



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

August 25, 2021

Specialist's Factual Report

METEOROLOGY

CEN21LA167

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A. ACCIDENT

Location: Bridgeport, Texas
Date: March 26, 2021
Time: 1527 central daylight time
2027 coordinated universal time (UTC)
Airplane: Beech 36; Registration: N3953N

B. METEOROLOGIST

Don Eick
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C. SUMMARY

On March 26, 2021, at 1527 central daylight time, a Beech 35 airplane, N3953N, was substantially damaged when it was involved in an accident near Bridgeport, Texas. The pilot and flight examiner were seriously injured. The airplane was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 personal flight.

D. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's (NTSB) Senior Meteorologist was not on scene for this investigation and conducted the meteorology phase of the investigation from the Washington D.C. office, collecting data from official National Weather Service (NWS) sources including the Weather Prediction Center (WPC) and the National Center for Environmental Information (NCEI). All times are central daylight time (CDT) based upon the 24 hour clock, local time is +5 hours to UTC, and UTC=Z. Directions are referenced to true north and distances in nautical miles. Heights are in feet (ft) above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles.

This report provides a meteorological review on the weather conditions and NWS aviation weather products applicable to the region around the accident time. The accident site was based on the coordinates at latitude 33.182663° N and longitude 97.82665° W at an elevation of approximately 863 ft.

E. WEATHER INFORMATION

1.0 Synoptic Conditions

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 (NCEP)

located in College Park, Maryland. These are the base products used in describing weather features and in the creation of forecasts and warnings. Reference to these charts and other weather products documented in this report can be found in the joint NWS and Federal Aviation Administration (FAA) Advisory Circular “Aviation Weather Services”, AC 00-45H change 2.

1.1 Surface Analysis Chart

The NWS south-central section of the Surface Analysis Chart for 1600 CST is included as figure 1 with the approximate accident site marked by the red star. The chart depicted a low-pressure system at 1004-hectopascals (hPa) (just off the chart) over Kansas along a developing frontal wave and warm front. A secondary trough of low pressure extended from the low southeastward across Oklahoma into Arkansas. A high-pressure system was located to the east over Alabama and Georgia at 1018-hPa. A warm front was located off the Texas coast into southern Louisiana, Mississippi, and Alabama. The accident site was located between the two fronts and south of the low-pressure system in an area of southerly winds of 10 to 15 knots. The station models surrounding the accident site indicated temperatures in the upper 70’s Fahrenheit (°F), with dew point temperatures in the mid 40’s °F, and clear skies.

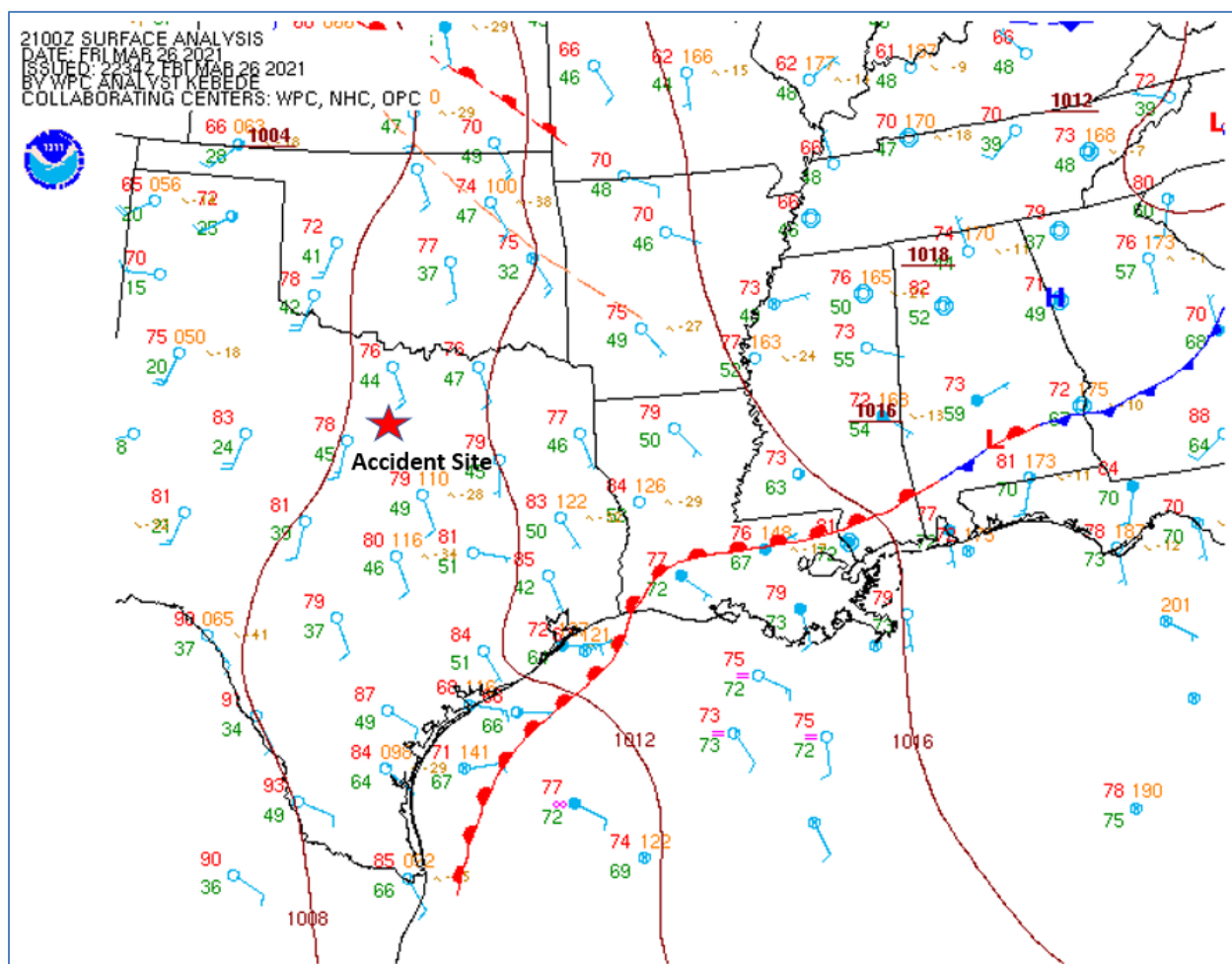


Figure 1 - NWS south-central Surface Analysis Chart for 1600 CDT with the accident site marked by red star

1.2 National Composite Radar Image

A review of the NWS National Composite Radar Mosaic surrounding the period plus and minus an hour of the accident indicated no meteorological echoes over the region of Dallas, Texas and thus was not included. The lack of any convective echoes over the area indicated that no thunderstorm related outflow boundary or microbursts were encountered during the period.

2.0 Observations

The area was documented using standard Aviation Routine Weather Reports (METAR¹) and Special Weather Reports (SPECI) disseminated longline² surrounding the period. The cloud heights are reported above ground level (agl) in the following section, and the magnetic variation over the region was estimated as 4° E based on the sectional chart for the area.

2.1 Bridgeport, Texas

The accident occurred as the aircraft was descending to land at Bridgeport Municipal Airport (KXBP), Bridgeport, TX, at an elevation of 864 ft. The airport had an Automated Weather Observations System (AWOS) which disseminated observations longline every 20-minutes. The conditions reported at the approximate time of the accident were as follows.

KXBP weather observation at 1515 CDT, automated, wind from 160° at 12 knots gusting to 17 knots, visibility 10 miles or more, sky clear below 12,000 ft, temperature 24° Celsius (C), dew point temperature 7° C, altimeter 29.87 inches of mercury (inHg). Remarks: automated station with a precipitation discriminator, temperature 24.3° C, dew point temperature 7.2° C.

Accident 1527 CDT

KXBP weather observation at 1535 CDT, automated, wind from 180° at 9 knots, visibility 10 miles or more, sky clear below 12,000 ft, temperature 25° Celsius (C), dew point temperature 7° C, altimeter 29.86 inHg. Remarks: automated station with a precipitation discriminator, temperature 25.0° C, dew point temperature 7.3° C.

The general flight categories³ and raw observations reported from 1215 through 1855 CDT in raw METAR format were as follows. The observations in bold italic type are decoded above in plain language.

¹ METAR – is an abbreviation for METeorological Aerodrome Report.

² Longline refers to the dissemination of weather observations with the intent that they are available in near-real time to national databases. Data is also available locally through very high frequency (VHF) line of sight broadcasts updated every minute.

³ As defined by the NWS and the FAA Aeronautical Information Manual (AIM) section 7-1-7, which defines the following general flight categories based on weather conditions reported:

- 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

VFR METAR KXBP 261715Z AUTO 15014KT 10SM CLR 22/07 A2996 RMK AO2 T02230074=
 VFR METAR KXBP 261735Z AUTO 17015G18KT 10SM CLR 23/07 A2995 RMK AO2 T02280071=
 VFR METAR KXBP 261755Z AUTO 20013G19KT 10SM CLR 23/08 A2995 RMK AO2 T02330076 10233
 20066=
 VFR METAR KXBP 261815Z AUTO 20014G22KT 10SM CLR 23/06 A2994 RMK AO2 T02290060=
 VFR METAR KXBP 261835Z AUTO 16013G22KT 10SM CLR 23/06 A2993 RMK AO2 T02300059=
 VFR METAR KXBP 261855Z AUTO 15012G17KT 10SM CLR 23/06 A2991 RMK AO2 T02300062=
 VFR METAR KXBP 261915Z AUTO 17012G17KT 140V200 10SM CLR 24/08 A2990 RMK AO2 T02360079=
 VFR METAR KXBP 261935Z AUTO 19013G17KT 140V200 10SM CLR 24/07 A2989 RMK AO2 T02390074=
 VFR METAR KXBP 261955Z AUTO 17010G18KT 10SM CLR 24/07 A2988 RMK AO2 T02390072=
VFR METAR KXBP 262015Z AUTO 16012G17KT 10SM CLR 24/07 A2987 RMK AO2 T02430072=
Accident 2027Z
VFR METAR KXBP 262035Z AUTO 18009KT 10SM CLR 25/07 A2986 RMK AO2 T02500073=
 VFR METAR KXBP 262055Z AUTO 18014G19KT 10SM CLR 25/07 A2985 RMK AO2 T02500070=
 VFR METAR KXBP 262115Z AUTO 20011G20KT 10SM CLR 25/07 A2985 RMK AO2 T02520066=
 VFR METAR KXBP 262135Z AUTO 17013G19KT 10SM CLR 25/07 A2984 RMK AO2 T02510067=
 VFR METAR KXBP 262155Z AUTO 18011G16KT 10SM CLR 25/07 A2984 RMK AO2 T02520068=
 VFR METAR KXBP 262215Z AUTO 18009G16KT 10SM CLR 25/07 A2983 RMK AO2 T02540071=
 VFR METAR KXBP 262235Z AUTO 16010G15KT 10SM CLR 25/07 A2982 RMK AO2 T02520069=
 VFR METAR KXBP 262255Z AUTO 16013G16KT 10SM CLR 25/07 A2982 RMK AO2 T02500071=
 VFR METAR KXBP 262315Z AUTO 16012G17KT 10SM CLR 25/07 A2982 RMK AO2 T02480070=
 VFR METAR KXBP 262335Z AUTO 15013G18KT 10SM CLR 24/07 A2982 RMK AO2 T02430073=
 VFR METAR KXBP 262355Z AUTO 15011G15KT 10SM CLR 24/08 A2982 RMK AO2 T02380075 10254
 20229=

2.2 METAR Depiction

A depiction of the observations at 1530 CDT from the NWS Aviation Weather Center's (AWC) METAR display⁴ is included as Figure 2, with the accident site marked by a small red star immediately north of KXBP. The radar overlay was also turned on and further confirmed no precipitation echoes over the region at the approximate time of the accident.

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 <https://aviationweather.gov/metar>

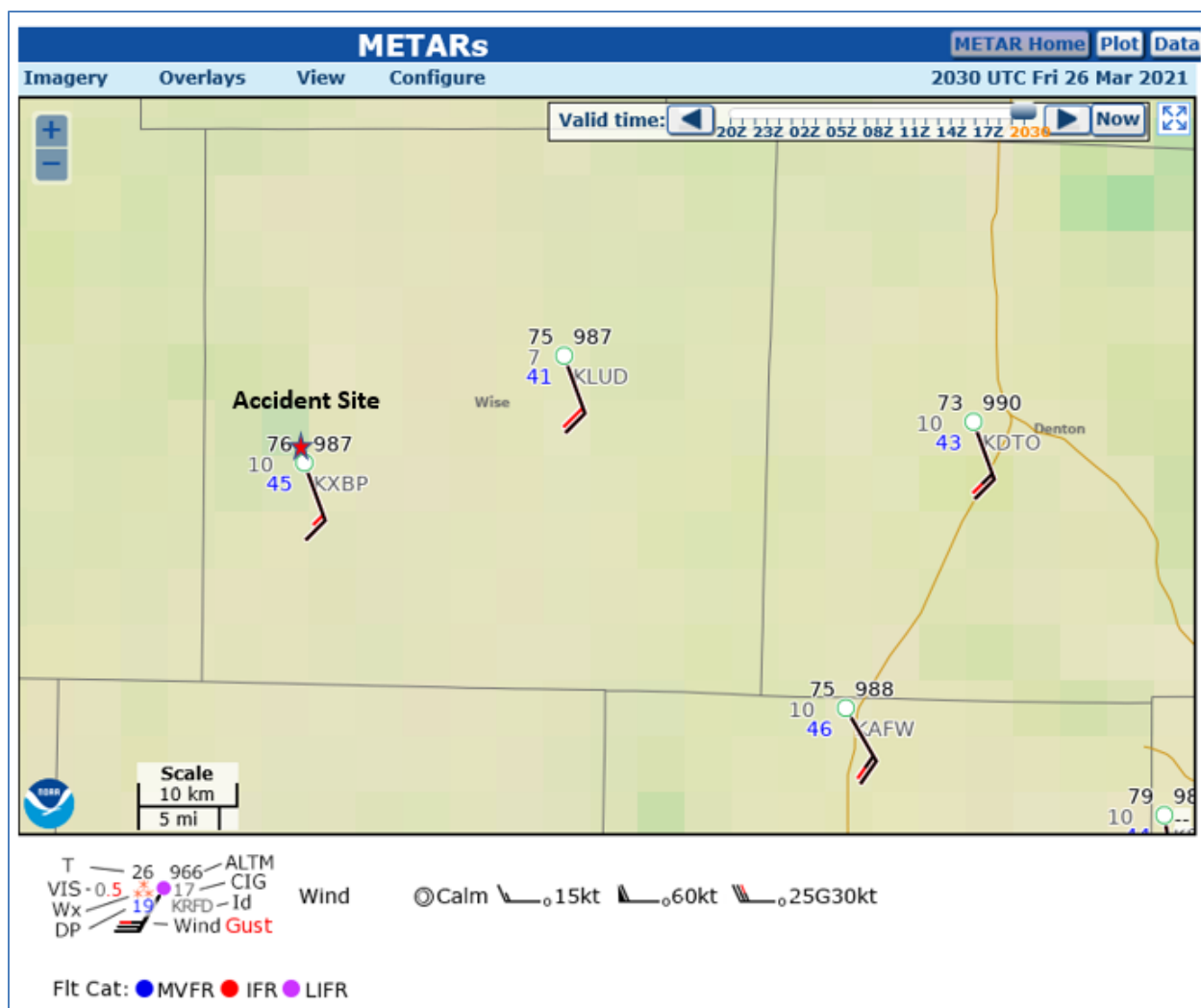


Figure 2 - NWS Aviation Weather Center's METAR display at 1530 CDT with accident site marked by a star

3.0 Sounding

A High-Resolution Rapid Refresh (HRRR)⁵ numerical model data were retrieved from the NOAA Air Resources Laboratory archive for the accident site coordinates. The HRRR numerical model was then plotted on a standard Skew T log P diagram⁶ using the Universal RAWinsonde OBservation (RAOB) program software⁷. Figure 3 is the HRRR sounding for 1500 CDT from the surface to 400-hPa or approximately 24,000 ft.

⁵ The HRRR is a National Oceanic and Atmospheric Administration (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.

⁶ Skew T log P diagram – is a standard meteorological plot or thermodynamic diagram 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.

⁷ RAOB – (The Universal RAWinsonde OBservation program) is an interactive sounding analysis program developed by Eosonde Research Services (ERS) previously known as Environmental Research Services, The Villages, Florida.

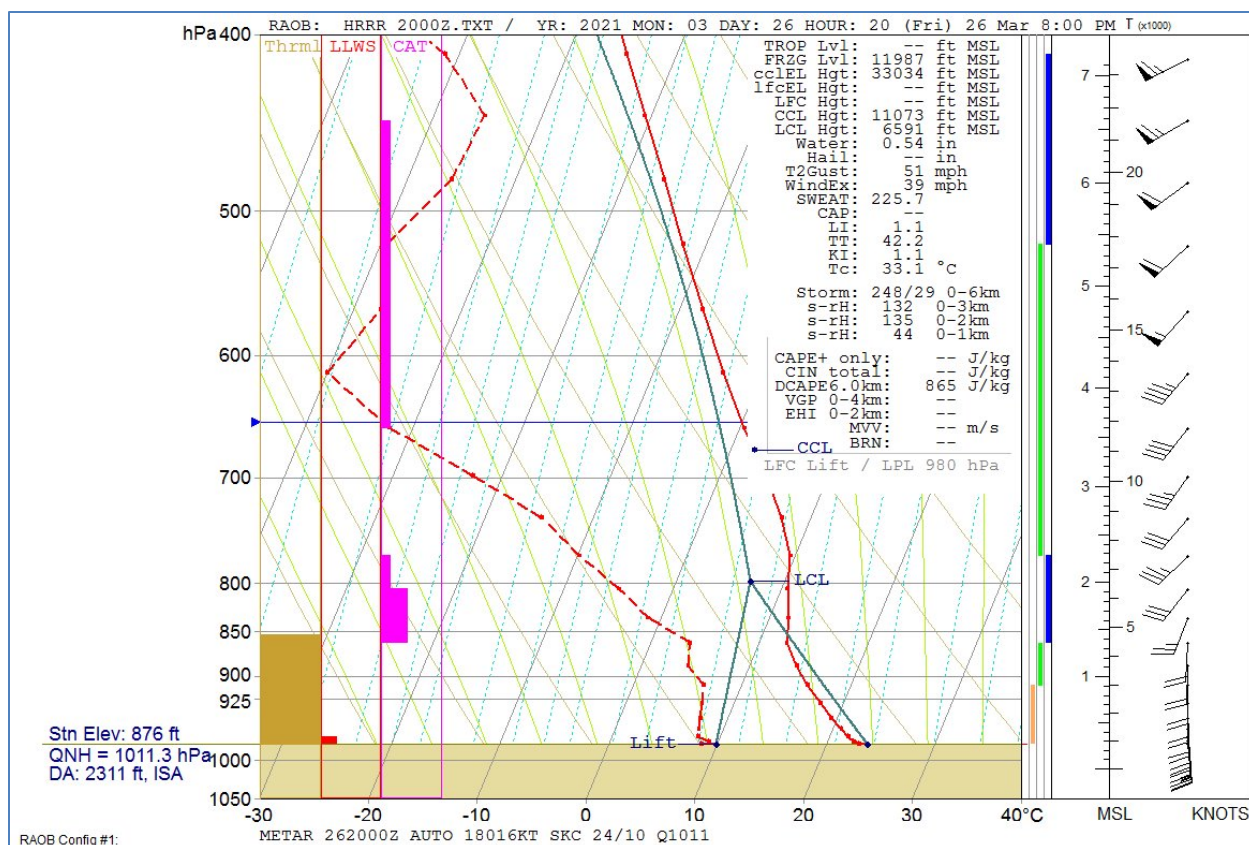


Figure 3 - HRRR numerical model sounding for 1500 CDT over the accident coordinates

The HRRR 1500 CDT sounding depicted a surface temperature of 24° C, a dew point temperature of 10° C, with a relative humidity of 41%, with an elevation of 876 ft, which provided a density altitude of 2,311 ft. The lifted condensation level (LCL)⁸ was identified at 6,591 ft msl and the convective condensation level (CCL)⁹ at 11,073 ft. The freezing level was identified at approximately 12,000 ft. The precipitable water content¹⁰ was 0.54 inches. The RAOB analysis program did not indicate any cloud layers. The atmosphere was characterized as conditionally unstable with a Lifted Index (LI)¹¹ of 1.1, with the lowest 2,000 ft the most unstable with a lapse rate greater than the dry adiabatic lapse of 3° C per 1,000 ft. The Convective Available Potential Energy (CAPE) was non-existent, with the Downdraft-CAPE of 865 Joules/kilogram. RAOB indicated the dry and unstable low-level conditions supported strong thermals below 5,000 ft.

The HRRR wind profile indicated a surface wind from 180° at 16 knots with little variation in wind direction through 4,000 ft. Above 4,000 ft the winds veered to the southwest with height with increasing wind speeds. The RAOB Analysis program indicated a potential for light-to-

⁸ Lifted Condensation Level (LCL) - the level at which a lifted parcel becomes saturated. The LCL height corresponds to cloud base height for forced ascent.

⁹ Convective Condensation Level (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.

¹⁰ Precipitable Water - The total amount of (condensed) water available within the lowest 400 mb of the sounding.

¹¹ Lifted Index (LI) - is an index to assess low-level parcel (in)stability of the troposphere. the difference between the lifted parcel temperature at 500 hPa and the 500 hPa temperature in the sounding. Negative values denote parcels that are warmer than the background 500 hPa temperatures and are thus buoyant or "unstable".

moderate turbulence between 4,500 ft and 6,000 ft where the winds began to veer to the southwest and increase in speed from 20 to 35 knots.

A review of the nearest NWS network soundings from Fort Worth (KFWD) for 1900 CDT is included as figure 4, which depicted a similar thermal structure with a defined temperature inversion at 5,000 ft and supported strong thermals below this level. That sounding indicated a more stable environment with a LI of 8.5, with also no CAPE. The KFWD observed soundings wind profile depicted easterly winds through the depth of the sounding, but also did not depict any significant turbulence below 4,500 ft.

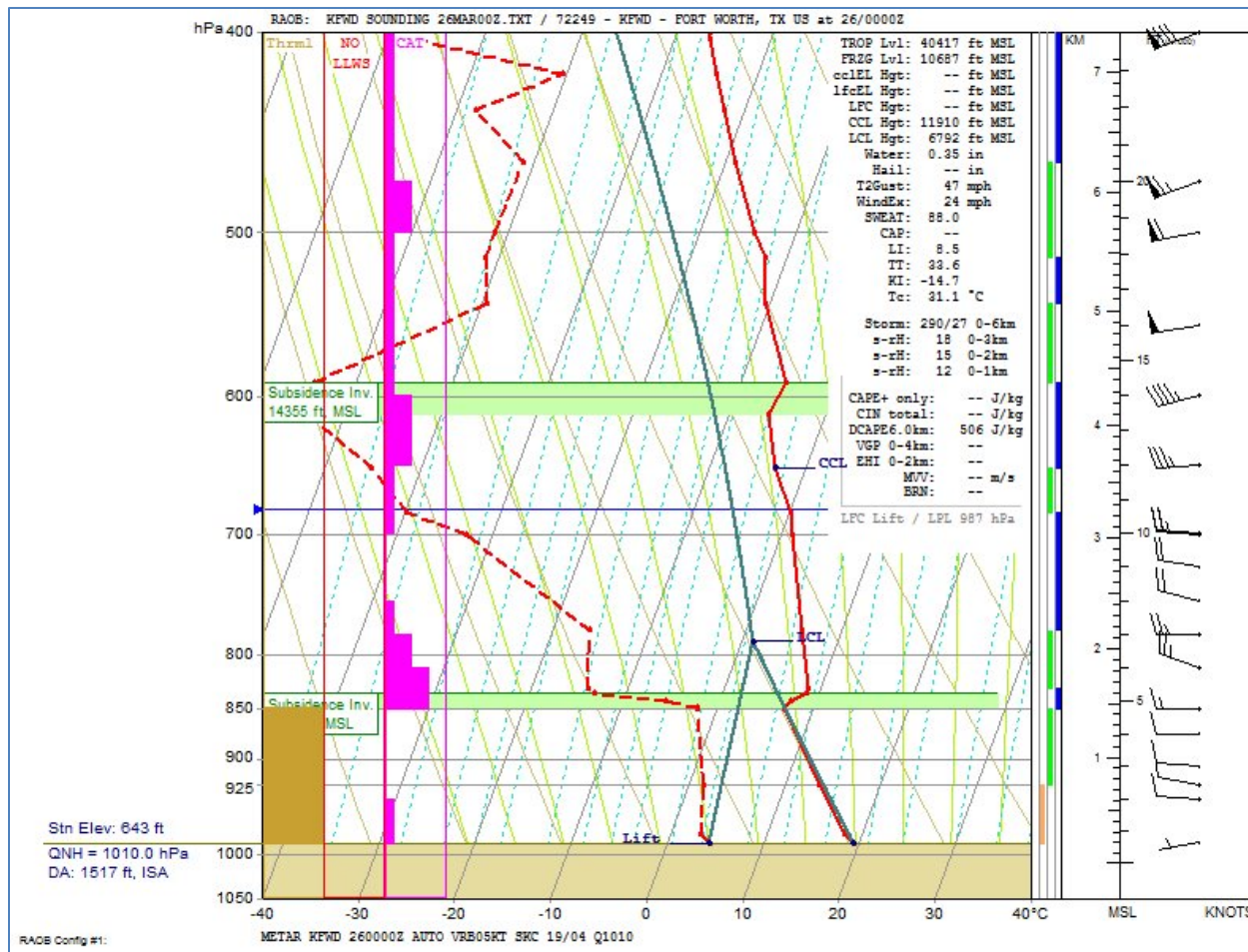


Figure 4 - NWS Fort Worth 1900 CDT observed sounding

4.0 Satellite Imagery

The Geostationary Operational Environmental Satellite number 16 (GOES-16) data were obtained from an archive at the Space Science Engineering Center (SSEC) at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System (McIDAS) software. The infrared and visible imagery were reviewed surrounding the period, and the closest images to the accident time documented. The infrared long wave imagery (band 16) at a wavelength of 13.3 microns (μm) provided radiative cloud top

temperatures with a nominal spatial resolution of 2 km. The visible (band 2) at a wavelength of 0.64 μm provided images at a nominal resolution of 0.5 km.

The GOES-16 infrared image depicted no significant clouds over Texas during the period and thus was not reproduced. Figure 5 is the GOES-16 visible image for 1526 CDT at 2X magnification with the accident site depicted by the red square. The image depicted clear skies over the region.

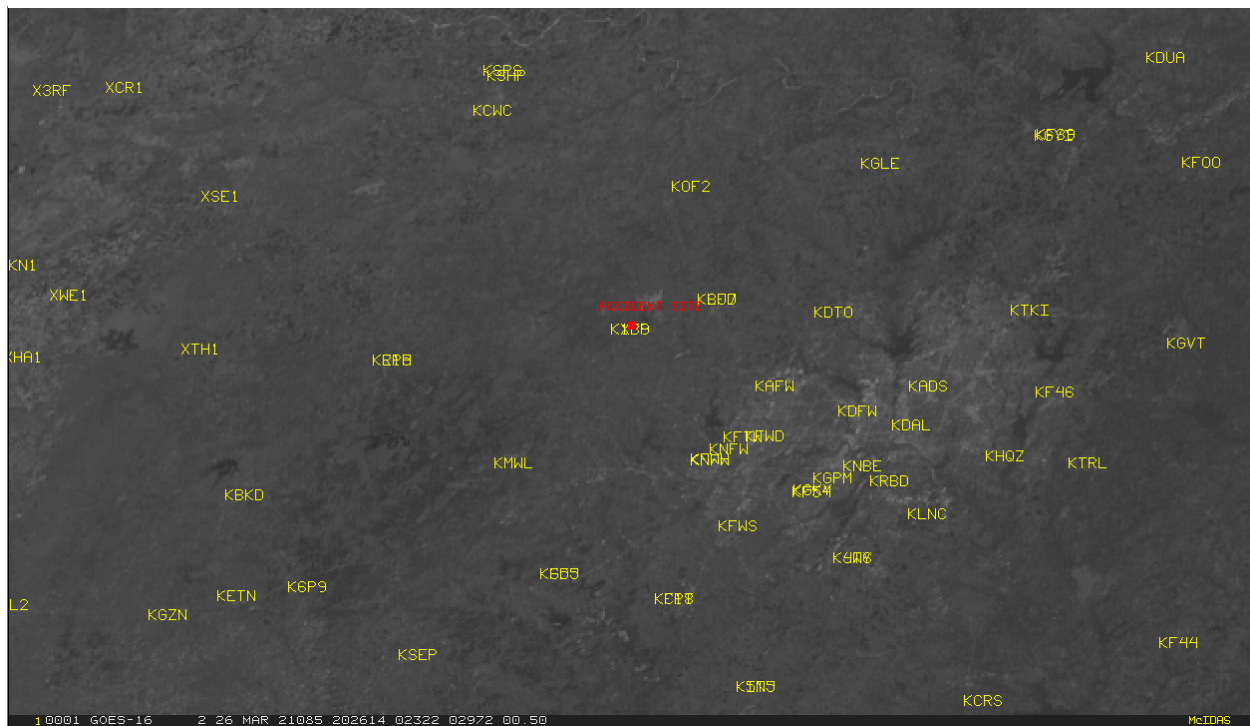


Figure 5 - GOES-16 visible image at 1526 CDT at 2X magnification

5.0 Pilot Reports

The following pilot reports (PIREPs) within 100 miles of the accident site between 1100 and 1800 CDT were recorded in the NWS database. The reports are in raw format with abbreviations, with time referenced to UTC.

JWY UA /OV KGPM135012/TM 1608/FL030/TP M20P/TB NEG/RM DURC

TKI UA /OV TKI/TM 1733/FL006/TP C180/SK SKC

ADS UA /OV ADS /TM 1758 /FL006 /TP C172 /SK SKC

JWY UA /OV KFWS-F41/TM 1905/FL055/TP C172/TB LGT BLO 035/NEG 055/RM DURC

A single report from a pilot operating a Cessna Skyhawk reported light turbulence below 3,500 ft during their climb from Fort Worth Spinks Airport (FWS), Fort Worth to Ennis Municipal Airport (F41), Ennis, Texas. The 3 other PIREPs reported clear skies and no significant turbulence.

6.0 NWS Forecasts and Advisories

The standard aviation forecasts were documented for the area.

6.1 Terminal Aerodrome Forecasts

The closest Terminal Aerodrome Forecast (TAF) to the accident site and KXBP was from Fort Worth Alliance Airport (KAFW) located approximately 30 miles southeast at an elevation of 723 ft. While a TAF consists of the expected meteorological conditions significant to aviation at an airport for a specified time period, it is only valid for the area within 5 statute miles of the center of an airport's runway complex. While not valid for the accident site, the TAF issued for KAFW at 1220 CDT and valid at the time of the accident was as follows:

*TAF KAFW 261720Z 2618/2718 16015KT P6SM SKC
FM270100 15005KT P6SM SKC
FM271000 15007KT P6SM SCT008 BKN012
FM271600 16006KT P6SM BKN012=*

The forecast for KAFW expected from 1300 through 2000 CDT a wind from 160° at 15 knots, visibility 6 miles or greater, with clear skies. The forecast did not include any forecast for low-level turbulence below 2,000 ft.

6.2 Area Forecast Discussion

The NWS Area Forecast Discussions (AFD) are issued by each WFO to describe the short-term weather conditions within their region with an aviation section that includes the general conditions as they relate to the creation of the TAF. These are useful for additional aviation-related issues that cannot be encoded into the TAF. The discussion also gives some reasoning behind the forecast. These are generated roughly every 6 hours and corresponds to the release of the latest TAFs for that office. The NWS Fort Worth Weather Forecast Office (WFO) was responsible for the Bridgeport area, and the forecast discussion current at the time was issued at 1538 CDT and was as follows:

*FXUS64 KFWD 261856
AFDFWD*

*Area Forecast Discussion
National Weather Service Fort Worth TX
156 PM CDT Fri Mar 26 2021*

...New Long Term...

*. SHORT TERM... /Issued 1239 PM CDT Fri Mar 26 2021/
/Through Saturday Afternoon/*

A tranquil afternoon today will give way to increasing cloud cover overnight as the regional low-level winds pick up out of the south. The southerly wind increase can be attributed to an approaching upper-level system that will help transport Gulf of Mexico moisture northward into North and Central Texas.

With the increasing moisture in place and weak ascent moving in from the west, warm advection showers will be possible across Central Texas and spread to the northeast (generally east of I-35). A weak capping

inversion will be in place, therefore, early to mid-afternoon severe storms appear unlikely across the region. However, a few non-severe storms cannot be ruled out, but the current expectation is that those will be under the capping inversion and not tap into the available instability in the mid and upper levels.

Afternoon temperatures throughout the region will be in the upper 70s to lower 80s with partly cloudy skies. There will an approaching cold front from the northwest late in the afternoon that will increase the potential for a few more robust thunderstorms. For additional information regarding any severe storm potential, see the discussion below.

Hernandez

**. AVIATION... /Issued 1239 PM CDT Fri Mar 26 2021/
/18Z TAFs/**

Concerns...MVFR in North Texas and IFR in Central Texas tonight. Reduced ceilings will remain through much of tomorrow.

Clear skies and southerly winds are ongoing through North and Central Texas, leading to no major weather impacts to the regional airspace. As we go through the rest of today and into tonight, an upper-level system will be moving in from the west. As it does so, increasing moisture is likely to surge northward leading to a stratus deck throughout much of the region. Initially, it will move into KACT around 08Z then into the Dallas/Fort Worth Metroplex closer to 10Z. With deeper moisture in place across Central Texas, IFR is likely to impact the airport for several hours early Saturday morning.

As daytime heating commences, gradual mixing of the lower levels should increase the ceiling heights across Central Texas into MVFR, with MVFR continuing across North Texas. An improvement in ceilings is likely to be delayed until a cold front approaches from the northwest, but that is likely to occur after 00Z Sunday across the Metroplex and closer to 06Z in Central Texas. A mention of precipitation may need to be added in subsequent forecast to account of the potential for a few storms along the front tomorrow night.

Hernandez

. PRELIMINARY POINT TEMPS/POPS...

Dallas-Ft. Worth	78	56	79	52	70	/	0	0	20	40	10
Waco	79	59	80	54	69	/	0	0	20	30	20
Paris	74	54	76	51	67	/	0	0	40	40	5
Denton	76	52	79	49	69	/	0	0	20	30	10
McKinney	76	54	78	51	69	/	0	0	20	40	10
Dallas	79	59	80	54	71	/	0	5	20	40	10
Terrell	77	56	78	51	68	/	0	5	30	40	10
Corsicana	79	59	79	54	69	/	0	0	30	50	20
Temple	80	59	81	53	69	/	0	0	20	40	30
Mineral Wells	79	53	79	49	70	/	0	0	5	30	10

.FWD WATCHES/WARNINGS/ADVISORIES...

None.

The short-term forecast indicated the low-level southerly winds were expected to increase as the frontal wave and upper-level trough to the north was expected to move into the area on March 27th with increasing clouds and moisture. The aviation section also indicated clear skies and southerly winds would prevail across the area with no significant impacts expected at the major airports across the area. The forecast maximum temperature for the area ranged from 74° to 80° with the probability of precipitation at zero for the period. No weather watches, weather warnings, or advisories were current for the forecast region and none expected for the period.

6.3 Winds and Temperatures Aloft Forecast

The NWS Winds and Temperature Aloft Forecast¹² for the general area of flight valid for the period for use between 1500 through 2200 CDT was as follows.

WINDS ALOFT FORECASTS

DATA BASED ON 261800Z

VALID 270000Z FOR USE 2000-0300Z. TEMPS NEG ABV 24000

<i>FT</i>	<i>3000</i>	<i>6000</i>	<i>9000</i>	<i>12000</i>	<i>18000</i>	<i>24000</i>	<i>30000</i>	<i>34000</i>	<i>39000</i>
<i>DAL</i>	<i>1622</i>	<i>2130+13</i>	<i>2228+08</i>	<i>2240+02</i>	<i>2451-12</i>	<i>2559-24</i>	<i>255741</i>	<i>255950</i>	<i>256860</i>
<i>SPS</i>	<i>1725</i>	<i>2027+10</i>	<i>2334+05</i>	<i>2446+00</i>	<i>2559-13</i>	<i>2470-25</i>	<i>257441</i>	<i>257851</i>	<i>257560</i>

The forecast location of Dallas (DAL) was approximately 53 miles east of the accident site and expected a wind at 3,000 ft from 160° at 22 knots. The Forecast for Wichita Falls (SPS) was located about 59 miles northwest of the accident site and expected at 3,000 ft a wind from 170° at 25 knots.

6.4 Inflight Weather Advisories

Inflight Aviation Weather Advisories are forecasts to advise en route aircraft of the development of potentially hazardous weather. Inflight aviation weather advisories in the conterminous U.S. are issued by the NWS AWC and from the Center Weather Service Units (CWSU) associated with FAA ARTCCs. There are four basic types of inflight aviation weather advisories: the Significant Meteorological Information (SIGMET), the Convective SIGMET, the Airmen's Meteorological Information (AIRMET), and the Center Weather Advisory (CWA). Inflight advisories serve to notify en route pilots of the possibility of encountering hazardous flying conditions which may not have been forecast at the time of the preflight briefing. Whether or not the condition described is potentially hazardous to a particular flight is for the pilot to evaluate on the basis of experience and the operational limits of the aircraft.

Surrounding the period of the accident the NWS had no Convective SIGMETs, SIGMETs, or CWA's current for the region. The NWS AWC did have AIRMET Tango current for occasional moderate turbulence from the surface to 8,000 ft and is depicted in figure 6.

¹² NWS bulletin FBUS31 KWNO.

TANGO 2021-03-26 21:00:00

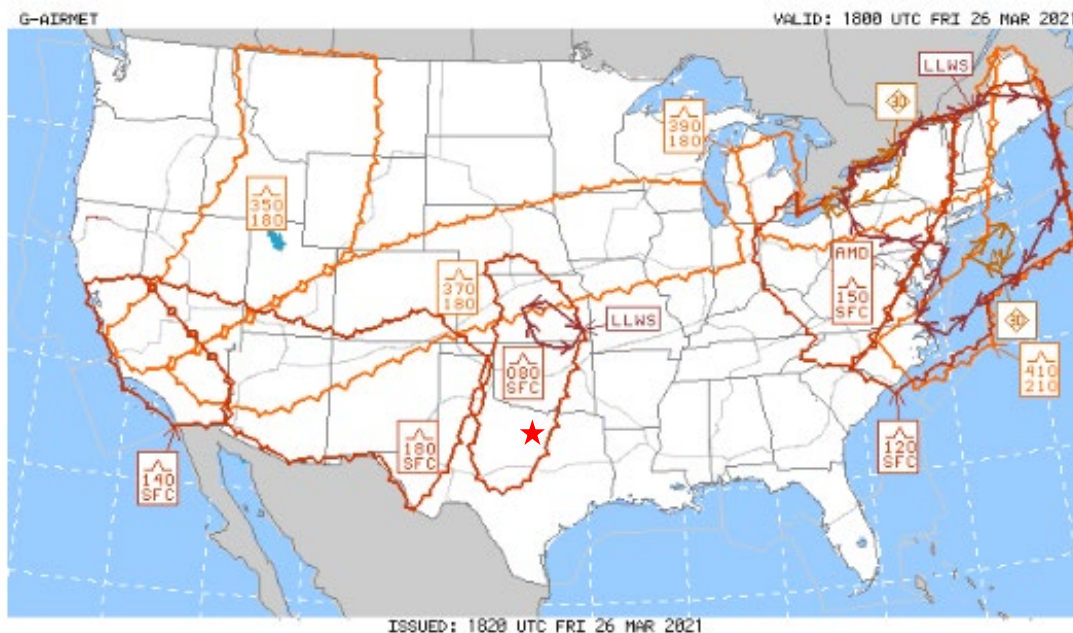


Figure 6 - NWS AIRMET Tango series for turbulence valid at the time of the accident

7.0 Background on Thermals

Thermals are caused by differential heating of the earth's surface. Thermals are often classified as low-level turbulence (LLT) which occurs primarily within the atmospheric boundary layer, where surface heating and friction are significant. They are created by surface heating as solar radiation heats the ground during the morning and afternoon hours generating thermals that move away from the ground, creating chaotic patterns that produce LLT.

A thermal is simply the updraft in a small-scale convective current, as warm less dense air rises transporting heat into the vertical to balance or equalize thermal differences. The strength of the thermal depends on the amount of heating, time of day, moisture content, cloud cover, and the atmospheric lapse rate. The strength of thermals is directly related to the stability of the atmosphere layer. Air tends to become stable at night due to nocturnal cooling of the earth's surface creating a low-level temperature inversion. Stable air suppresses convection, and limits thermals until the inversion "burns off" or dissipates. Unstable air favors thermal development and allows the upward moving air to ascend to higher levels, transporting warm moist air to higher altitudes.

Figure 7 is from the FAA Pilot's Handbook of Aeronautical Knowledge illustration of a thermal bubble and showing the low-level turbulence relating to the thermals. The thermal bubble also creates vortices as it rises and dissipates. While the lift or updraft is strongest near the core, downdrafts surrounding the cores edges extend over a large area.

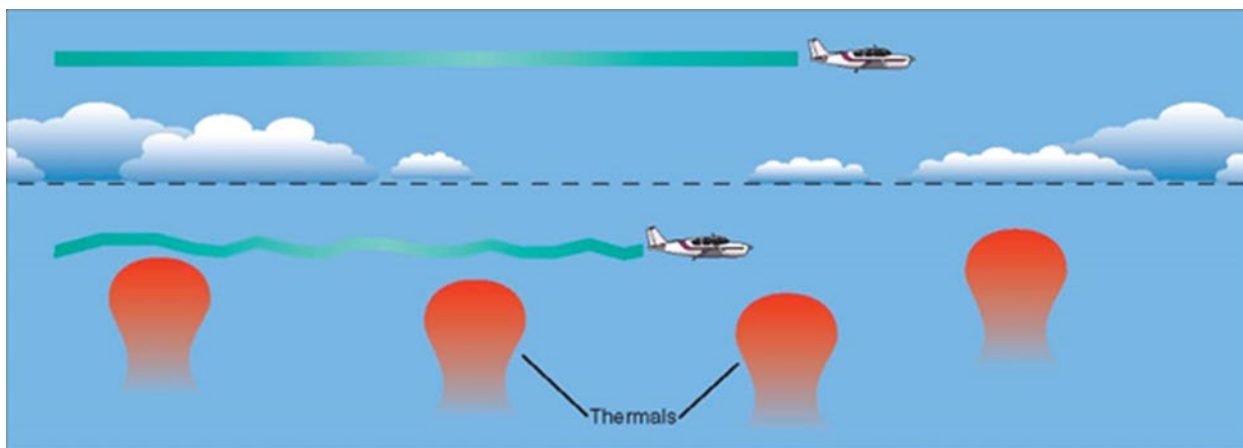


Figure 7 - Thermals and low-level turbulence from FAA's Pilot's Handbook of Aeronautical Knowledge

A thermal bubble is simply an individual parcel of air that rises that brings the warm air upwards. As the air rises it will often break away from the surface and create a vortex with rising air in the center and descending air on the outside of the parcel and is illustrated in figure 8.

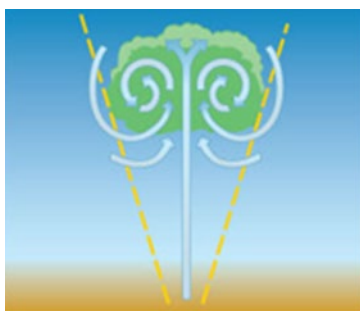


Figure 8 - Thermal Bubble illustration

Attachment 1 is a model animation of a thermal bubble showing the vortex breakdown with time, which results in turbulence.

8.0 Pilot and Witness Statements

In the accident pilot's statement¹³ indicated that he encountered a strong downdraft as he was turning from base leg to final but did not recall any details after that.

9.0 Astronomical Conditions

The astronomical conditions over the accident site obtained from the United States Naval Observatory's Multiyear Interactive Computer Almanac (MICA) software provided the following conditions for KXBP. The time of the accident has been added in bold italic print for reference.

¹³ See docket for more detail on pilot's statement and more accident notification.

<u>Sun</u>	<u>Time (CDT)</u>
Begin civil twilight	0702
Sunrise	0727
Cumulative	1337
<i>Accident</i>	<i>1527</i>
Sunset	1948
End civil twilight	2012

At the time of the accident the Sun was approximately 50° above the horizon at an azimuth of 226°.

F. Attachments

Attachment 1 – model of a thermal bubble.

Submitted by:

Don Eick
Senior Meteorologist