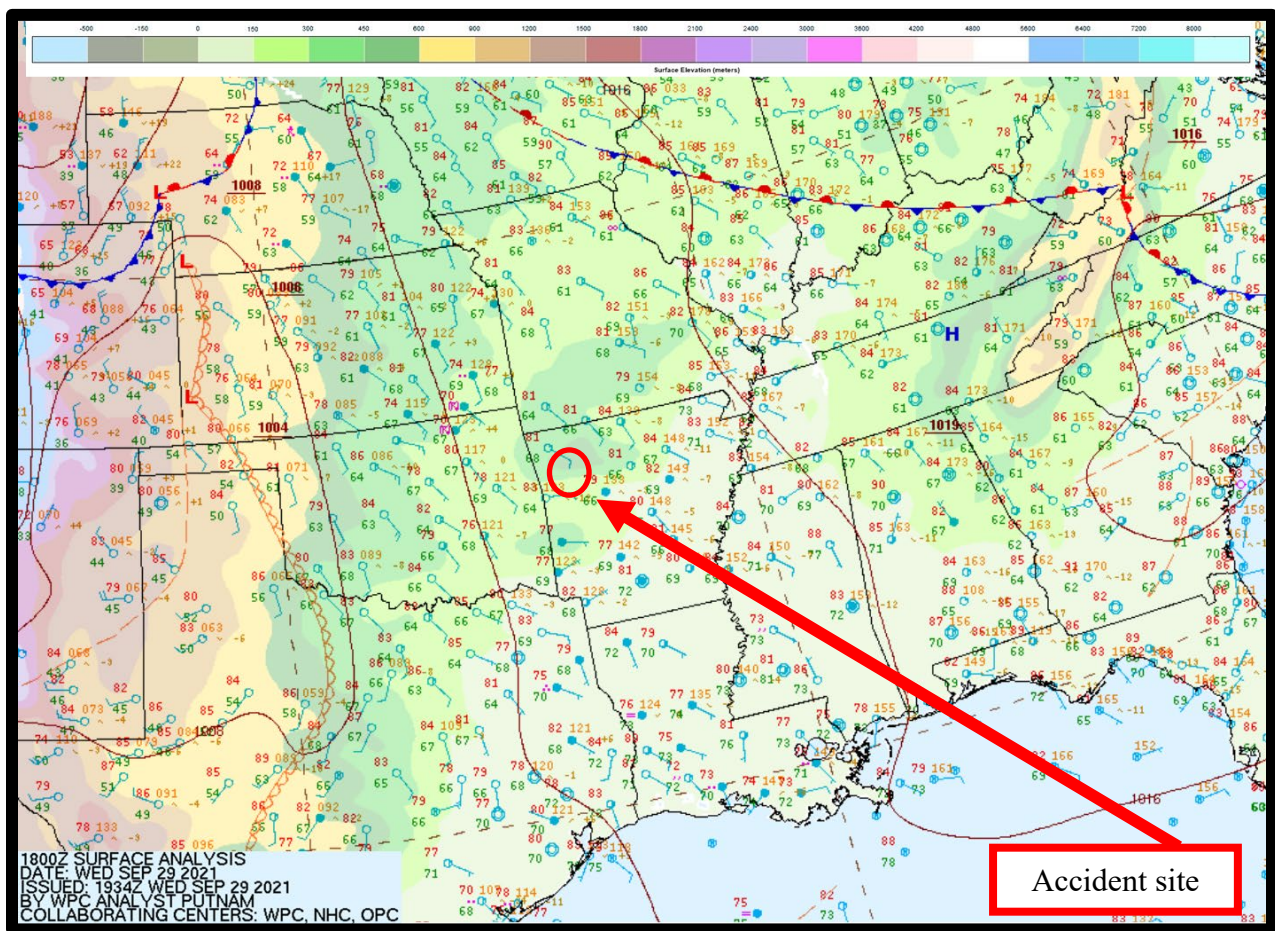


Figure 1 – NWS Surface Analysis Chart for 1300 CDT.

2.0 Surface Observations

The area surrounding the accident site was documented using official Aviation Routine Weather Reports (METARs) and Specials (SPECIs). The following observations were taken from standard code and are provided in plain language. Figure 2 is a local sectional chart with the accident site and the closest weather reporting locations marked.



Figure 2 – Sectional map of the accident area with the locations of the accident site and surface observation sites.

Drake Field Airport (KFYV) had the closest official weather station to the accident site. KFYV had an Automated Surface Observing System (ASOS²) whose longline³ reports were supplemented by air traffic control (ATC) when the tower was in operation⁴. The KFYV ASOS was located 29 miles northwest of the accident site, at an elevation of 1,252 ft, and had a 1° easterly magnetic variation⁵ (figure 2). KFYV ASOS observations surrounding the accident time are shown below:⁶

² ASOS – Automated Surface Observing System is equipped with meteorological instruments to observe and report wind, visibility, weather phenomena, ceiling, temperature, dewpoint, altimeter, and barometric pressure.

³ “Longline” refers to the dissemination of weather observations with the intent that they are available in near-real time to national databases (effectively, the whole world) and accessible to the general global public from a large number of vendors. This does not include public accessibility to observations from a reporting station’s Very High Frequency (VHF; line-of-site) or telephone broadcast, where applicable. Longline dissemination of weather observations is the primary vehicle through which the general global public has access to surface weather observations, particularly outside of the aviation community.

⁴ ATC hours of operation 0600 to 2200 local.

⁵ Magnetic variation – The angle (at a particular location) between magnetic north and true north. Latest measurement taken from <https://skyvector.com/>

⁶ The bold sections in this NWS product and the rest of the products in this report are intended to highlight the text

[0953 CDT] METAR KFYV 291453Z 16006KT 10SM CLR 25/19 A2997 RMK AO2 SLP136 T02500189 51011

[1053 CDT] METAR KFYV 291553Z 14007KT 10SM SCT032 27/18 A2997 RMK AO2 SLP135 T02670178

[1153 CDT] METAR KFYV 291653Z 13008KT 10SM BKN036 28/17 A2995 RMK AO2 SLP128 T02780172

[1253 CDT] METAR KFYV 291753Z 11007KT 10SM FEW039 29/17 A2994 RMK AO2 SLP123 T02890172 10289 20172 58010

[1353 CDT] METAR KFYV 291853Z 20007KT 170V240 10SM BKN044 29/18 A2992 RMK AO2 SLP117 T02890178

ACCIDENT TIME 1400 CDT

[1453 CDT] METAR KFYV 291953Z 16007KT 10SM BKN046 28/17 A2991 RMK AO2 SLP113 T02780172

[1553 CDT] METAR KFYV 292053Z 16009KT 10SM CLR 27/18 A2992 RMK AO2 SLP120 T02720178 55005

The bold type observations decoded in plain language were as follows:

KFYV weather at 1353 CDT, wind from 200° at 7 knots with wind direction varying between 170° to 240°, visibility 10 miles or greater, broken ceiling at 4,400 ft above ground level (agl), temperature of 29° Celsius (C), dew point temperature 18°C, and an altimeter setting of 29.92 inches of mercury (inHg). Remarks, station with a precipitation discriminator, sea level pressure 1011.7 hPa, temperature 28.9°C, dew point temperature 17.8°C.

KFYV weather at 1453 CDT, wind from 160° at 7 knots, visibility 10 miles or greater, broken ceiling at 4,600 ft agl, temperature of 28°C, dew point temperature 17°C, and an altimeter setting of 29.91 inHg. Remarks, station with a precipitation discriminator, sea level pressure 1011.3 hPa, temperature 27.8°C, dew point temperature 17.2°C.

Fort Smith Regional Airport (KFSM) had the second closest official weather station to the accident site. KFSM had an ASOS whose longline reports were supplemented by ATC when the tower was in operation⁷. The KFSM ASOS was located 37 miles southwest of the accident site, at an elevation of 469 ft, and had a 2° easterly magnetic variation (figure 2). KFYV ASOS observations surrounding the accident time are shown below:

that directly reference the weather conditions that affected the accident location around the accident time. The local times in this section next to the METARs are provided for quick reference between UTC and local times around the accident time.

⁷ ATC hours of operation 0530 to 2300 local.

[0953 CDT] METAR KFSM 291453Z 11008KT 10SM BKN050 26/18 A2995 RMK AO2
SLP135 T02560183 51017

[1053 CDT] METAR KFSM 291553Z 15008KT 10SM CLR 27/18 A2994 RMK AO2 SLP131
T02670178

[1153 CDT] METAR KFSM 291653Z 11008G17KT 10SM CLR 28/17 A2992 RMK AO2
SLP126 T02780172

[1253 CDT] METAR KFSM 291753Z 09011KT 10SM CLR 28/18 A2991 RMK AO2 SLP123
T02830178 10283 20200 57012

**[1353 CDT] METAR KFSM 291853Z 12009G15KT 10SM CLR 29/18 A2990 RMK AO2
SLP117 T02890178**

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**[1453 CDT] METAR KFSM 291953Z VRB04KT 10SM SCT043 29/18 A2988 RMK AO2
SLP111 T02890178**

[1553 CDT] METAR KFSM 292053Z 14009KT 10SM BKN045 29/18 A2988 RMK AO2
SLP112 T02890178 55011

The bold type observations decoded in plain language were as follows:

KFSM weather at 1353 CDT, wind from 120° at 9 knots with gusts to 15 knots, visibility 10 miles or greater, clear skies, temperature of 29°C, dew point temperature 18°C, and an altimeter setting of 29.90 inHg. Remarks, station with a precipitation discriminator, sea level pressure 1011.7 hPa, temperature 28.9°C, dew point temperature 17.8°C.

KFSM weather at 1453 CDT, variable wind at 4 knots, visibility 10 miles or greater, scattered clouds at 4,300 ft agl, temperature of 29°C, dew point temperature 18°C, and an altimeter setting of 29.88 inHg. Remarks, station with a precipitation discriminator, sea level pressure 1011.1 hPa, temperature 28.9°C, dew point temperature 17.8°C.

The observations from KFYV and KFSM surrounding the accident time indicated variable wind directions from east through southwest and VFR⁸ conditions with wind gusts as high as 15 knots.

⁸ As defined by the NWS and the FAA Aeronautical Information Manual (AIM) section 7-1-7 defines the following general flight categories:

- Low Instrument Flight Rules (LIFR*) – ceiling below 500 ft above ground level (agl) and/or visibility less than 1 statute mile.
- Instrument Flight Rules (IFR) – ceiling between 500 to below 1,000 feet agl and/or visibility 1 to less than 3 miles.
- Marginal Visual Flight Rules (MVFR**) – ceiling from 1,000 to 3,000 ft agl and/or visibility 3 to 5 miles.
- Visual Flight Rules (VFR) – ceiling greater 3,000 ft agl and visibility greater than 5 miles.

* By definition, IFR is a ceiling less than 1,000 ft agl and/or visibility less than 3 miles while LIFR is a sub-category

3.0 Upper Air Sounding

A High-Resolution Rapid Refresh (HRRR)⁹ model sounding was created for the accident site for 1400 CDT which provided a surface elevation of 1,171 ft.¹⁰ The 1400 CDT HRRR sounding was plotted on a standard Skew-T Log P diagram¹¹ with the derived stability parameters included in figure 3 with data from the surface to 600-hPa (or approximately 14,000 ft above msl). These data were analyzed using the RAOB¹² software package. The sounding depicted the lifted condensation level (LCL)¹³ and the level of free convection (LFC)¹⁴ at 3,291 agl (4,462 ft msl), and the convective condensation level (CCL)¹⁵ at 5,118 ft msl. The freezing level was located at 14,304 ft. The precipitable water value was 1.46 inches.

of IFR.

**By definition, VFR is a ceiling greater than or equal to 3,000 ft agl and visibility greater than 5 miles while MVFR is a sub-category of VFR.

⁹ The HRRR is a NOAA real-time three-kilometer resolution, hourly-updated, cloud-resolving, convection-allowing atmospheric model, initialized by three-kilometer grids with three-kilometer radar assimilation. Radar data is assimilated in the HRRR every 15 minutes over a one-hour period.

¹⁰ HRRR sounding was created using NOAA Air Resource Laboratory: <https://ready.arl.noaa.gov/READYamet.php>

¹¹ Skew T log P diagram – is a standard meteorological plot using temperature and the logarithmic of pressure as coordinates, used to display winds, temperature, dew point, and various indices used to define the vertical structure of the atmosphere.

¹² RAOB – (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Eosonde Research Services, The Villages, Florida.

¹³ LCL - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

¹⁴ LFC – The level at which a parcel of saturated air becomes warmer than the surrounding air and begins to rise freely. This occurs most readily in a conditionally unstable atmosphere.

¹⁵ CCL – The level in the atmosphere to which an air parcel, if heated from below, will rise dry adiabatically, without becoming colder than its environment just before the parcel becomes saturated.

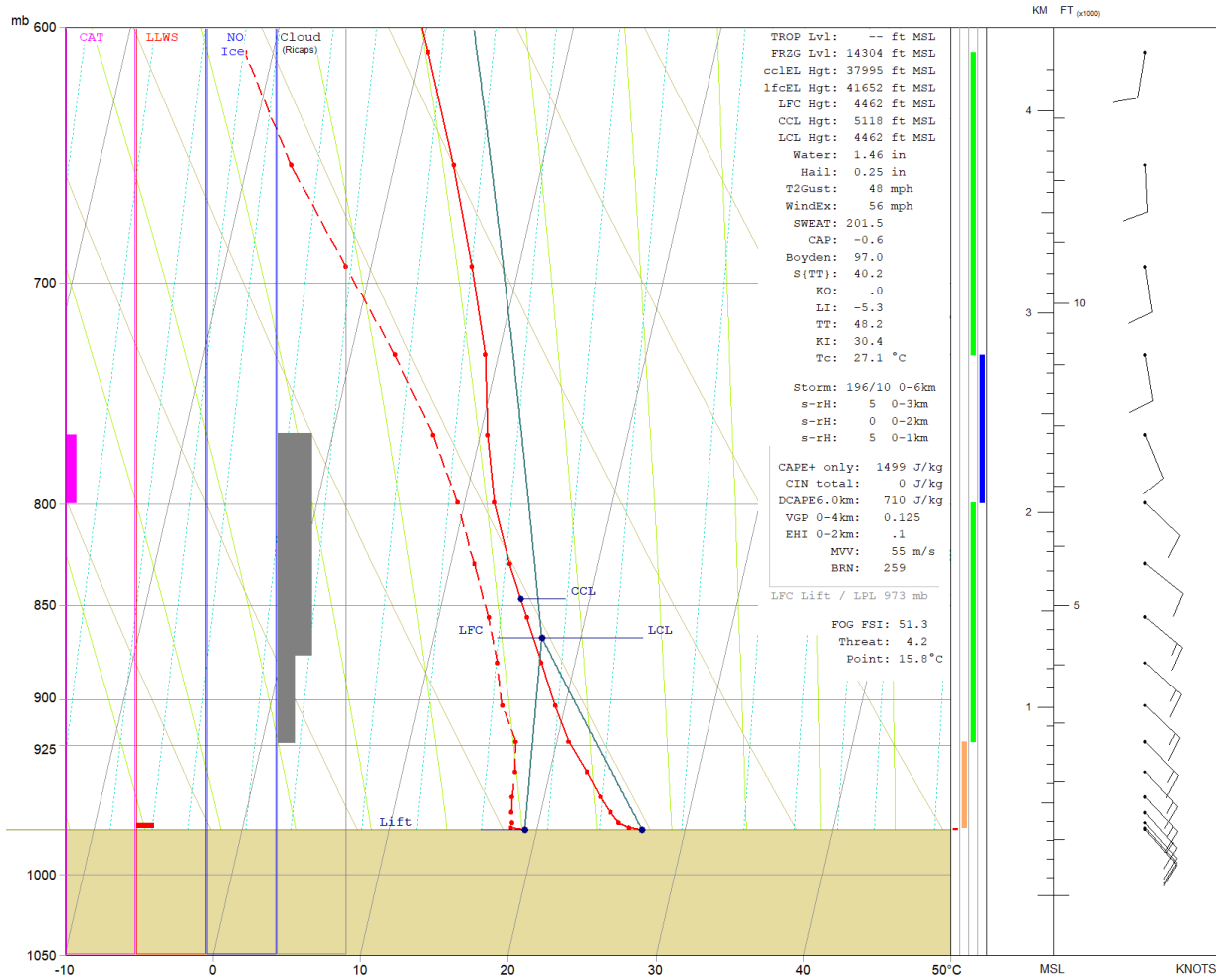


Figure 3 – 1400 CDT HRRR sounding.

The 1400 CDT HRRR sounding for the accident site indicated an unstable environment from the surface through 2,750 ft (~1,600 ft agl). Clouds were indicated by RAOB to be present from 3,000 ft through 8,000 ft. No icing potential was indicated by RAOB below 14,000 ft.

The 1400 CDT HRRR sounding wind profile indicated a near surface wind from 139° at 9 knots with the wind increasing to 15 knots by 2,000 ft (~800 ft agl) from the southeast. The wind remained southeasterly through 7,000 ft. RAOB indicated the possibility of light low-level wind shear (LLWS) between the surface and 400 ft agl. The potential for light clear-air turbulence was noted by RAOB around 7,000 ft.

4.0 Astronomical Data

The astronomical data obtained for the accident site on September 29, 2021, indicated the following:

SUN	
Begin civil twilight	0643 CDT
Sunrise	0708 CDT
Sun transit	1305 CDT
Accident time	1400 CDT¹⁶
Sunset	1901 CDT
End civil twilight	1926 CDT

At the time of the accident the Sun was located at an altitude of 49.52° and azimuth of 201.42°.

Submitted by:

Paul Suffern
Senior Meteorologist

¹⁶ Inserted accident time for reference and context.