



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

May 29, 2019

Weather Study

METEOROLOGY

CEN19FA140

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A. ACCIDENT

Location: Eagle Lake, Texas
Date: May 11, 2019
Time: about 0815 central daylight time (about 1315 UTC¹)
Airplane: AT-502A; N713LA

B. METEOROLOGIST

Mike Richards
Senior Meteorologist
Operational Factors Division (AS-30)
National Transportation Safety Board

C. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's meteorological specialist did not travel in support of this accident investigation and gathered all weather data remotely. Unless otherwise noted, all times are in central daylight time (CDT) for May 11, 2019 (based upon the 24-hour clock), directions are referenced to true north, distances are in nautical miles and heights are above mean sea level (msl).

Coordinates used for the accident location: 29.449167° north latitude, 96.397222° west longitude, at an elevation of about 150 feet.

D. WEATHER INFORMATION

1.0 Surface Observations

An Automated Weather Observing System (AWOS) was located at Eagle Lake Airport (ELA²) in Eagle Lake, Texas, which was located about 10 miles north-northeast of the accident location at an elevation of about 185 feet. Automated reports from KELA during the times surrounding the accident time are presented here.

¹ UTC – abbreviation for Coordinated Universal Time

² This report uses the 3-digit International Air Transport Association format for airport identification, which does not use the geographic designating digit (e.g., “K” for stations in the continental U.S. and “P” for U.S. stations in Alaska and the Pacific region) as found in the 4-digit International Civil Aviation Organization (ICAO) identifier format. Weather observations from airports in this report are referenced by their reporting station's identifier (using ICAO format that includes the geographic designating digit), not by the airport at which the reporting station is located.

[0715 CDT] METAR KELA 111215Z AUTO 33004KT 3/4SM BR OVC002 18/17
A2989 RMK AO2 T01760173=

[0735 CDT] METAR KELA 111235Z AUTO 33005KT 1 3/4SM BR OVC002 18/17
A2989 RMK AO2 T01760173=

[0755 CDT] METAR KELA 111255Z AUTO 32006KT 2SM BR OVC002 18/17 A2990
RMK AO2 T01770173=

**[0815 CDT] METAR KELA 111315Z AUTO 33008G14KT 4SM BR OVC002 18/17
A2990 RMK AO2 LTG DSNT NW T01750171=**

**[0835 CDT] METAR KELA 111335Z AUTO 33009G16KT 5SM BR OVC002 18/17
A2990 RMK AO2 T01750171=**

[0855 CDT] METAR KELA 111355Z AUTO 33010G14KT 5SM BR OVC002 18/17
A2991 RMK AO2 T01750169=

At 0815 CDT, KELA reported a wind from 330° at 8 knots with gusts to 14 knots, visibility of 4 statute miles, mist, ceiling overcast at 200 feet above ground level (agl), temperature of 18° Celsius (C) and a dew point temperature of 17°C, altimeter setting of 29.90 inches of mercury; remarks: station with a precipitation discriminator, lightning distant to the northwest³, temperature of 17.5°C and dew point temperature of 17.1°C.

At 0835 CDT, KELA reported a wind from 330° at 9 knots with gusts to 16 knots, visibility of 5 statute miles, mist, ceiling overcast at 200 feet agl, temperature of 18°C and a dew point temperature of 17°C, altimeter setting of 29.90 inches of mercury; remarks: station with a precipitation discriminator, temperature of 17.5°C and dew point temperature of 17.1°C.

An AWOS was located at Robert R Wells Jr. Airport (66R) in Columbus, Texas, which was located about 13 miles north-northwest of the accident location at an elevation of about 240 feet. Automated reports from K66R during the times surrounding the accident time are presented here.

[0735 CDT] METAR K66R 111235Z AUTO 33006KT 1/2SM FG OVC002 17/16 A2991
RMK AO2 T01720160=

[0755 CDT] METAR K66R 111255Z AUTO 32007KT 2 1/2SM BR OVC002 17/16
A2992 RMK AO2 T01710158=

**[0815 CDT] METAR K66R 111315Z AUTO 33008KT 4SM BR OVC002 17/16 A2992
RMK AO2 LTG DSNT NW T01700156=**

**[0835 CDT] METAR K66R 111335Z AUTO 34011G16KT 4SM BR OVC002 17/15
A2992 RMK AO2 T01670153=**

[0855 CDT] METAR K66R 111355Z AUTO 33009KT 4SM BR OVC002 17/15 A2993
RMK AO2 T01650150=

³ A query to the Earth Networks Total Lightning Network database did not reveal any lightning activity within a box defined by latitudes 30.02014 and 29.32251 and longitudes -97.32239 and -95.55908.

At 0815 CDT, K66R reported a wind from 330° at 8 knots, visibility of 4 statute miles, mist, ceiling overcast at 200 feet agl, temperature of 17°C and a dew point temperature of 16°C, altimeter setting of 29.92 inches of mercury; remarks: station with a precipitation discriminator, lightning distant to the northwest, temperature of 17.0°C and dew point temperature of 15.6°C.

At 0835 CDT, K66R reported a wind from 340° at 11 knots with gusts to 16 knots, visibility of 4 statute miles, mist, ceiling overcast at 200 feet agl, temperature of 17°C and a dew point temperature of 15°C, altimeter setting of 29.92 inches of mercury; remarks: station with a precipitation discriminator, temperature of 16.7°C and dew point temperature of 15.3°C.

An AWOS was located at Wharton Regional Airport (ARM) in Wharton, Texas, which was located about 17 miles southeast of the accident location at an elevation of 100 feet. Automated reports from KARM during the times surrounding the accident time are presented here.

[0735 CDT] METAR KARM 111235Z AUTO 34005KT 4SM BR BKN003 OVC009
19/19 A2988 RMK AO2 T01910185=

[0755 CDT] METAR KARM 111255Z AUTO 34005KT 4SM BR BKN003 OVC011
19/19 A2988 RMK AO2 T01910185=

**[0815 CDT] METAR KARM 111315Z AUTO 34005KT 4SM BR SCT003 OVC015
19/19 A2988 RMK AO2 LTG DSNT NW T01920186=**

**[0835 CDT] METAR KARM 111335Z AUTO 35005KT 4SM BR BKN003 OVC015
19/19 A2989 RMK AO2 T01920186=**

[0855 CDT] METAR KARM 111355Z AUTO 33006KT 4SM BR OVC003 19/19 A2990
RMK AO2 T01910185=

At 0815 CDT, KARM reported a wind from 340° at 5 knots, visibility of 4 statute miles, mist, scattered clouds at 300 feet agl, ceiling overcast at 1,500 feet agl, temperature of 19°C and a dew point temperature of 19°C, altimeter setting of 29.88 inches of mercury; remarks: station with a precipitation discriminator, lightning distant to the northwest, temperature of 19.2°C and dew point temperature of 18.6°C.

At 0835 CDT, KARM reported a wind from 350° at 5 knots, visibility of 4 statute miles, mist, ceiling broken at 300 feet agl, overcast clouds at 1,500 feet agl, temperature of 19°C and a dew point temperature of 19°C, altimeter setting of 29.89 inches of mercury; remarks: station with a precipitation discriminator, temperature of 19.2°C and dew point temperature of 18.6°C.

2.0 Upper Air Data

A High-Resolution Rapid Refresh (HRRR) model⁴ sounding for the accident site at 0800 CDT (figure 1) was retrieved from the National Oceanic and Atmospheric Administration's Air Resources Laboratory. The sounding revealed that a temperature inversion was present between about 650 and 1,600 feet. The relative humidity was greater than 95 percent between the surface and about 4,200 feet, and the Rawinsonde Observation Program (RAOB) projected cloudy conditions from about 350 through 8,400 feet. RAOB produced a fog stability index of 25.3 (high severity) and a fog threat of 1.9 (medium severity). The wind in the lowest 800 feet was northerly or north-northwesterly at around 10 knots. Above this layer the wind veered significantly to a south wind at about 1,100 feet but remained at or below 12 knots. Between 1,110 and 10,000 feet the wind was southerly to southwesterly at magnitudes between 10 and 25 knots.

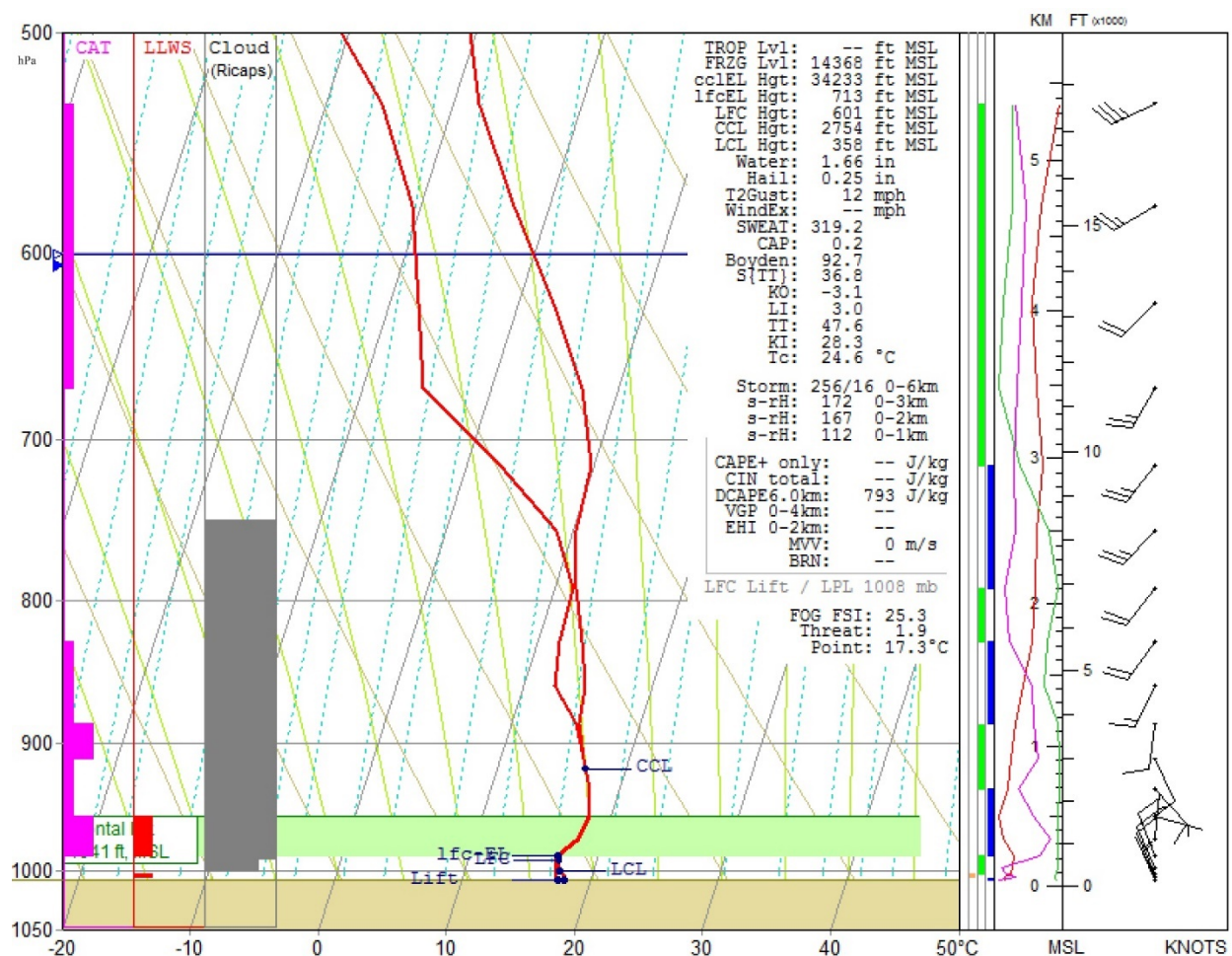


Figure 1 – HRRR model sounding data in SkewT/LogP format for 0800 CDT at the accident site, surface to 500 hectopascals.

⁴ 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.

3.0 Satellite Imagery

Geostationary Operational Environmental Satellite (GOES)-16 visible ($0.64\mu\text{m}$) and infrared ($10.3\mu\text{m}$) data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison. Imagery from 0831 CDT are presented in figures 2 and 3. The satellite imagery identified cloudy conditions over the accident region, with brightness temperatures of 10°C over the accident location. Considering the 0800 CDT HRRR sounding, 10°C corresponded to cloud top heights of about 9,000 feet.

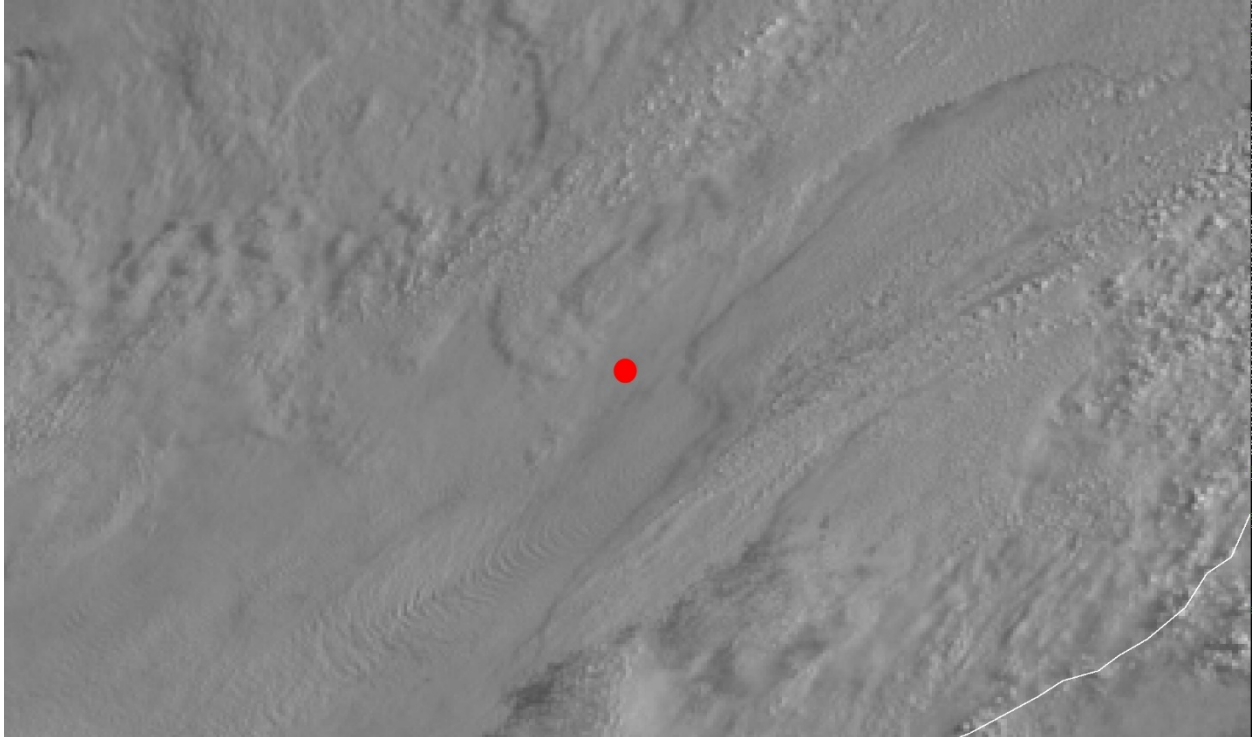


Figure 2 – GOES-16 visible imagery from 0831 CDT. Accident location denoted by red circle. This image has not been corrected for any parallax error.

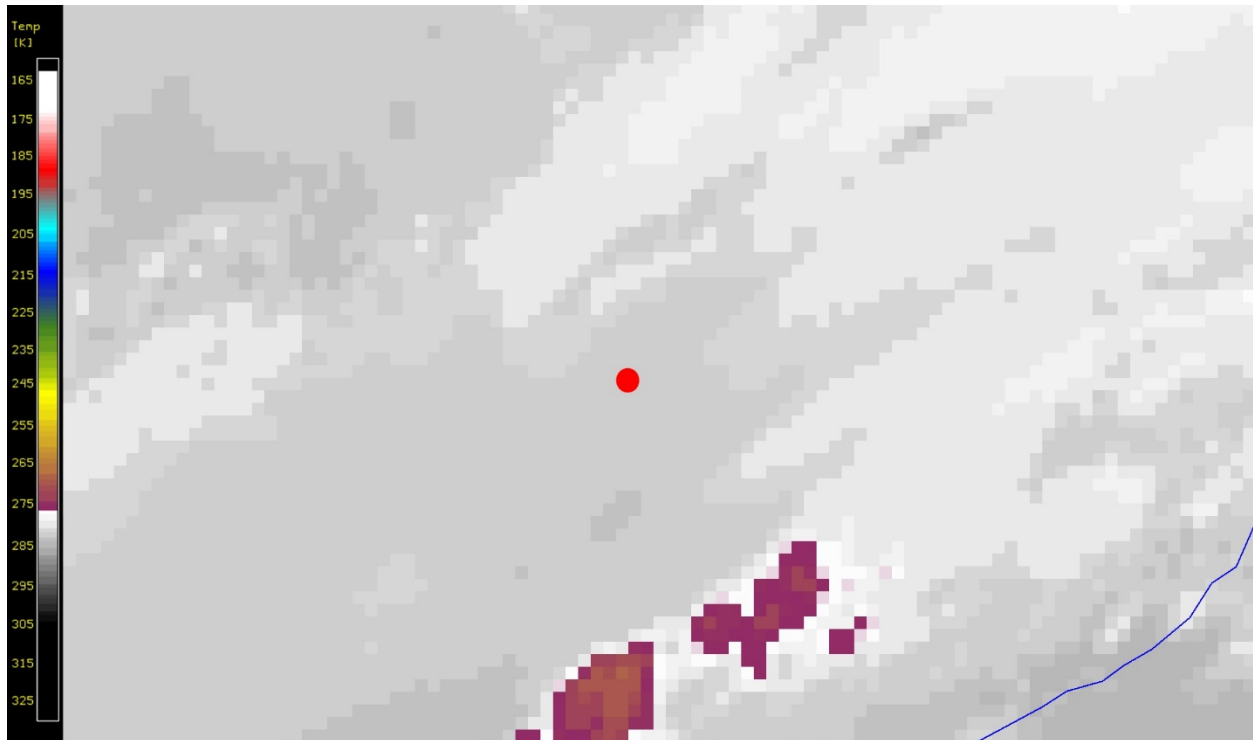


Figure 3 – GOES-16 infrared imagery (brightness temperature in degrees Kelvin) from 0831 CDT. Accident location denoted by the red dot. This image has not been corrected for any parallax error.

4.0 Weather Radar

The WSR-88D⁵ Level-II weather radar imagery from the KHGX site is presented in figure 4. KHGX was located approximately 69 miles east of the accident location at an elevation of about 115 feet. Assuming standard refraction and considering the 0.95° beam width⁶ for the WSR-88D radar beam, the KLRX 0.48° tilt would have “seen” altitudes above the accident location of between about 3,300 and 10,300 feet. Around the time of the accident, there were no pertinent areas of reflectivity depicted at or next to the accident location.

⁵ Weather Surveillance Radar 88 Doppler (WSR-88D)

⁶ Here we define the angular width of the radar beam as the region of transmitted energy that is bounded by one-half the maximum power. The maximum power lies along the beam centerline and decreases outward.

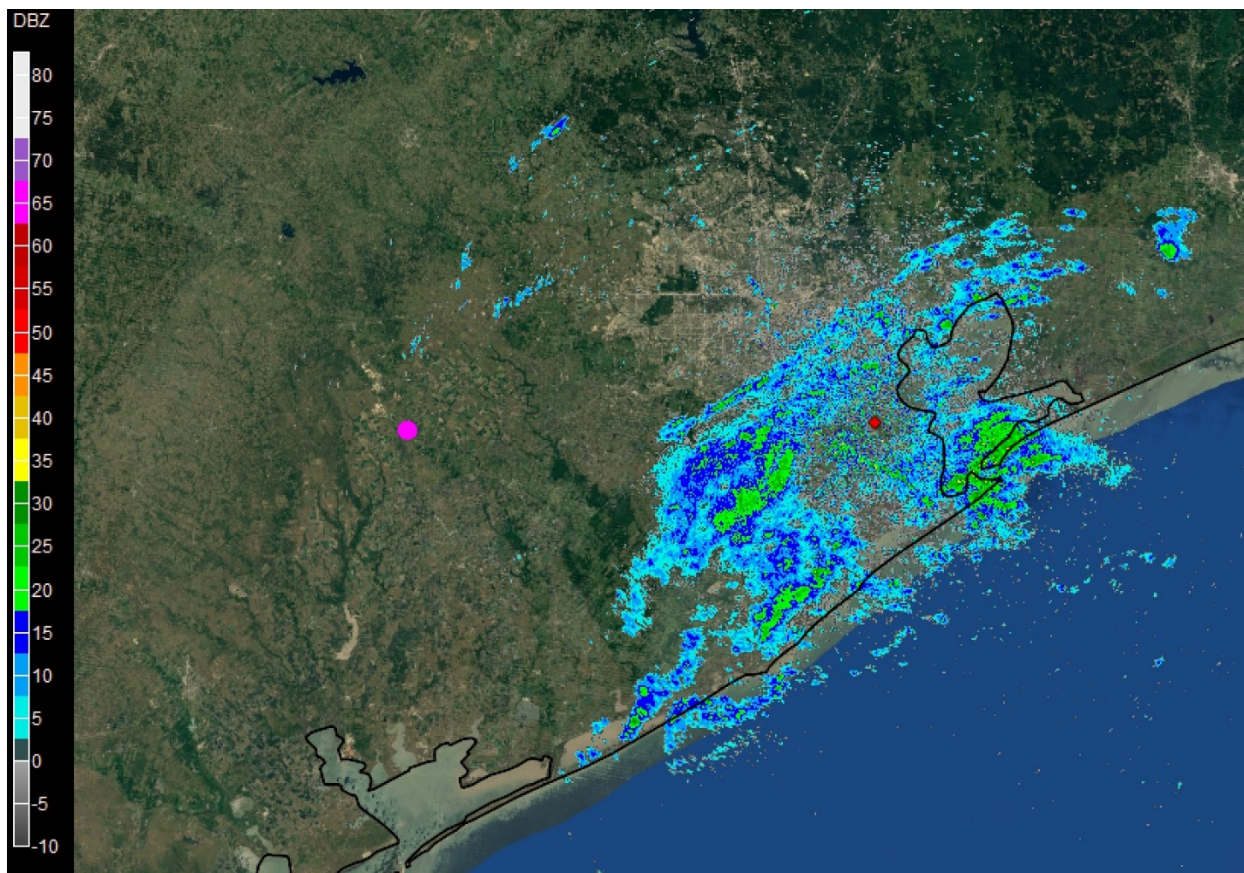


Figure 4 – KHGX 0.48° Level-II reflectivity product from a sweep initiated at 0815 CDT. Accident location marked by pink circle.

5.0 Pilot Reports

Publicly disseminated pilot reports⁷ (PIREP) made within 100 miles of the accident location between 0700 and 1000 CDT below 15,000 feet, the majority of which were located over the Houston area, are presented here. Many reported overcast sky conditions, with bases as low as 300 feet reported near the accident time.

HOU UA /OV KHOU/TM 1212/FL004/TP B737/SK BKN/RM PIREP RWY 4
APPROACH

IAH UA /OV 8R/TM 1222/FLDURD/TP E175/SK BKN 004

IAH UA /OV IAH130002/TM 1243/FLDURGC/TP A319/SK BKN004

IAH UA /OV IAH360000/TM 1244/FL000/TP B763/SK BASES 004

IAH UA /OV IAH230015/TM 1247/FL100/TP A321/SK TOPS 027 LAYER AT 097

⁷ Pilot reports publicly-disseminated only over radio were not captured.

IAH UA /OV IAH/TM 1300/FL100/TP E170/SK BASES 005 TOPS 100
 IAH UA /OV CXO/TM 1309/FL004/TP E35L/SK BASES 004
 CLL UA /OV CLL/TM 1312/FL006/TP SR22/SK OVC
 IAH UA /OV 6W/TM 1319/FLDURD/TP B737/SK OVC 005 /RM TOPS 017 BASE
 005
IAH UA /OV 1.5 W IAH/TM 1323/FLDURD/TP B738/SK OVC 003
 IAH UA /OV CLL270005/TM 1326/FL007/TP S22T/SK BASES 007 TOPS 095
 IAH UA /OV TS07/TM 1407/FL020/TP C172/SK BKN 007
 IAH UA /OV IAH 240003/TM 1425/FLDURC/TP B350/SK OVC 004
 CLL UA /OV CLL/TM 1430/FL1000/TP SR22/SK BASES 1000
 CLL UA /OV CLL/TM 1438/FL006/TP BE35/SK OVC
 IAH UA /OV IAH310004/TM 1442/FLDURGD/TP B737/SK OVC004
 HOU UA /OV HOU135005/TM 1500/FL070/TP B738/TB LIGHT CHOP/RM MOD
 PRECIP

6.0 Area Forecast Discussion

An Area Forecast Discussions (AFD) was issued at 0623 CDT by the National Weather Service (NWS) Weather Forecast Office in Houston/Galveston, Texas. Presented here is the “Aviation” section of that AFD, which discussed low ceilings and patchy fog across the area.

FXUS64 KHGX 111123

AFDHGX

Area Forecast Discussion

National Weather Service Houston/Galveston TX

623 AM CDT Sat May 11 2019

.AVIATION [12Z TAF Issuance]...

Generally IFR conditions across Southeast Texas. Most are for ceilings, but with patchy fog about, some IFR-MVFR visibilities may be seen for the next couple of hours as well.

As sun comes up, fog and low ceilings should dissipate. Look for rain and thunderstorm chances to increase as coastal low moves up the Texas coast, peaking around mid-day and into the afternoon.

Conditions should dry out overnight, and there is some question whether we may see a brief window of low stratus again before drier air scatters out the cloud cover towards morning.

7.0 AIRMETs for IFR Conditions

At 0613 CDT, the NWS Aviation Weather Center issued the following Airmen's Meteorological Information (AIRMET) advisory for IFR conditions⁸ that was active for the accident site at the accident time.

*WAUS44 KKCI 111113 AAA
WA4S
-DFWS WA 111113 AMD
AIRMET SIERRA UPDT 3 FOR IFR AND MTN OBSCN VALID UNTIL 111500
.
AIRMET IFR...OK TX AR TN LA MS AL AND CSTL WTRS...UPDT
FROM HMV TO GQO TO 50SW PZD TO 40W CEW TO 40SSE SJI TO 40E LEV TO
60E PSX TO RZC TO HMV
CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS CONTG BYD 15Z THRU 21Z.*

8.0 SIGMETs

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

9.0 CWSU Products

Two Center Weather Advisories (CWA) for LIFR conditions⁹ were issued by the Center Weather Service Unit (CWSU) at the Houston Air Route Traffic Control Center (ZHU) that were active for near the accident location at the accident time (see figure 5).

At 0736 CDT, the ZHU CWSU issued the following CWA which was valid until 0930 CDT, which advised of widespread LIFR conditions that were expected to improve between 0830 and 0930 CDT.

*FAUS21 KZHU 111236
ZHU1 CWA 111240
ZHU CWA 102 VALID UNTIL 111430
FROM 25NE MCB-60SSW LSU-50SW LCH-60W IAH-45W LFK-MLU-25NE MCB
AREA OF WDSPRD LIFR CONDS CONT. CIGS AOB 005/VIS AOB 1SM BR/FG.
CONDS TO IMPR BTN 1330-1430Z.*

⁸ Instrument Flight Rule (IFR) conditions - ceiling less than 1,000 feet agl and/or visibility less than three statute miles.

⁹ Low Instrument Flight Rules (LIFR) conditions - ceiling less than 500 feet agl and/or visibility less than 1 statute mile. Sub-category of IFR conditions.

At 0739 CDT, the ZHU CWSU issued the following CWA which was valid until 0930 CDT, which advised of scattered/widespread LIFR conditions that were expected to continue beyond 0930 CDT.

*FAUS22 KZHU 111239
ZHU2 CWA 111240
ZHU CWA 203 VALID UNTIL 111430
FROM 45W LFK-55SW CRP-BRO-80SSE LRD-50W CWK-ACT-45W LFK
AREA OF LIFR CONDS CONT. SCT/WDSPRD CIGS AOB 005. LCL VIS AOB
1SM BR/FG. CONDS TO CONT BYD 1430Z.*

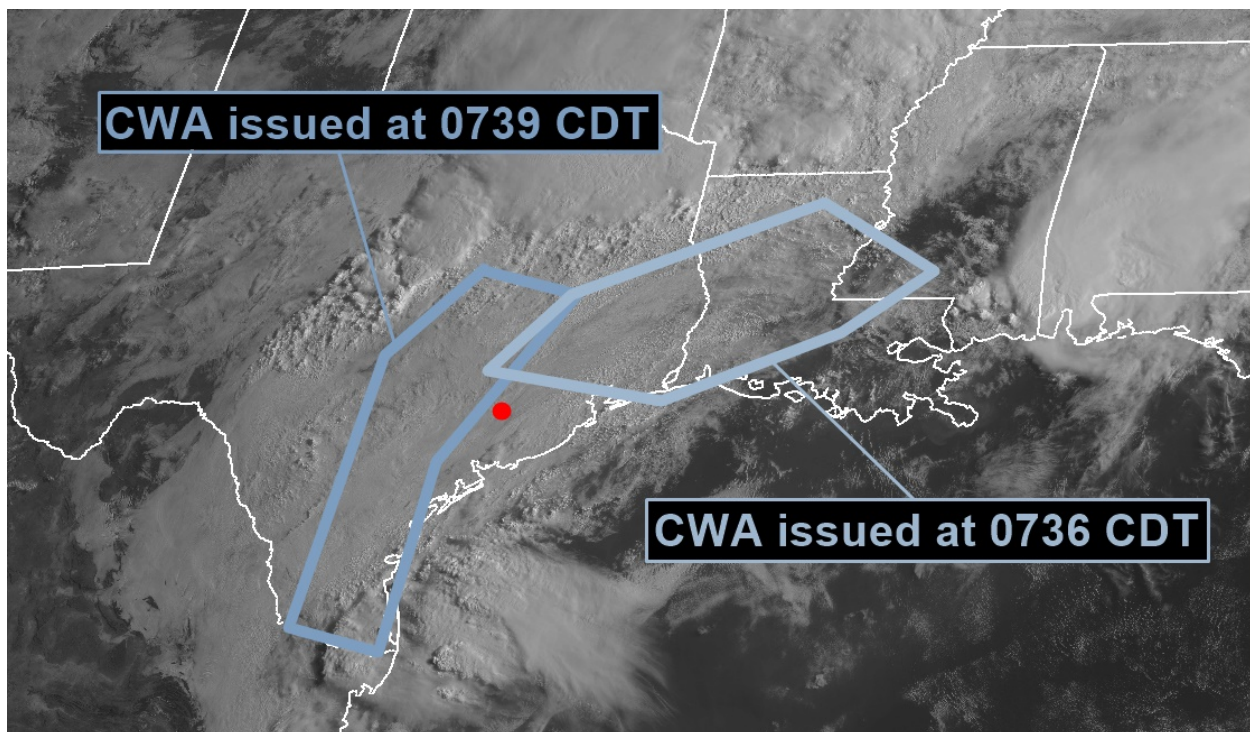


Figure 5 – CWAs issued by the ZHU CWSU active for near the accident location at the accident time. Accident location marked by red circle.

10.0 Flight Service

According to Leidos, neither they nor any third-party vendors utilizing the Leidos Flight Service system had any contact with the accident aircraft on the accident day or the day prior to the accident day.

Submitted by:

Mike Richards
Senior Meteorologist

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