



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

May 27, 2022

Specialist's Factual Report

METEOROLOGY

CEN22LA163

A. ACCIDENT

Location: Crowell, Texas
Date: March 31, 2022
Time: 0938 central daylight time
1438 Coordinated Universal Time (UTC)
Aircraft: Kitfox Series 7; Registration: N789RB

B. METEOROLOGY SPECIALIST

Specialist Paul Suffern
National Transportation Safety Board
Washington, DC

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 an approximate latitude 33.9999° N, Longitude 99.7569° W, and elevation of 1,530 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

1.1 Surface Analysis Chart

The NWS Surface Analysis Chart centered over the southcentral United States for 1500 CDT is provided as figure 1 with the location of the accident site within the black circle. The chart depicted a low-pressure system over southeast Colorado at 1009-hectopascals (hPa). A high pressure system at 1013-hPa was located over southeastern Texas. A surface trough² was depicted from central Colorado southeastward into the Panhandle of Texas then east-northeastward through central Missouri, with another trough located south of the accident from northeastern Mexico stretched through Texas into northern Arkansas. The accident site was located between the low and high-pressure systems and between the surface troughs.

The station models around the accident site depicted northwest winds near 10 knots, clear skies, with temperatures in the upper 40's degrees Fahrenheit (°F), with dew point temperatures between 35° and 40°F, with temperature-dew point spreads of 10°F or more.

¹ https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1030235

² Trough - An elongated area of relatively low atmospheric pressure or heights. Troughs can act as lifting mechanisms to help produce clouds and precipitation if sufficient moisture is present.

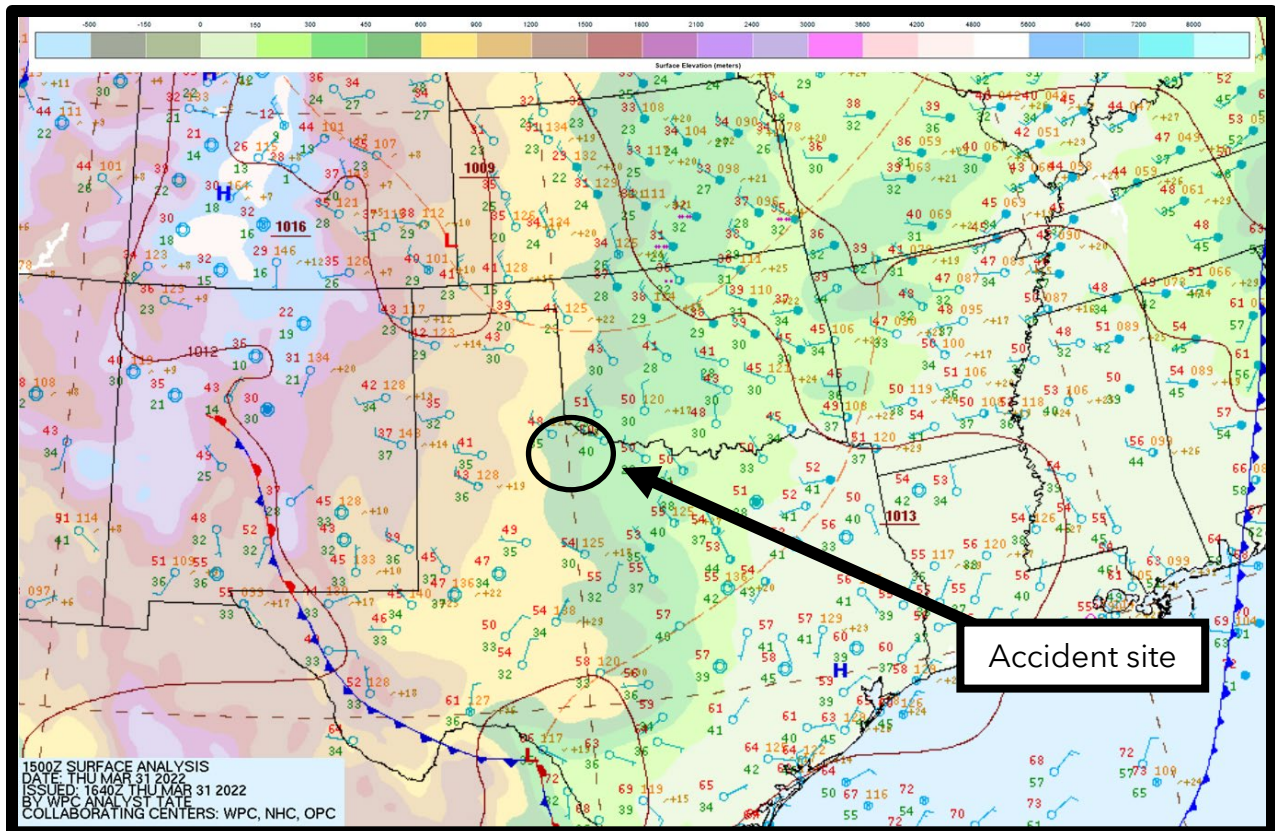


Figure 1. NWS Surface Analysis Chart for 1000 CDT.

2.0 Surface Observations

The area surrounding the accident site was documented using official Aviation Routine Weather Reports (METARs) and Specials Reports (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. The chart depicted the magnetic variation³ of 5° east over the area.

³ Magnetic variation - The angle (at a particular location) between magnetic north and true north. Latest measurement taken from <https://skyvector.com/>

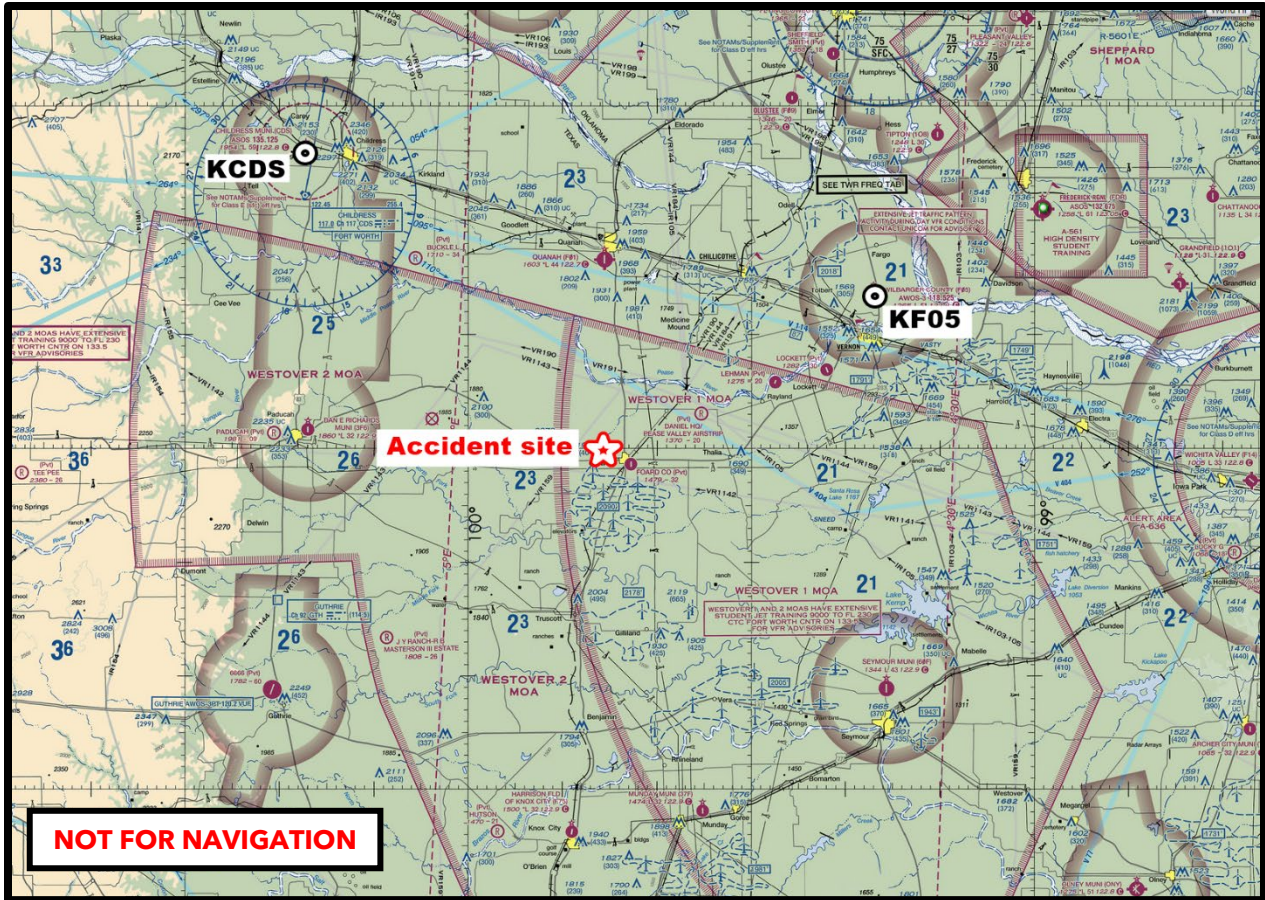


Figure 2. Sectional map of the accident area with the location of the accident site and surface observation sites.

The closest official weather reporting location was from Wilbarger County Airport (KF05), Vernon, Texas, located 27 miles northeast of the accident site at an elevation of 1,265 ft. KF05 had an Automated Weather Observing System (AWOS⁴) whose longline⁵ reports were not augmented, and issued the following observations surrounding the period of the accident:⁶

⁴ AWOS - Automated Weather Observing System is equipped with meteorological instruments to observe and report temperature, dewpoint, wind speed and direction, visibility, cloud coverage and ceiling up to 12,000 feet, and altimeter setting. AWOS are maintained by the FAA.

⁵ "Longline" refers to the dissemination of weather observations with the intent that they are available in near-real time to national databases 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 weather observations are distributed.

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

[0815 CDT] METAR KF05 311315Z AUTO 31011KT 10SM CLR 07/04
A2991 RMK AO2 T00700043=

[0835 CDT] METAR KF05 311335Z AUTO 31009KT 10SM CLR 08/05
A2993 RMK AO2 T00760046=

[0855 CDT] METAR KF05 311355Z AUTO 32008KT 10SM CLR 08/05
A2992 RMK AO2 T00820046=

[0915 CDT] METAR KF05 311415Z AUTO 31008KT 10SM CLR 09/05
A2993 RMK AO2 T00890048=

*[0935 CDT] METAR KF05 311435Z AUTO 30009KT 10SM CLR
10/05 A2993 RMK AO2 T00950045=*

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*[0955 CDT] METAR KF05 311455Z AUTO 30007KT 10SM CLR
10/04 A2994 RMK AO2 T00980044=*

[1015 CDT] METAR KF05 311515Z AUTO 33008KT 10SM CLR 11/04
A2995 RMK AO2 T01050035=

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

KF05 weather at 0935 CDT, automated, wind from 300° at 9 knots, visibility 10 miles or greater, clear skies below 12,000 ft above ground level (agl), temperature of 10° Celsius (C), dew point temperature 5°C, and an altimeter setting of 29.93 inches of mercury (inHg). Remarks, automated station with a precipitation discriminator, temperature 9.5°C, dew point temperature 4.5°C.

KF05 weather at 0955 CDT, automated, wind from 300° at 7 knots, visibility 10 miles or greater, clear skies below 12,000 ft agl, temperature of 10°C, dew point temperature 4°C, and an altimeter setting of 29.94 inHg. Remarks, automated station with a precipitation discriminator, temperature 9.8°C, dew point temperature 4.4°C.

The next closest official weather station to the accident site was Childress Municipal Airport (KCDS), Childress, Texas, located 37 miles northwest of the accident site at an elevation of 1,954 ft. KCDS had an Automated Surface Observing System (ASOS⁷) whose longline reports were not augmented. KCDS ASOS observations surrounding the accident time are shown below:

[0453 CDT] METAR KCDS 310953Z AUTO 30006KT 10SM CLR 06/04
A2985 RMK AO2 SLP102 T00560039=

[0553 CDT] METAR KCDS 311053Z AUTO 32009KT 10SM CLR 05/03
A2987 RMK AO2 SLP107 T00500033=

[0653 CDT] METAR KCDS 311153Z AUTO 31012KT 10SM CLR 04/03
A2988 RMK AO2 SLP113 60002 70002 T00440028 10117 20044
53003=

[0753 CDT] METAR KCDS 311253Z AUTO 32010KT 10SM CLR 04/02
A2990 RMK AO2 SLP120 T00440022=

***[0853 CDT] METAR KCDS 311353Z AUTO 32015KT 10SM CLR
07/03 A2992 RMK AO2 SLP124 T00670028=***

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***[0953 CDT] METAR KCDS 311453Z AUTO 31010KT 10SM CLR
09/02 A2993 RMK AO2 SLP128 T00890017 51015=***

[1053 CDT] METAR KCDS 311553Z AUTO 32012KT 10SM CLR 12/02
A2995 RMK AO2 SLP134 T01170017=

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

KCDS weather at 0853 CDT, automated, wind from 320° at 15 knots, visibility 10 miles or greater, clear skies below 12,000 ft agl, temperature of 7°C, dew point temperature 3°C, and an altimeter setting of 29.92 inHg. Remarks, automated station with a precipitation discriminator, sea level pressure 1012.4 hPa, temperature 6.7°C, dew point temperature 2.8°C.

⁷ 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. ASOS are maintained by the NWS.

KCDS weather at 0953 CDT, automated, wind from 310° at 10 knots, visibility 10 miles or greater, clear skies below 12,000 ft agl, temperature of 9°C, dew point temperature 2°C, and an altimeter setting of 29.93 inHg. Remarks, automated station with a precipitation discriminator, sea level pressure 1012.8 hPa, temperature 8.9°C, dew point temperature 1.7°C, 3-hourly pressure increase of 1.5 hPa.

The observations from KF05 and KCDS surrounding the accident time indicated VFR⁸ conditions with a west-northwest to northwest surface wind between 7 and 15 knots, with no reported gusts during the period.

3.0 Upper Air Sounding

A High-Resolution Rapid Refresh (HRRR)⁹ model sounding was created for the approximate accident site coordinates for 1000 CDT with a surface elevation of 1,522 ft.¹⁰ The 1000 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). These data were analyzed using the RAOB¹² software package. The sounding depicted the lifted condensation level (LCL)¹³ at 4,881 ft and the convective condensation level (CCL)¹⁴ at 11,395 ft. The freezing level was located at 10,017 ft. The precipitable water value was 0.58 inches.

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 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 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.

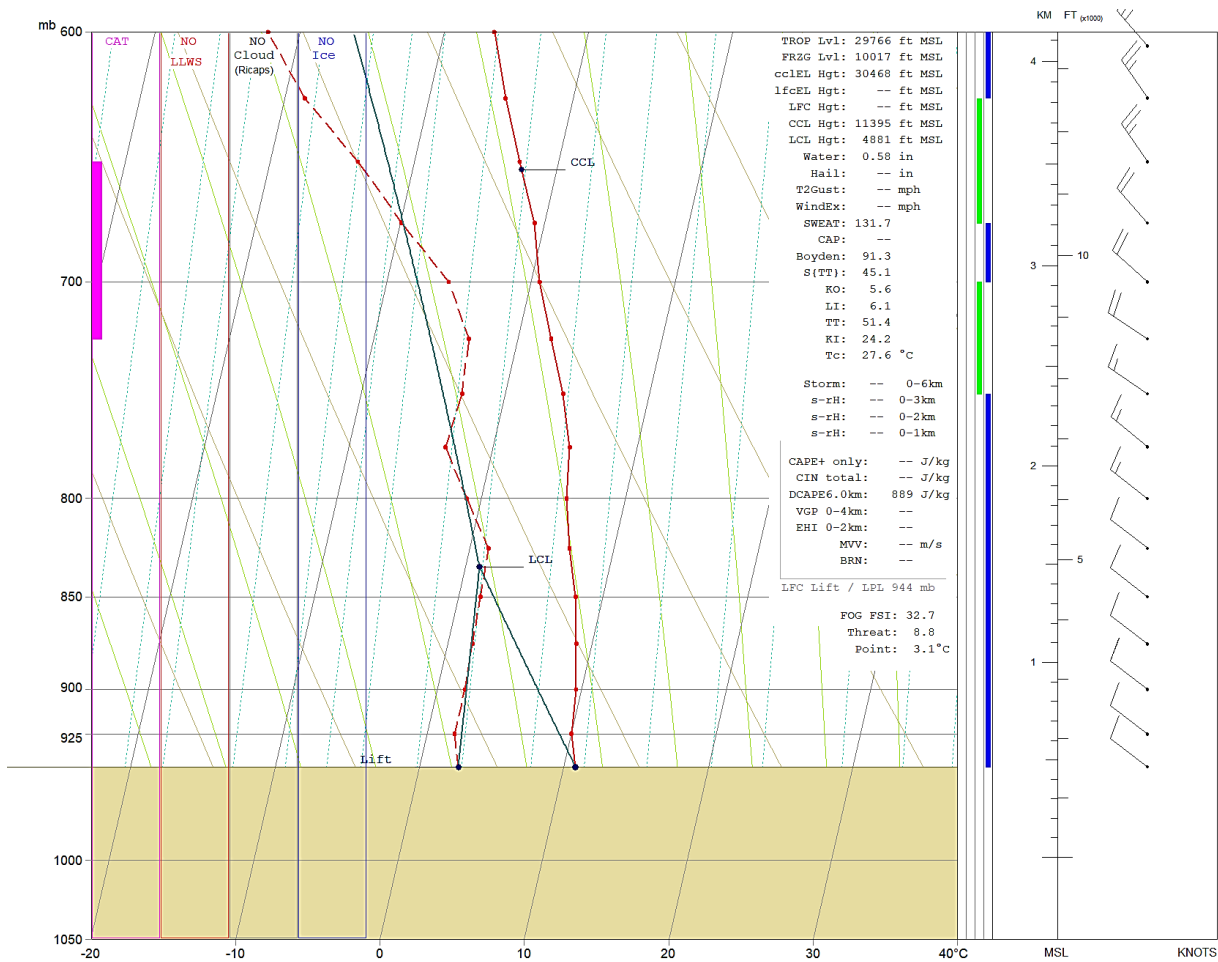


Figure 3. 1000 CDT HRRR sounding.

The 1000 CDT HRRR sounding for the accident site indicated a stable environment from the surface through 8,000 ft. No potential for clouds or structural icing conditions were indicated by RAOB below 14,000 ft.

The 1000 CDT HRRR sounding wind profile indicated a near surface wind from 310° at 9 knots with the wind remaining northwesterly at 10 knots below 5,000 ft. The wind speed increased to 20 knots by 9,000 ft. RAOB did not indicate the possibility of low-level wind shear (LLWS) or clear air turbulence (CAT) below 8,000 ft.

4.0 Pilot Reports

The longline-disseminated pilot reports¹⁵ (PIREPs) distributed into the national airspace system (NAS) were reviewed for about two hours either side of the accident time and no PIREPs were issued into the NAS within 100 miles of the accident site for below 18,000 ft.

5.0 National Weather Service Products

A review of the NWS Aviation Weather Center products¹⁶ indicated that there were no SIGMETs, Convective SIGMETs, or AIRMETs valid for the accident site surrounding the period. In addition, the Fort Worth Center Weather Service Unit issued no Center Weather Advisories over the region during the period.

6.0 Pilot Weather Briefing

The accident pilot did not request weather information¹⁷ from Leidos Flight Service. A search of archived ForeFlight information indicated that the accident pilot did not request a ForeFlight weather briefing before the accident flight nor had the accident pilot viewed Weather Imagery via ForeFlight prior to the flight.

7.0 Astronomical Data

The astronomical data obtained for the accident site on March 31, 2022, indicated the following:

SUN

Begin civil twilight	0702 CDT
Sunrise	0727 CDT
Accident time	0938 CDT ¹⁸
Sun transit	1343 CDT
Sunset	1959 CDT
End civil twilight	2024 CDT

At the time of the accident the Sun was located at an altitude of 26.07° and azimuth of 103.24°.

¹⁵ Only pilot reports with the World Meteorological Organization headers UBNV**, UBUT**, UBCA**, and UBAZ** were considered. These do not include pilot reports only broadcast via radio.

¹⁶ [AWC - AIRMETs/SIGMETs \(aviationweather.gov\)](https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_91-92.pdf)

¹⁷ https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_91-92.pdf

¹⁸ Inserted accident time for reference and context.

E. LIST OF ATTACHMENTS

None.

Submitted by:

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