



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

July 10, 2020

Weather Study Report

METEOROLOGY

CEN20LA248

Table Of Contents

A.	ACCIDENT	3
B.	METEOROLOGIST	3
C.	DETAILS OF THE INVESTIGATION	3
D.	WEATHER INFORMATION	3
1.0	Synoptic Situation	3
1.1	Surface Analysis Chart	4
1.2	Upper Air Charts	5
2.0	SPC Products	9
3.0	Surface Observations	11
4.0	Upper Air Data	16
5.0	Satellite Data	18
6.0	Regional Radar Imagery Information	19
7.0	Pilot Reports	20
8.0	SIGMET	20
9.0	CWSU Advisories	20
10.0	AIRMETs	20
11.0	Graphical Forecasts for Aviation	21
12.0	Terminal Aerodrome Forecast	21
13.0	NWS Area Forecast Discussion	22
14.0	Winds and Temperature Aloft Forecast	23
15.0	Pilot Weather Briefing	23
16.0	Fog Formation and References	24
17.0	Astronomical Data	24
E.	LIST OF ATTACHMENTS	24

A. ACCIDENT

Location: Zavalla, Texas
Date: June 27, 2020
Time: 0153 central daylight time
0653 Coordinated Universal Time (UTC)
Aircraft: Piper PA-32R-301T; Registration: N315AM

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 gathered the weather data for this investigation from official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources including the National Centers for Environmental Information (NCEI). All times are central daylight time (CDT) on June 27, 2020, and are based upon the 24-hour clock, where local time is -5 hours from UTC, and UTC=Z (unless otherwise noted). Directions are referenced to true north and distances in nautical miles. Heights are above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles. NWS airport and 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 location used was at latitude 31.1875° N, longitude 94.3406° W, with an approximate elevation of 190 feet (ft).

D. WEATHER 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/1030235

1.1 Surface Analysis Chart

The southern section of the NWS Surface Analysis Chart for 0100 CDT is provided as figure 1 with the approximate location of the accident site marked by the red circle. The chart did not identify any frontal boundaries near the accident site.

The station models around the accident site depicted air temperatures in the upper 70's to 80 degrees Fahrenheit (°F), dew point temperatures in the upper 70's °F with temperature-dew point spreads of 3°F or less, southeast winds of 5 knots, and scattered to overcast cloud cover.

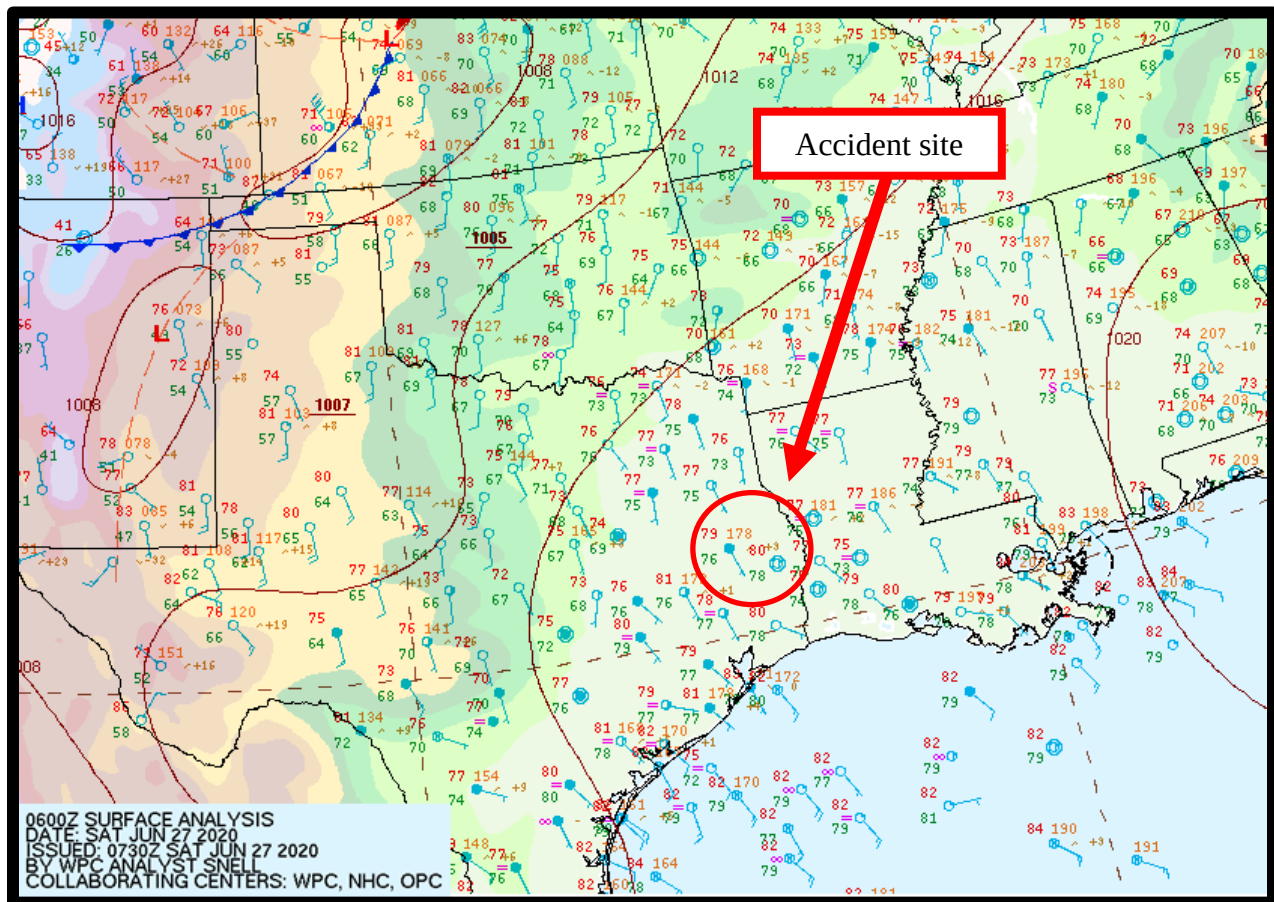


Figure 1 – NWS Surface Analysis Chart for 0100 CDT

1.2 Upper Air Charts

The NWS Storm Prediction Center (SPC) Constant Pressure Charts for 0700 CDT at 925-, 850-, 700-, 500-, and 300-hectopascals (hPa) are presented in figures 2 through 6. There was a low- and mid-level trough² located above the accident site from 850- through 500-hPa (figures 3 to 5). Troughs can act as lifting mechanisms to help produce clouds and precipitation if sufficient moisture is present. There was a southwest wind of 25 knots at 925-hPa above the accident site with the wind remaining southwesterly at 25 knots through 700-hPa (figure 4). By 300-hPa the wind above the accident site had become westerly at 20 knots (figure 6).

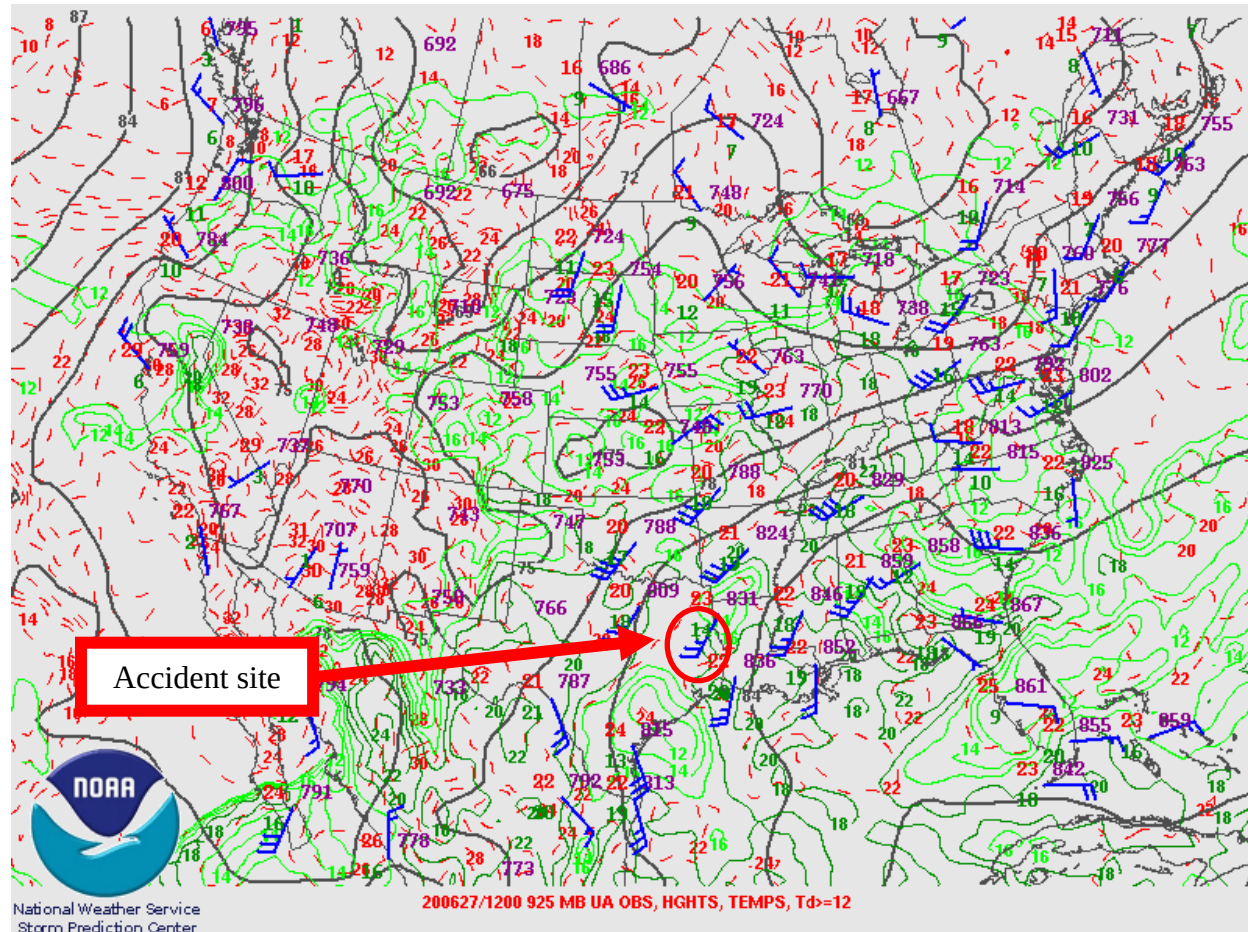


Figure 2 – 925-hPa Constant Pressure Chart for 0700 CDT

² Trough – An elongated area of relatively low atmospheric pressure or heights.

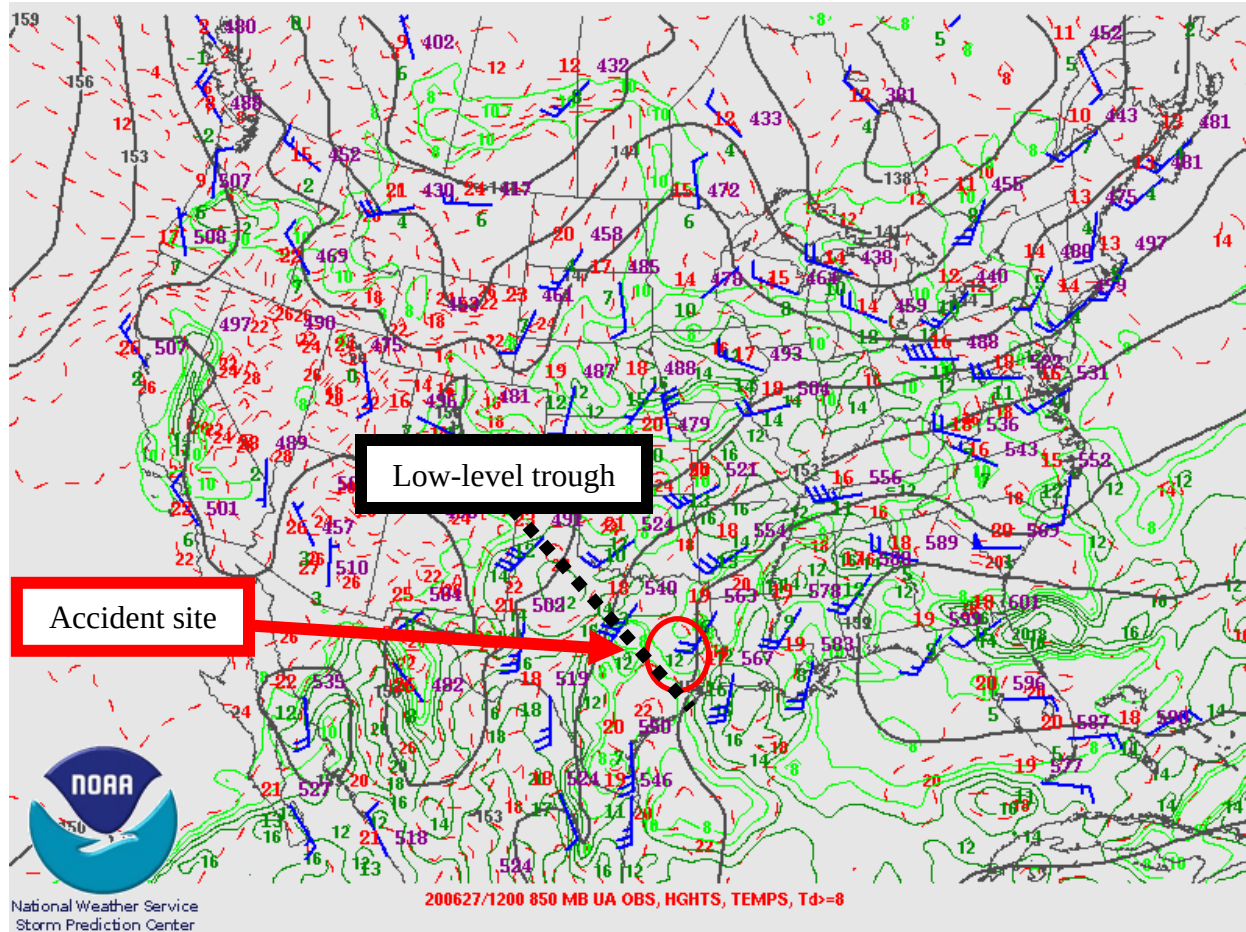


Figure 3 – 850-hPa Constant Pressure Chart for 0700 CDT

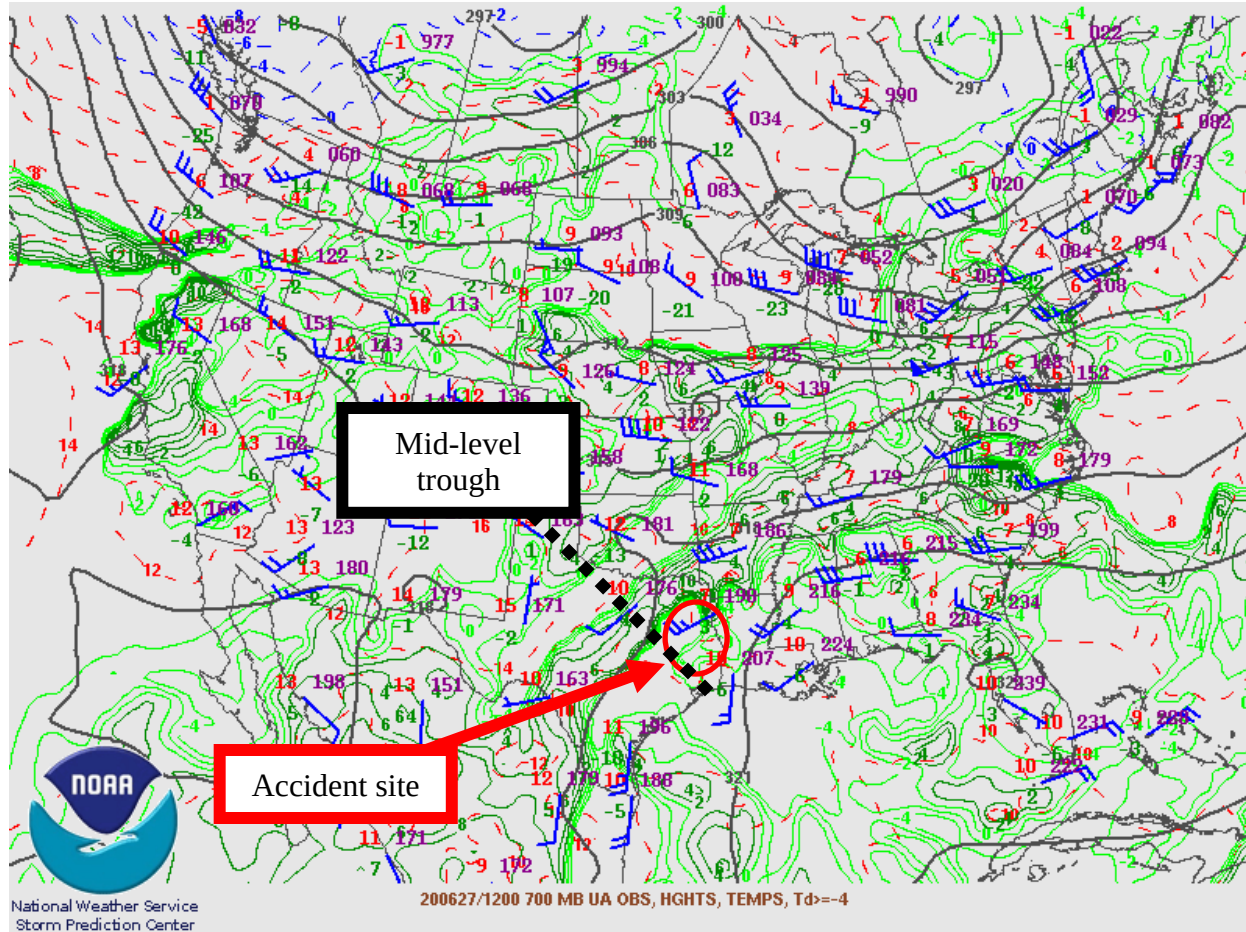


Figure 4 – 700-hPa Constant Pressure Chart for 0700 CDT

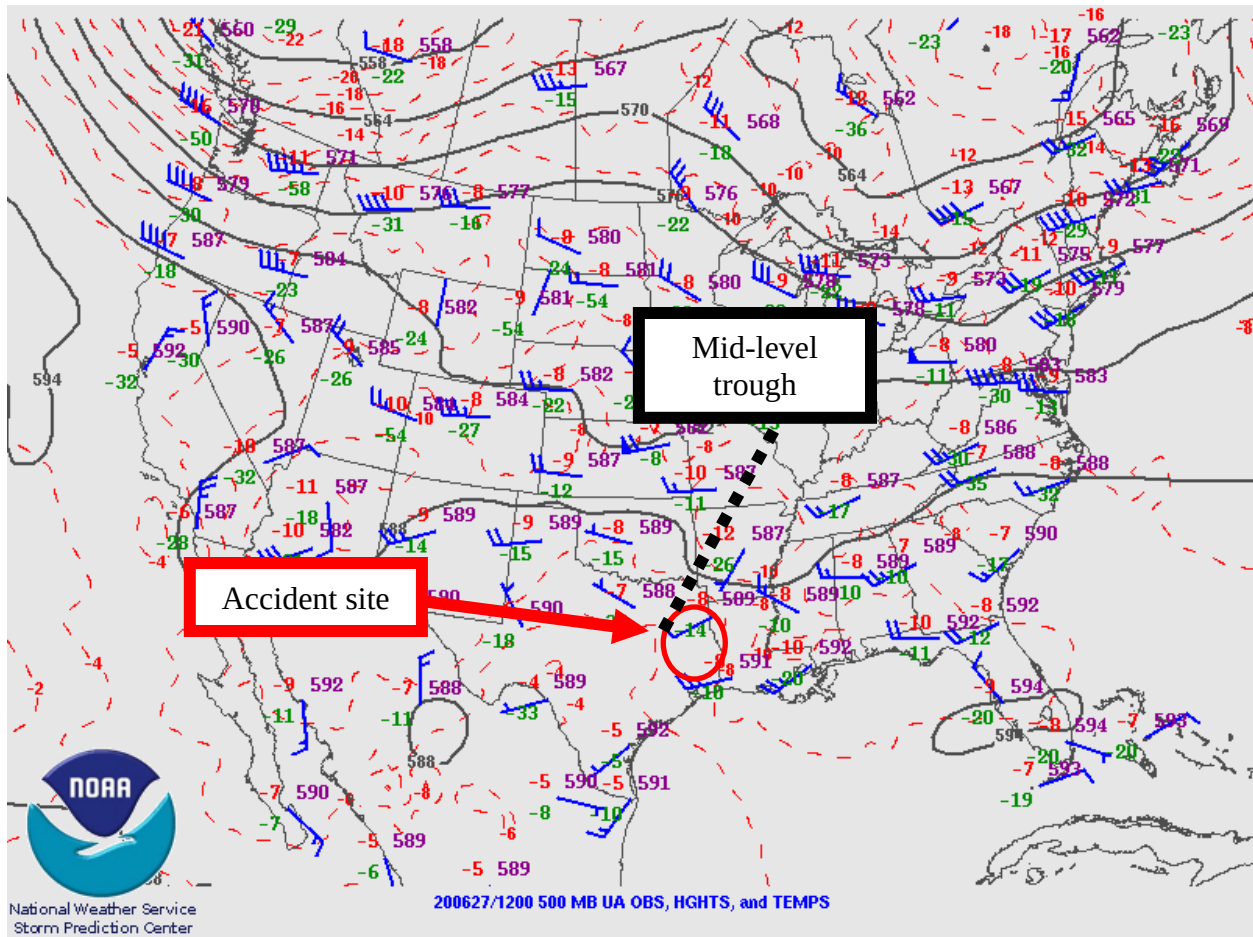


Figure 5 – 500-hPa Constant Pressure Chart for 0700 CDT

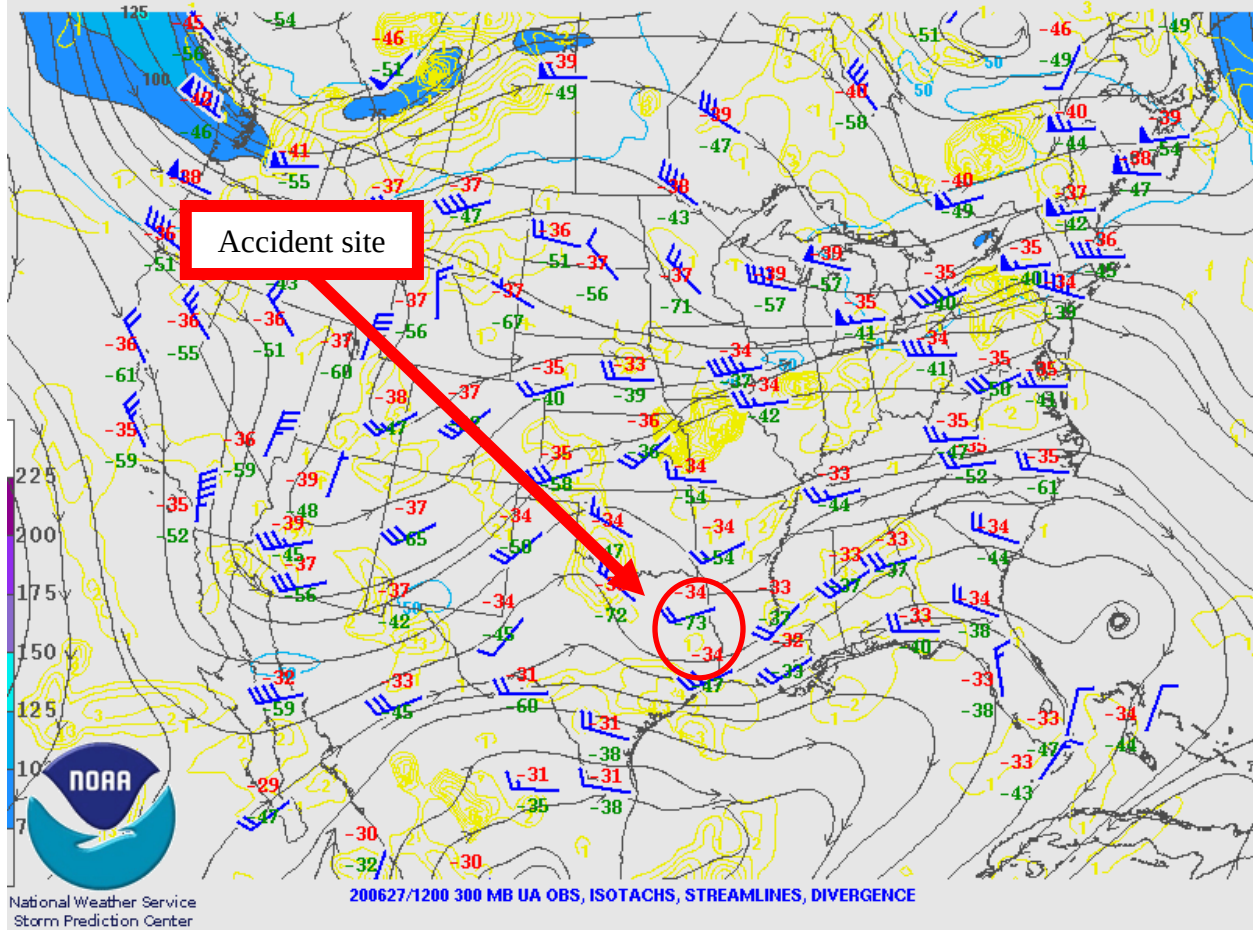


Figure 6 – 300-hPa Constant Pressure Chart for 0700 CDT

2.0 SPC Products

SPC issued the following Day 1 Convective Outlook at 1956 CDT on June 26, 2020, (figure 7) with an area of general thunderstorms forecast for the accident site. SPC defines the “TSTM” area as an area that encloses where a 10% or higher probability of thunderstorms is forecast during the valid period. The SPC Day 1 Convective Outlook text follows figure 7.

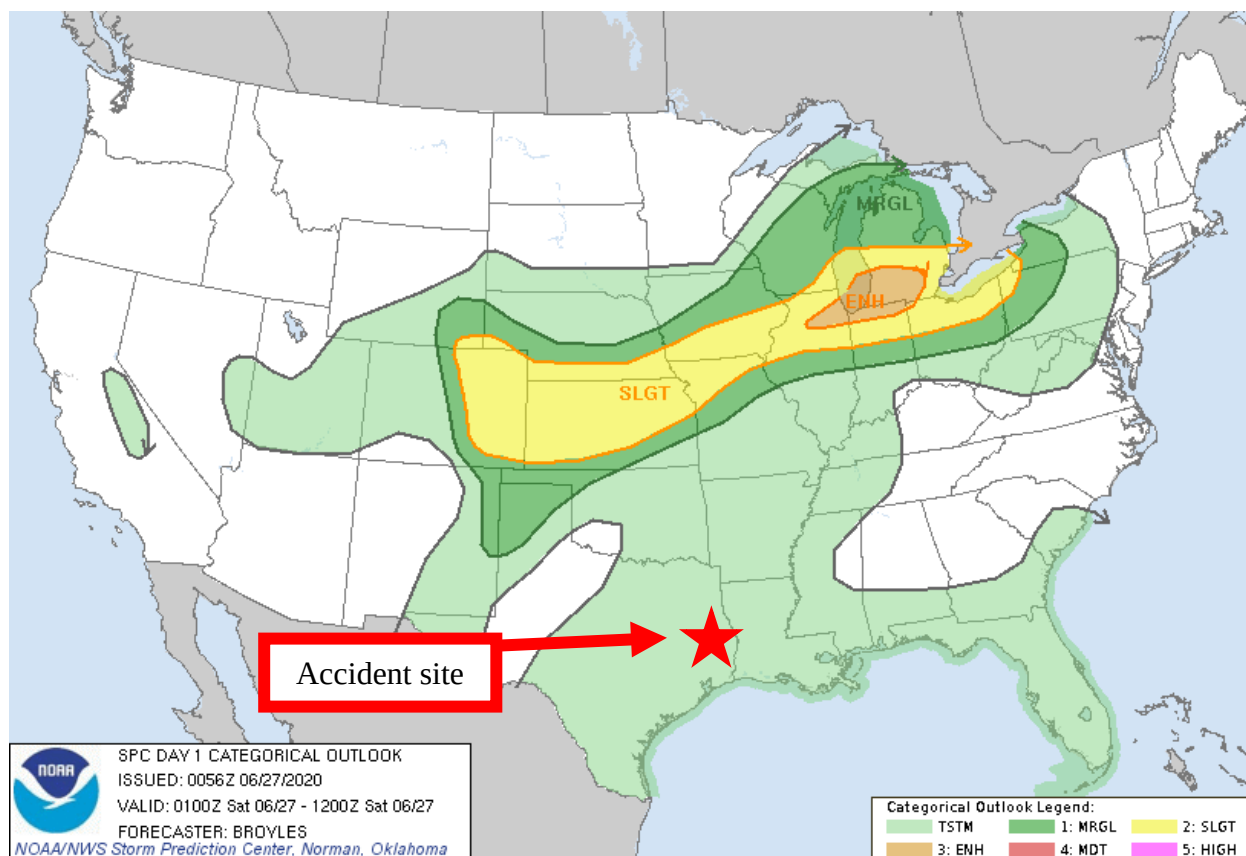


Figure 7 – SPC day 1 Convective Outlook valid at the time of the accident

SPC AC 270056

Day 1 Convective Outlook
NWS Storm Prediction Center Norman OK
0756 PM CDT Fri Jun 26 2020

Valid 270100Z - 271200Z

...THERE IS AN ENHANCED RISK OF SEVERE THUNDERSTORMS ACROSS PARTS OF NORTHEAST ILLINOIS...FAR NORTHERN INDIANA...SOUTHERN LOWER MICHIGAN AND FAR NORTHWEST OHIO...

...SUMMARY...

Severe thunderstorms with damaging winds, large hail, and a couple tornadoes are possible this evening in northeastern Illinois, far northern Indiana, southern Lower Michigan and far northwest Ohio. Other severe thunderstorms with large hail and wind damage may occur from eastern Colorado into parts of Kansas, Nebraska, Missouri and Iowa from this evening into the overnight period.

...Southern Great Lakes...

The latest radar imagery shows a well-developed line segment from southern Lake Michigan extending southwestward into the Chicago Metro area. According to water vapor imagery, the MCS is located along the leading edge of large-scale ascent associated with a shortwave trough moving into the western Great Lakes region. Ahead

of the line of severe storms, surface dewpoints are in the 65 to 70 F range and the RAP is estimating MLCAPE of 2000 to 3000 J/kg. In addition, the RAP has a 40 to 50 kt speed max across northern Illinois which is supporting the linear MCS. As this line segment moves quickly eastward across far northeastern Illinois, far northern Indiana and southern Lower Michigan over the next 3 to 4 hours, wind damage will be likely along the leading edge. Isolated large hail could also occur with the more intense rotating cells embedded in the line. The line of severe storms is expected to reach western Lake Erie in the 03Z to 04Z timeframe and may produce damaging wind gusts as far east as far northwest Pennsylvania.

...Central High Plains/Central Plains/Lower to Mid Missouri Valley...

The latest radar imagery shows scattered strong to severe thunderstorms from western Nebraska into eastern Colorado. These storms were currently in a moderately unstable airmass where deep-layer shear and steep mid-level lapse rates are favorable for a severe threat. Large hail and wind damage may occur with supercells and organized multicells. Further to the east into the central Plains and lower to mid Missouri Valley, low-level moisture is greater than in the central High Plains. Surface dewpoints from central Kansas to Iowa are generally in the 65 to 70 F range. This is contributing to strong instability with the RAP showing MLCAPE as high as 4000 J/kg in north-central Kansas. As the convection over eastern Colorado and western Nebraska moves eastward into the stronger instability, severe threat coverage is expected to increase some as an MCS organizes...see MCD 1012. Large hail will continue to be possible, especially with supercells that develop. Wind damage may also occur with supercells and bowing line segments. Wind damage may become the greater threat late this evening especially if linear mode becomes dominant.

..Broyles.. 06/27/2020

CLICK TO GET WUUS01 PTSDY1 PRODUCT

NOTE: THE NEXT DAY 1 OUTLOOK IS SCHEDULED BY 0600Z

3.0 Surface Observations

The area surrounding the accident site was documented using official Meteorological Aerodrome Reports (METARs) and Specials (SPECIs). The following observations were taken from standard code and are provided in plain language. Figure 8 is a sectional chart with the accident site and the closest weather reporting locations marked.

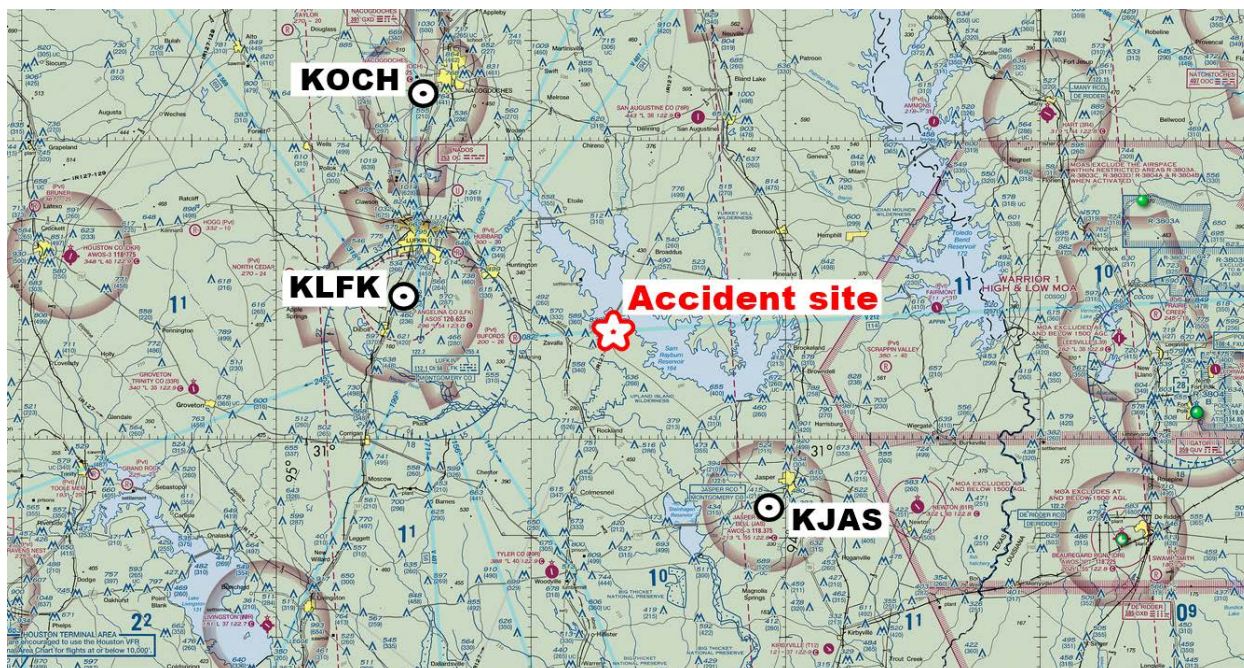


Figure 8 – Sectional map of the accident area with the location of the accident site and surface observation sites

Angelina County Airport (KLFK) had the closest official weather station to the accident site. KLFK had an Automated Surface Observing System (ASOS³) whose reports were not supplemented, and was located 21 miles west of the accident site at an elevation of 296 ft and had a 2° easterly magnetic variation⁴. The following observations were taken and disseminated during the times surrounding the accident:⁵

[2053 CDT] SPECI KLFK 270206Z AUTO 11006KT 8SM FEW016 BKN030 27/24 A3005
RMK AO2 T02670244=

[2153 CDT] METAR KLFK 270253Z AUTO 12006KT 8SM BKN036 27/25 A3007 RMK
AO2 SLP177 T02670250 53003=

[2253 CDT] METAR KLFK 270353Z AUTO 13006KT 8SM SCT038 27/24 A3007 RMK
AO2 SLP178 T02670244=

[2353 CDT]⁶ METAR KLFK 270453Z AUTO 15006KT 9SM BKN012 OVC030 26/24 A3007
RMK AO2 SLP179 T02610244=

³ ASOS – Automated Surface Observing System is equipped with meteorological instruments to observe and report wind, visibility, ceiling, temperature, dewpoint, altimeter, and barometric pressure.

⁴ Magnetic variation – The angle (at a particular location) between magnetic north and true north. Latest measurement taken from <https://skyvector.com/>

⁵ The bold sections in this NWS product and the rest of the products in this report are intended to highlight the sections 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.

⁶ All times from 2353 CDT and before are from June 26, 2020.

**[0053 CDT] METAR KLFK 270553Z AUTO 16005KT 10SM OVC011 26/24 A3007 RMK
AO2 SLP178 T02610244 10283 20261 403060239 50003=**

ACCIDENT TIME 0153 CDT

**[0153 CDT] METAR KLFK 270653Z AUTO 15006KT 10SM BKN013 26/24 A3006 RMK
AO2 SLP173 T02610239=**

**[0217 CDT] SPECI KLFK 270717Z AUTO 15005KT 10SM SCT011 SCT034 26/24
A3005 RMK AO2 T02560239=**

KLFK weather at 0053 CDT, automated, wind from 160° at 5 knots, 10 miles visibility or greater, overcast ceiling at 1,100 ft above ground level (agl), temperature of 26°Celsius (C), dew point temperature of 24°C, and an altimeter setting of 30.07 inches of mercury. Remarks: automated station with a precipitation discriminator, sea level pressure 1017.8 hPa, temperature 26.1°C, dew point temperature 24.4°C, 6-hourly maximum temperature of 28.3°C, 6-hourly minimum temperature of 26.1°C, 24-hour maximum temperature of 30.6°C, 24-hour minimum temperature of 23.9°C, 3-hourly pressure increase of 0.3 hPa.

KLFK weather at 0153 CDT, automated, wind from 150° at 6 knots, 10 miles visibility or greater, broken ceiling at 1,300 ft agl, temperature of 26°C, dew point temperature of 24°C, and an altimeter setting of 30.06 inches of mercury. Remarks: automated station with a precipitation discriminator, sea level pressure 1017.3 hPa, temperature 26.1°C, dew point temperature 23.9°C.

Jasper County Airport (KJAS) had the next closest official weather station to the accident site. KJAS had an Automated Weather Observing System (AWOS⁷) whose reports were not supplemented, and was located 24 miles southeast of the accident site at an elevation of 213 ft. The following observations were taken and disseminated during the times surrounding the accident:

**[0015 CDT] METAR KJAS 270515Z AUTO 00000KT 7SM SCT008 27/26 A3011 RMK
AO2 T02650256=**

**[0035 CDT] METAR KJAS 270535Z AUTO 15003KT 7SM SCT008 27/26 A3011 RMK
AO2 T02650256=**

**[0055 CDT] METAR KJAS 270555Z AUTO 00000KT 7SM SCT008 27/26 A3010 RMK
AO2 T02650256=**

**[0115 CDT] METAR KJAS 270615Z AUTO 00000KT 7SM BKN006 26/26 A3010 RMK
AO2 P0001 T02640256=**

⁷ 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.

[0135 CDT] METAR KJAS 270635Z AUTO 16003KT 7SM OVC006 26/26 A3010 RMK AO2 P0001 T02630256=

ACCIDENT TIME 0153 CDT

[0155 CDT] METAR KJAS 270655Z AUTO 15003KT 7SM OVC006 26/26 A3010 RMK AO2 P0001 T02630256=

[0215 CDT] METAR KJAS 270715Z AUTO 00000KT 7SM OVC006 26/26 A3009 RMK AO2 T02620256=

KJAS weather at 0135 CDT, automated, wind from 160° at 3 knots, 7 miles visibility, overcast ceiling at 600 ft agl, temperature of 26°C, dew point temperature of 26°C, and an altimeter setting of 30.10 inches of mercury. Remarks: automated station with a precipitation discriminator, 0.01 inches of precipitation since 0055 CDT, temperature 26.3°C, dew point temperature 25.6°C.

KJAS weather at 0155 CDT, automated, wind from 150° at 3 knots, 7 miles visibility, overcast ceiling at 600 ft agl, temperature of 26°C, dew point temperature of 26°C, and an altimeter setting of 30.10 inches of mercury. Remarks: automated station with a precipitation discriminator, 0.01 inches of precipitation since 0055 CDT, temperature 26.3°C, dew point temperature 25.6°C.

Nacogdoches A L Mangham Jr. Regional Airport (KOCH) had the next closest official weather station to the accident site. KOCH had an AWOS whose reports were not supplemented, and was located 30 miles northwest of the accident site at an elevation of 355 ft. The following observations were taken and disseminated during the times surrounding the accident:

[2256 CDT] METAR KOCH 270356Z AUTO 15007KT 6SM BR OVC021 26/25 A3008 RMK AO2 SLP186 T02610250=

[2356 CDT]⁸ METAR KOCH 270456Z AUTO 15007KT 6SM BR BKN021 26/25 A3008 RMK AO2 SLP186 T02610250=

[0009 CDT] SPECI KOCH 270509Z AUTO 16005KT 6SM BR FEW007 SCT012 BKN021 26/25 A3008 RMK AO2=

[0025 CDT] SPECI KOCH 270525Z AUTO 16007KT 6SM BR BKN010 OVC021 26/25 A3008 RMK AO2 CIG 007V013=

[0056 CDT] METAR KOCH 270556Z AUTO 16006KT 7SM OVC010 26/25 A3008 RMK AO2 CIG 007V012 SLP185 T02610250 10278 20261 403060239 50002=

ACCIDENT TIME 0153 CDT

[0156 CDT] METAR KOCH 270656Z AUTO 17008KT 10SM OVC012 26/24 A3006 RMK AO2 SLP181 T02610244=

⁸ All times from 2356 CDT and before are from June 26, 2020.

[0256 CDT] METAR KOCH 270756Z AUTO 18007KT 10SM OVC008 26/24 A3005 RMK
AO2 CIG 004V011 SLP178 T02560244=

KOCH weather at 0056 CDT, automated, wind from 160° at 6 knots, 7 miles visibility, overcast ceiling at 1,000 ft agl, temperature of 26°C, dew point temperature of 25°C, and an altimeter setting of 30.08 inches of mercury. Remarks: automated station with a precipitation discriminator, ceiling varying between 700 and 1,200 ft agl, sea level pressure 1018.5 hPa, temperature 26.1°C, dew point temperature 25.0°C, 6-hourly maximum temperature of 27.8°C, 6-hourly minimum temperature of 26.1°C, 24-hour maximum temperature of 30.6°C, 24-hour minimum temperature of 23.9°C, 3-hourly pressure increase of 0.2 hPa.

KOCH weather at 0156 CDT, automated, wind from 170° at 8 knots, 10 miles visibility or greater, overcast ceiling at 1,200 ft agl, temperature of 26°C, dew point temperature of 24°C, and an altimeter setting of 30.06 inches of mercury. Remarks: automated station with a precipitation discriminator, sea level pressure 1018.1 hPa, temperature 26.1°C, dew point temperature 24.4°C.

The observations from KLFK, KJAS, and KOCH surrounding the accident time indicated IFR to MVFR⁹ conditions due to lower ceilings near the time of the accident.

⁹ 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.

4.0 Upper Air Data

A High-Resolution Rapid Refresh (HRRR)¹⁰ model sounding was created for the accident site for 0200 CDT with station elevation of 203 ft.¹¹ The 0200 CDT HRRR sounding was plotted on a standard Skew-T Log P diagram¹² with the derived stability parameters included in figure 9 with data from the surface to 700-hPa (or approximately 10,000 ft msl). These data were analyzed using the RAOB¹³ software package. The sounding depicted the lifted condensation level (LCL)¹⁴ at 681 ft agl, the level of free convection (LFC)¹⁵ at 1,367 ft agl, and the convective condensation level (CCL)¹⁶ at 2,184 ft agl. The freezing level was located at 14,859 ft msl. The precipitable water value was 1.60 inches.

¹⁰ 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.

¹¹ HRRR sounding was created using NOAA Air Resource Laboratory: <https://ready.arl.noaa.gov/READYamet.php>

¹² 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.

¹³ RAOB – (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Environmental Research Services, Matamoras, Pennsylvania.

¹⁴ LCL - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

¹⁵ 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.

¹⁶ 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.

5.0 Satellite Data

The Geostationary Operational Environmental Satellite number 16 (GOES-16) visible and infrared data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System software. Visible and infrared imagery (GOES-16 bands 2 and 13, respectively) at wavelengths of 0.64 microns (μm) and 10.3 μm , respectively, were retrieved for the period from 2000 CDT on June 26, 2020, through 0400 CDT on June 27, 2020, and reviewed, and the closest images to the time of the accident were documented. Because the time of the accident was after local sunset, the visible imagery did not provide helpful data at the accident time.

Figure 10 presents the GOES-16 infrared imagery from 0156 CDT at 4X magnification with the accident site highlighted with a red square. Inspection of the infrared imagery indicated cloud cover over the accident site. The lower brightness temperatures (blue and green colors; higher cloud tops) were located to the east of the accident site. Based on the brightness temperatures above the accident site and the vertical temperature profile provided by the 0200 CDT HRRR sounding, the approximate cloud-top heights over the accident site were 20,000 ft at 0156 CDT (263 Kelvin, not shown on figure 9). It should be noted these figures have not been corrected for any parallax error.

Attachment 1 presents the GOES-16 Nighttime Microphysics¹⁷ RGB (red green blue) imagery animation from 0001 CDT through 0206 CDT. Inspection of the Nighttime Microphysics RGB imagery indicated 2 levels of cloud cover above the accident site at the accident time. The lower-level cloud cover, which was increasing in areal coverage across the accident site between 0001 and 0206 CDT, was indicated by the yellow-green color. The higher-level cloud cover was moving from southwest to northeast and was indicated by the dark red colors. The yellow-green color on the Nighttime Microphysics RGB imagery identify low-level cool water clouds, and the dark red colors on the Nighttime Microphysics RGB imagery identify high thick ice clouds.

¹⁷ Also see: <https://nasasporttraining.wordpress.com/2017/02/23/nighttime-microphysics-rgb-application-aviation-module-2/>

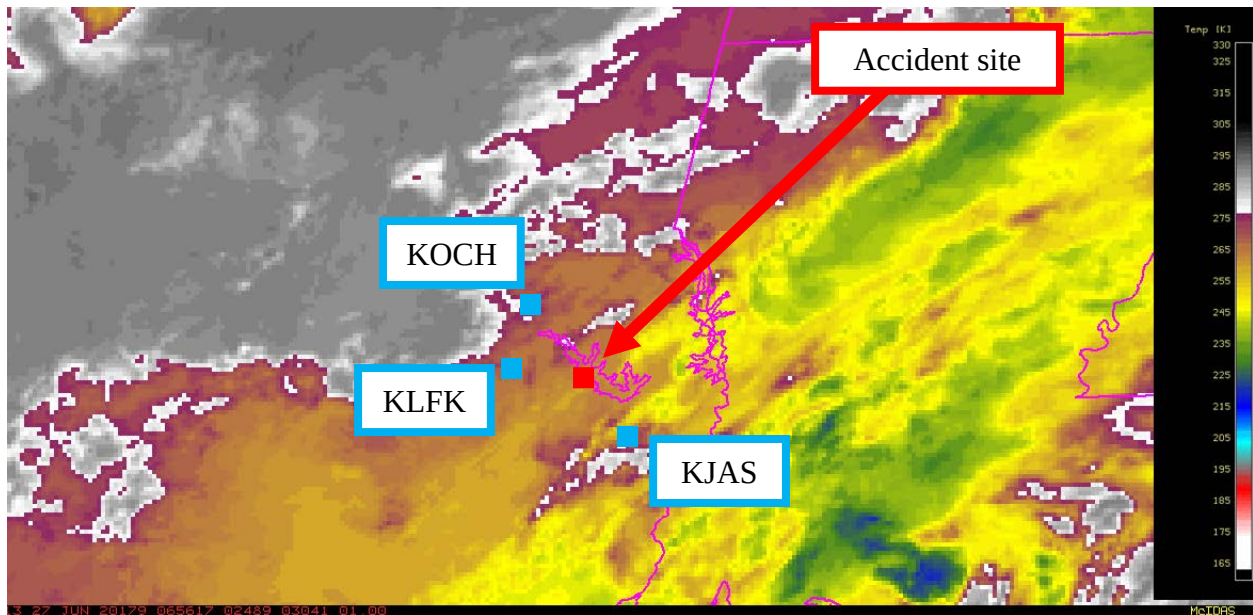


Figure 10 – GOES-16 infrared image at 0156 CDT

6.0 Regional Radar Imagery Information

A regional view of the NWS national composite radar mosaic is included as figure 11 for 0155 CDT with the approximate location of the accident site marked by a red circle. The image depicted no precipitation above the accident site at the accident time.

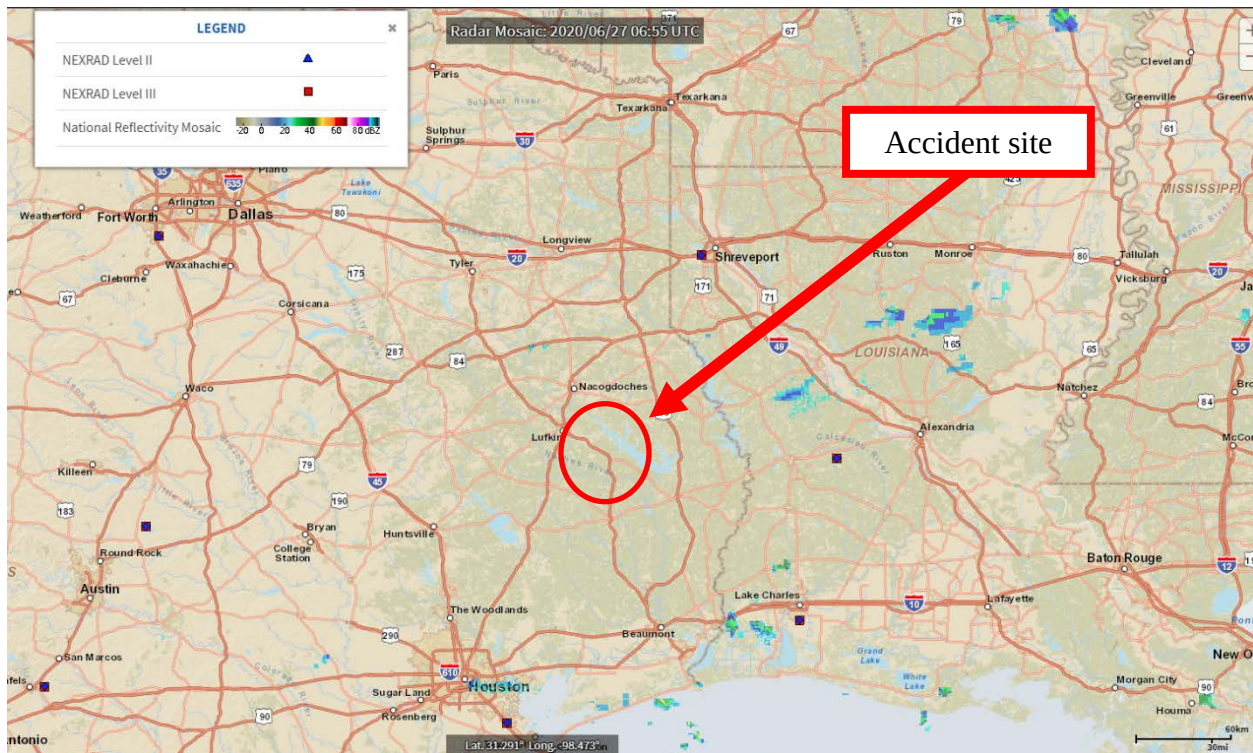


Figure 11 – Regional Composite Reflectivity image for 0155 CDT

7.0 Pilot Reports¹⁸

There were no pilot reports (PIREPs) distributed into the national airspace within 150 miles of the accident site from about two hours prior to the accident time to two hours after the accident time.

8.0 SIGMET

There were no convective or non-convective Significant Meteorological Information (SIGMET) advisories valid for the accident site at the accident time.

9.0 CWSU Advisories

There were no Center Weather Service Unit (CWSU) Meteorological Impact Statements (MIS) or Center Weather Advisories (CWA) valid for the accident site at the accident time.

10.0 AIRMETs

Airmen's Meteorological Information (AIRMET) advisory Sierra was valid for the accident site at the accident time. The AIRMET Sierra warned of IFR conditions due to precipitation and mist:

WAUS44 KPCI 270245

WA4S

-DFWS WA 270245

AIRMET SIERRA FOR IFR AND MTN OBSCN VALID UNTIL 270900

.

AIRMET IFR...TX

FROM 30N CWK TO 50W IAH TO 50E LRD TO 50SE DLF TO 60NW DLF TO

30N CWK

CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS DVLPG 06-09Z. CONDS CONTG

BYD 09Z ENDG 12-15Z.

.

AIRMET IFR...TX LA MS AND CSTL WTRS

FROM 60E TTT TO 30ESE EIC TO 40SE MHZ TO 30E LEV TO 50WSW LSU TO

30ENE IAH TO 60E TTT

CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS DVLPG 03-06Z. CONDS CONTG

BYD 09Z THRU 15Z.

.

AIRMET IFR...TN AL

FROM 60WSW BKW TO HMV TO GQO TO 40WSW GQO TO 70ESE DYR TO 20WSW

BWG TO 20S LOZ TO 60WSW BKW

CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS CONTG BYD 09Z ENDG 09-12Z.

.

AIRMET MTN OBSCN...TN KY

FROM 40W BKW TO HMV TO GQO TO 50ESE BWG TO 40NNE LOZ TO 40W BKW

MTNS OBSC BY CLDS/PCPN/BR. CONDS CONTG BYD 09Z THRU 15Z.

.

OTLK VALID 0900-1500Z...IFR TX AR LA MS AND CSTL WTRS

¹⁸ Only pilot reports with the World Meteorological Organization headers UBTX** and UBLA** were considered.

BOUNDED BY 50SW LIT-30NE MEI-30WSW SJI-LEV-50ESE LCH-30E IAH-
50ENE TTT-TXK-50SW LIT
CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS CONTG THRU 15Z.
....

11.0 Graphical Forecasts for Aviation

The Graphical Forecasts for Aviation (GFA) products made available to the public before the accident flight and valid at 0100 and 0400 CDT are shown in attachment 2. The GFA surface forecast products indicated surface visibilities between 1 to 5 miles and these surface visibilities met the MVFR to IFR thresholds¹⁹ with isolated (between a 10 and 20 percent chance) thunderstorms and a surface wind from the southeast at 5 to 10 knots. The GFA cloud forecast valid before departure for around the accident time indicated scattered to overcast clouds at 1,800 ft msl, with cloud tops at 3,000 ft msl to FL220²⁰ with cirrus clouds above. The G-AIRMET Sierra valid for the accident site was overlaid on the GFA surface forecast graphics. For more information please see attachment 2.

12.0 Terminal Aerodrome Forecast

KLFK was the closest airport to the accident site with a NWS Terminal Aerodrome Forecast (TAF). The KLFK TAF valid at the time of the accident was issued at 0024 CDT and was valid for a 24-hour period beginning at 0100 CDT. The TAF for KLFK was as follows:

TAF KLFK 270524Z 2706/2806 **15004KT 6SM BR BKN015 OVC030**
TEMPO 2708/2712 3SM BR BKN007
FM271200 14004KT 5SM BR OVC007
TEMPO 2712/2716 P6SM NSW BKN015
FM271600 18007KT P6SM BKN030 BKN150 BKN250
FM271800 18008KT P6SM BKN040 BKN250
FM280000 17006KT P6SM SCT045 SCT150=

Between 0100 and 0700 CDT, the forecast expected a wind from 150° at 4 knots, 6 miles visibility, mist, a broken ceiling at 1,500 ft agl, and overcast skies at 3,000 ft agl. Temporary conditions²¹ of 3 miles visibility, mist, and a broken ceiling at 700 ft agl were forecast between 0300 and 0700 CDT.

¹⁹ <https://aviationweather.gov/gfa/help?page=plot>

²⁰ Flight Level – A Flight Level (FL) is a standard nominal altitude of an aircraft, in hundreds of ft. This altitude is calculated from the International standard pressure datum of 1013.25 hPa (29.92 inHg), the standard sea-level pressure, and therefore is not necessarily the same as the aircraft's true altitude either above mean sea level or above ground level.

²¹ The TEMPO group is used for any conditions in wind, visibility, weather, or sky condition which are expected to last for generally less than an hour at a time (occasional), and are expected to occur during less than half the time period.

13.0 NWS Area Forecast Discussion

The NWS office in Shreveport, Louisiana, issued the following Area Forecast Discussion (AFD) at 0031 CDT (closest AFD to the accident time). The aviation section of the AFD discussed reduced visibilities due to the Saharan dust²² in the airspace and continuing IFR ceiling conditions:

FXUS64 KSHV 270531
AFDSHV

Area Forecast Discussion
National Weather Service Shreveport LA
1231 AM CDT Sat Jun 27 2020

.AVIATION...

Slightly reduced VSBYS from Saharan Dust across our airspace to prevail the 06z TAF package. Otherwise, seeing IFR ceilings at the ELD terminal as precipitation pulls out to the north and east. Prevailing AC deck near 10kft to begin but IFR/MVFR ceilings should develop underneath this deck as we move through the predawn hours. This deck should lift through the mid to late morning hours with ceilings eventually becoming VFR. Only added VCTS to the MLU terminal for the afternoon hours. VFR conditions should prevail through the evening hours with the exception of VSBYS as we could see some 5-6SM HZ due to the dust.

13

&&

.PREV DISCUSSION... /issued 926 PM CDT Fri Jun 26 2020/

UPDATE...

I had briefly considered trimming back PoPs for the evening update, but after glancing at the HREF suite and latest radar, what is currently on the books seems pretty solid. The rest of the morning forecast package is on track, and no update is needed at this time.

/44/

&&

.PRELIMINARY POINT TEMPS/POPS...

SHV 74 92 74 91 / 10 40 10 40
MLU 73 92 73 92 / 10 40 0 40
DEQ 72 90 71 89 / 10 20 10 40
TXK 73 90 73 89 / 10 20 10 40
ELD 72 91 72 91 / 10 30 10 40
TYR 75 90 73 89 / 10 30 10 30
GGG 74 92 73 91 / 10 40 10 40
LFK 75 91 75 91 / 10 40 10 30

²² <https://www.aoml.noaa.gov/saharan-air-layer/>

&&

.SHV WATCHES/WARNINGS/ADVISORIES...

AR...None.

LA...None.

OK...None.

TX...None.

&&

\$\$

13/44

14.0 Winds and Temperature Aloft Forecast

The NWS 2054 CDT June 26, 2020, Winds and Temperature Aloft forecast valid for the closest points to the accident site are included below:

FBUS31 KWN0 270154

FD1US1

DATA BASED ON 270000Z

VALID 270600Z FOR USE 0200-0900Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
----	------	------	------	-------	-------	-------	-------	-------	-------

CLL	1821	1827+17	2029+12	2225+05	2506-06	2811-17	262733	264042	275454
-----	-------------	----------------	---------	---------	---------	---------	--------	--------	--------

HOU	1418	1618+19	1826+12	2130+05	2305-06	2607-16	242431	253642	264255
-----	-------------	----------------	---------	---------	---------	---------	--------	--------	--------

LCH	1716	1814+17	1819+12	2021+06	2225-09	2318-16	252631	263342	264055
-----	-------------	----------------	---------	---------	---------	---------	--------	--------	--------

SHV	2026	2326+17	2429+12	2425+04	2812-07	2713-18	252334	253544	254655
-----	-------------	----------------	---------	---------	---------	---------	--------	--------	--------

The accident site was located in between the CLL, SHV, LCH, and HOU forecast points. The 2054 CDT June 26, 2020, forecast for use between 2100 CDT on June 26, 2020, and 0400 CDT on June 27, 2020, indicated a wind at 3,000 ft from 140° to 200° between 16 and 26 knots, and a wind at 6,000 ft from 160° to 230° between 14 and 27 knots with a temperature of 17 to 19°C.

15.0 Pilot Weather Briefing

The accident pilot did not request a weather briefing from Leidos.

A search of archived ForeFlight information indicated that the accident pilot did not request weather briefing information via ForeFlight. There is no record of the accident pilot receiving or retrieving any other weather information before or during the accident flight.

16.0 Fog Formation and References

There are several environmental characteristics that lead to fog formation and reduced horizontal visibilities, especially during the nighttime hours. Lower wind speed conditions, a low dew point depression and lack of cloud cover are some of the important factors to consider for potential fog formation and reduced visibilities conditions. However, an additional characteristic is high concentrations of atmospheric pollutants like pollen, smoke particles or dust. Around the time of the accident, much of the southern United States had higher than normal atmospheric pollutant concentrations due to the Saharan dust layer (section 13.0). For more discussion on fog formation and reduced visibilities conditions please see attachment 3 and footnotes below.²³

17.0 Astronomical Data

The astronomical data obtained for the accident site on June 27, 2020, indicated the following:

SUN

Accident time	0153 CDT²⁴
Begin civil twilight	0548 CDT
Sunrise	0615 CDT
Sun transit	1321 CDT
Sunset	2026 CDT
End civil twilight	2053 CDT

MOON

Accident time	0153 CDT²⁵
Moonrise	1242 CDT
Moon transit	1908 CDT
Moonset	0051 CDT on the following day

The Moon was Waxing Crescent with 38.1% of the Moon illuminated and the Moon was below the horizon at the time of the accident.

E. LIST OF ATTACHMENTS

Attachment 1 – GOES-16 Nighttime Microphysics RGB animation from 0001 CDT to 0206 CDT

Attachment 2 – GFA products valid for the accident flight

Attachment 3 – Fog Information

²³ <https://www.weather.gov/safety/fog-water>
https://www.weather.gov/source/zhu/ZHU_Training_Page/fog_stuff/fog_definitions/Fog_definitions.html

²⁴ Inserted accident time for reference and context.

²⁵ Inserted accident time for reference and context.

Submitted by:

Paul Suffern
Senior Meteorologist

THIS PAGE INTENTIONALLY BLANK