National Transportation Safety Board

Office of Aviation Safety
Washington, D.C. 20594-2000
April 1, 2013

WEATHER STUDY

CEN13FA105

A. Accident

Location: Amarillo, Texas
Date: December 14, 2012
Time: about 1805 central standard time (0005 UTC[1] on December 15, 2012)
Aircraft: Beech E-90, registration: N67PS

B. Meteorological Specialist

Mike Richards
Senior Meteorologist
National Transportation Safety Board
Operational Factors Division, AS-30
Washington, DC 20594-2000

C. Details of the Investigation

The National Transportation Safety Board's meteorological specialist was not on scene and gathered weather data for this investigation from the Washington D.C. office from official National Oceanic and Atmospheric Administration (NOAA)'s National Weather Service (NWS) sources including the National Climatic Data Center (NCDC), except where noted. All times are in central standard time (CST) on December 14, 2012 - based upon the 24-hour clock. Directions are referenced to true north and distances in nautical miles. Heights are above mean sea level (msl) unless otherwise noted. Distances along the surface of the earth are calculated using the "Great Circle" formula.

Coordinates used for the accident locations: 34.94404° North latitude, 101.5902° West Longitude.

[1] UTC – abbreviation for Coordinated Universal Time

Synoptic Conditions

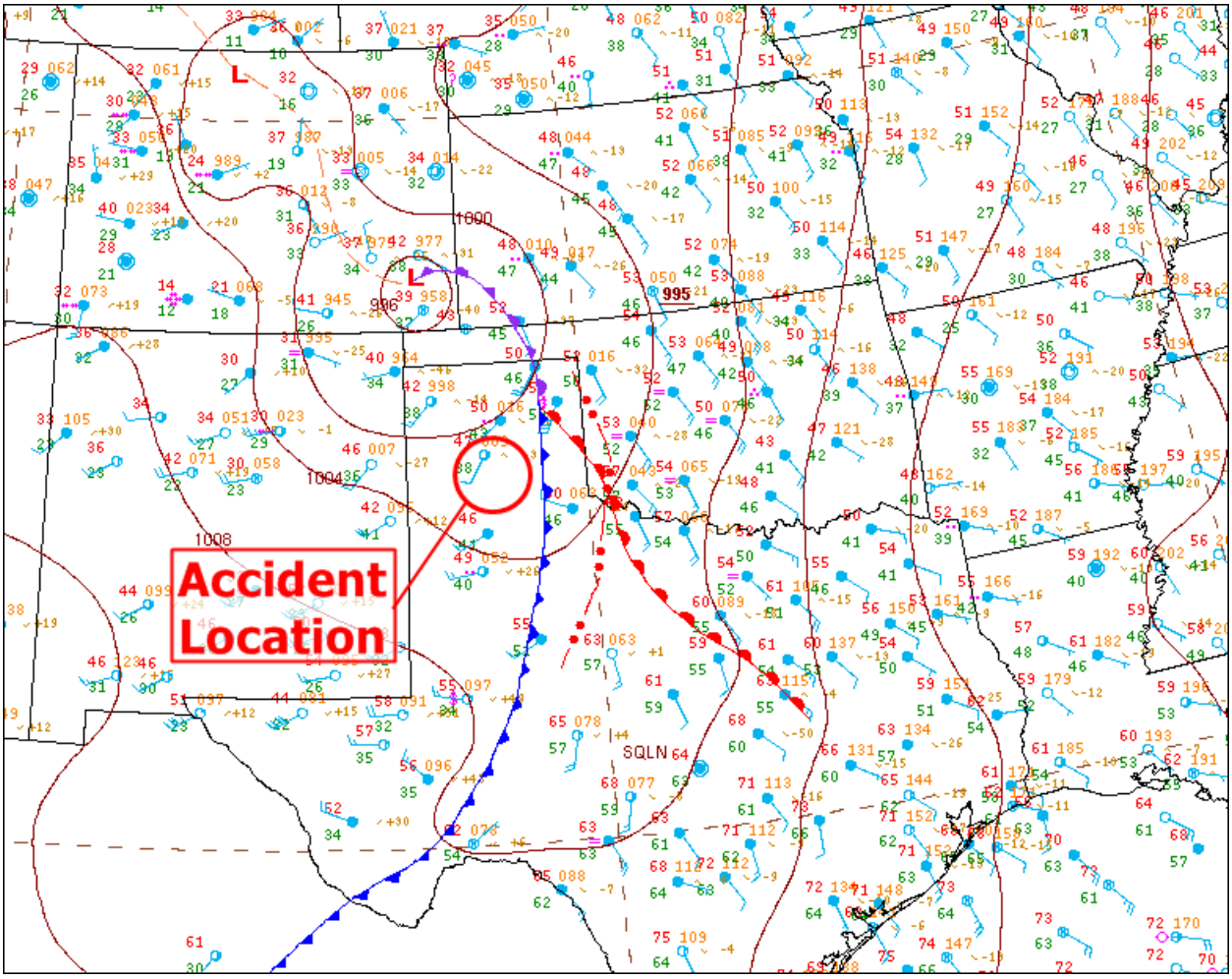

Figure 1 – NWS Surface Analysis Chart for 1800 CST.

The National Weather Service (NWS) Surface Analysis Chart for 1800 CST (figure 1) depicted a low-pressure center in the far southeastern corner of Colorado. Associated with the low-pressure center was an occluded front that stretched eastward, then southward into the northern portion of the Texas panhandle. The surface analysis chart depicted a cold front extended from the occluded front southward (east of the accident site) through Texas and into Mexico. A warm front was also depicted extending southeast from the occluded front into central Texas. A squall line was depicted parallel to and east of the northern portion of the cold front. Station models ahead of the cold front in Texas and Oklahoma depicted the wind as generally from the southeast.

A regional Next-Generation Radar (NEXRAD) mosaic obtained from the NCDC for 1805 CST (figure 2) identified a north-south oriented line of high (>50 dBZ) values of reflectivity east of the accident site in western Oklahoma. Only light values of reflectivity were depicted near the accident location.

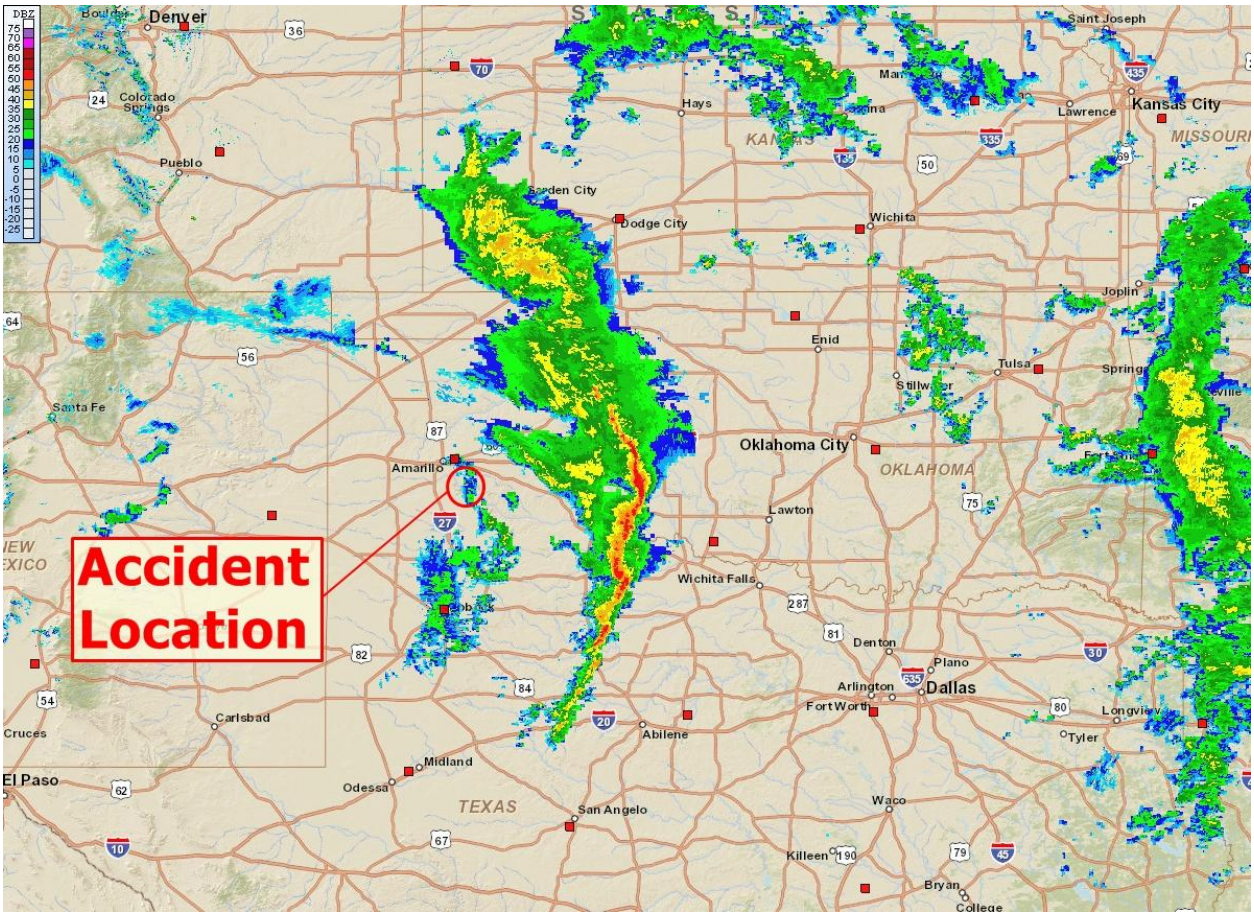

Figure 2 – NCDC NEXRAD mosaic from 1805 CST.

Surface Observations

Rick Husband Amarillo International Airport (KAMA) in Amarillo, Texas, was located approximately 19 miles north-northwest of the accident site at an elevation of 3,607 feet. The following reports were issued from KAMA during the time period surrounding the accident time while a weather observer was logged into the reporting system:

[1453 CST] KAMA 142053Z 14019G31KT 10SM BKN032 BKN039 15/08 A2962 RMK AO2 PK WND 16034/2013 SLP006 T01500083 56060=

[1553 CST] KAMA 142153Z 14019G29KT 10SM BKN036 OVC070 14/09 A2957 RMK AO2 PK WND 14034/2139 LTG DSNT ALQDS SLP991 T01390089=

[1653 CST] KAMA 142253Z 26017G29KT 10SM SCT050 OVC070 08/06 A2965 RMK AO2 PK WND 22043/2206 WSHFT 2201 LTG DSNT NE-SE TSB2156E35RAB08E49 SLP026 P0018 T00830056=

[1753 CST] KAMA 142353Z 21010KT 10SM BKN100 08/03 A2961 RMK AO2 PK WND 26033/2314 RAB14E23 SLP009 P0000 60018 T00830033 10167 20061 58003=

[1853 CST] KAMA 150053Z 23022G30KT 10SM CLR 07/02 A2962 RMK AO2 PK WND 23032/0043 SLP016 T00720022=

[1953 CST] KAMA 150153Z 23029G42KT 10SM CLR 07/01 A2964 RMK AO2 PK WND 23042/0148 SLP023 T00720011=

At 1753 CST, KAMA reported a wind from 210° at 10 knots, visibility of 10 miles or greater, ceiling broken at 10,000 feet above ground level (agl), temperature of 8º Celsius (C) and dew point temperature of 3ºC, altimeter setting 29.61 inches of mercury. Remarks: station with a precipitation discriminator, peak wind at 1714 CST from 260º at 33 knots, rain began at 1714 CST and ended at 1723 CST, sea-level pressure of 1000.9 hectopascals (hPa), trace amount of hourly precipitation, six-hour precipitation of 0.18 inches, hourly temperature of 8.3ºC and hourly dew point 3.3ºC, six-hour maximum temperature of 16.7ºC, six-hour minimum temperature of 6.1ºC, pressure decrease of 0.3 hPa in last three hours.

Upper Air Data

Atmospheric data were retrieved from a rawinsonde launch at 1800 CST from Amarillo, Texas (AMA; station identifier 72363). AMA was located approximately 18 miles north-northwest of the accident site. While the data from this weather balloon is considered to be valid at 1800 CST, according to the NWS, the actual launch time of the balloon from AMA was 1721 CST, and the balloon ascended to a pressure level of 568 hPa about 10 minutes later. Given the upper-level winds below this pressure level, the balloon would have drifted to the west/northwest of AMA. The sounding data are presented in figure 3.

The AMA sounding indicated almost the entire troposphere was stable or conditionally unstable. No temperature inversions were noted below 35,000 feet. The relative humidity (RH) was greater than 90 percent between about 11,000 and 13,000 feet. The freezing level was approximately 8,400 feet. Assessments of icing made by the Universal RAwinsonde OBservation program (RAOB) for this sounding yielded the potential for moderate clear icing around 12,700 feet, with light mixed and rice icing potential at altitudes between 10,700 and 13,500 feet. Another area of light rime icing potential was identified between 15,600 and 17,300 feet.

The OKX wind profile identified a west-southwesterly wind near the surface with a magnitude of 17 knots. The wind remained west-southwesterly/southwesterly but increased in magnitude to 51 knots through about 11,000 feet. Above this level the wind *backed*[2] slightly and increased in magnitude to 63 knots through 20,000 feet. Calculations by RAOB indicated several layers of significant clear-air turbulence potential below about 13,000 feet.

[2] A "backing" wind is a wind that turns counter-clockwise with increasing height.

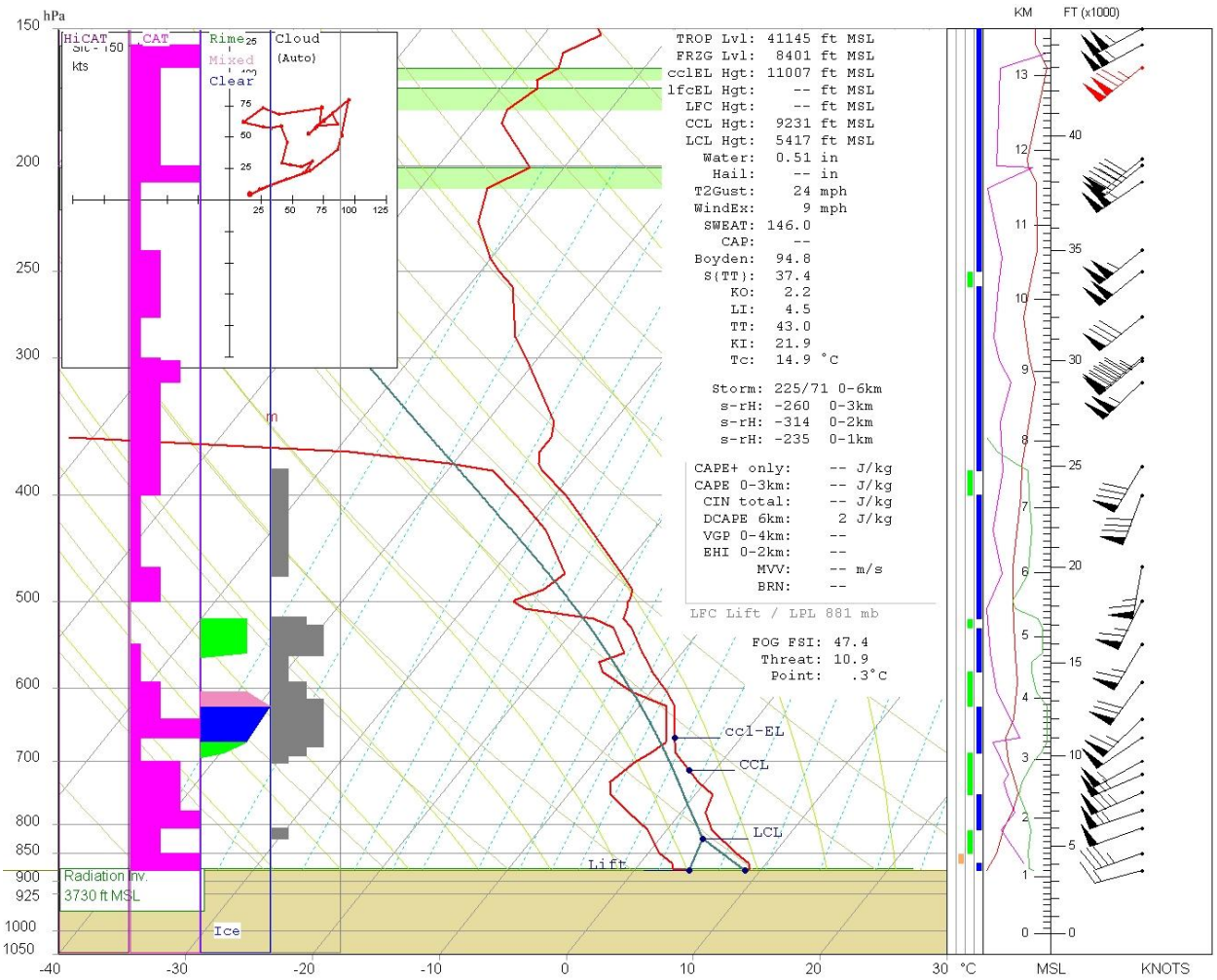

Figure 3 – Rawinsonde sounding data in SkewT/LogP[3] format for 1800 CST, surface to 150 hPa.

Pilot Reports

Publically disseminated pilot reports[4] within 50 miles of the accident site issued within 3 hours of the accident time are presented here.

PVW UA /OV TXO090034/TM 2130/FL330/TP E135/RM MOUNTAIN WAVE +20KT AWC-WEB:KZFW=

AMA UA /OV PNH/TM 0029/FL380/TP MD11/TB MODERATE/RM ZAB=

PVW UA /OV LBB045050 /TM 0215 /FL170 /TP FA50 /TB MOD=

[3] SkewT/LogP - A thermodynamic diagram, using the temperature and the logarithm of pressure as coordinates, which allows the plotting of the vertical profile of the temperature, humidity, and atmosphere above a particular point on the earth's surface.

[4] Only pilot reports distributed with the UBTX** headers were considered.

Weather Radar

WSR-88D Level-II legacy base product imagery from KAMA, is presented in figures 4-7. Figures 4 and 5 present the KAMA radar 6.43º tilt reflectivity[5] and velocity sweeps initiated at 1804:24 CST with the accident aircraft's flight path overlaid. Assuming standard refraction, the KAMA radar's 6.43° tilt would have "seen" altitudes between about 15,800 and 17,700 feet msl at the accident site. The reflectivity imagery indicates light values (0 to ~25 dBZ) of reflectivity coincident with the volume of airspace surrounding the accident aircraft's final positions. The velocity imagery, which provides the magnitude of the components of wind directly toward or directly away from the radar site, indicated a wind magnitude component toward the radar of 50–60 knots in the area of the final portion of the accident aircraft's flight. Dealiasing of the velocity imagery was accomplished by GR2Analyst.

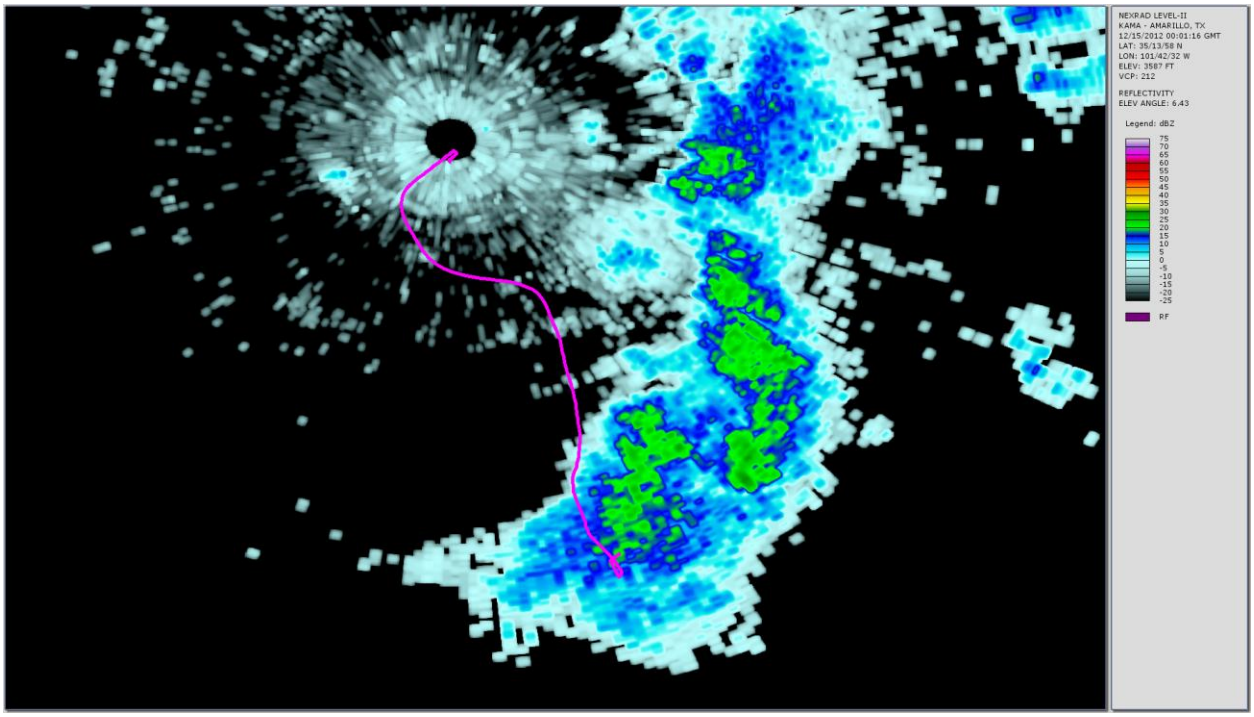

Figure 4 – KAMA 6.43° elevation base reflectivity image from a sweep that began at about 1804:25 CST. Aircraft flight path presented as pink line. Radar data has been graphically smoothed.

[5] Reflectivity - The sum of all backscattering cross-sections (eg, precipitation particles) in a pulse resolution volume divided by that volume. In order for the radar to calculate the reflectivity, it sends out a small burst of energy. This energy strikes the particles located in the volume. For simplification sake, it is assumed that these particles are evenly spread throughout the volume. The more of these particles located in the volume, the greater the return of energy returned back to the radar. One will see a greater reflectivity return from heavy rain than light rain.

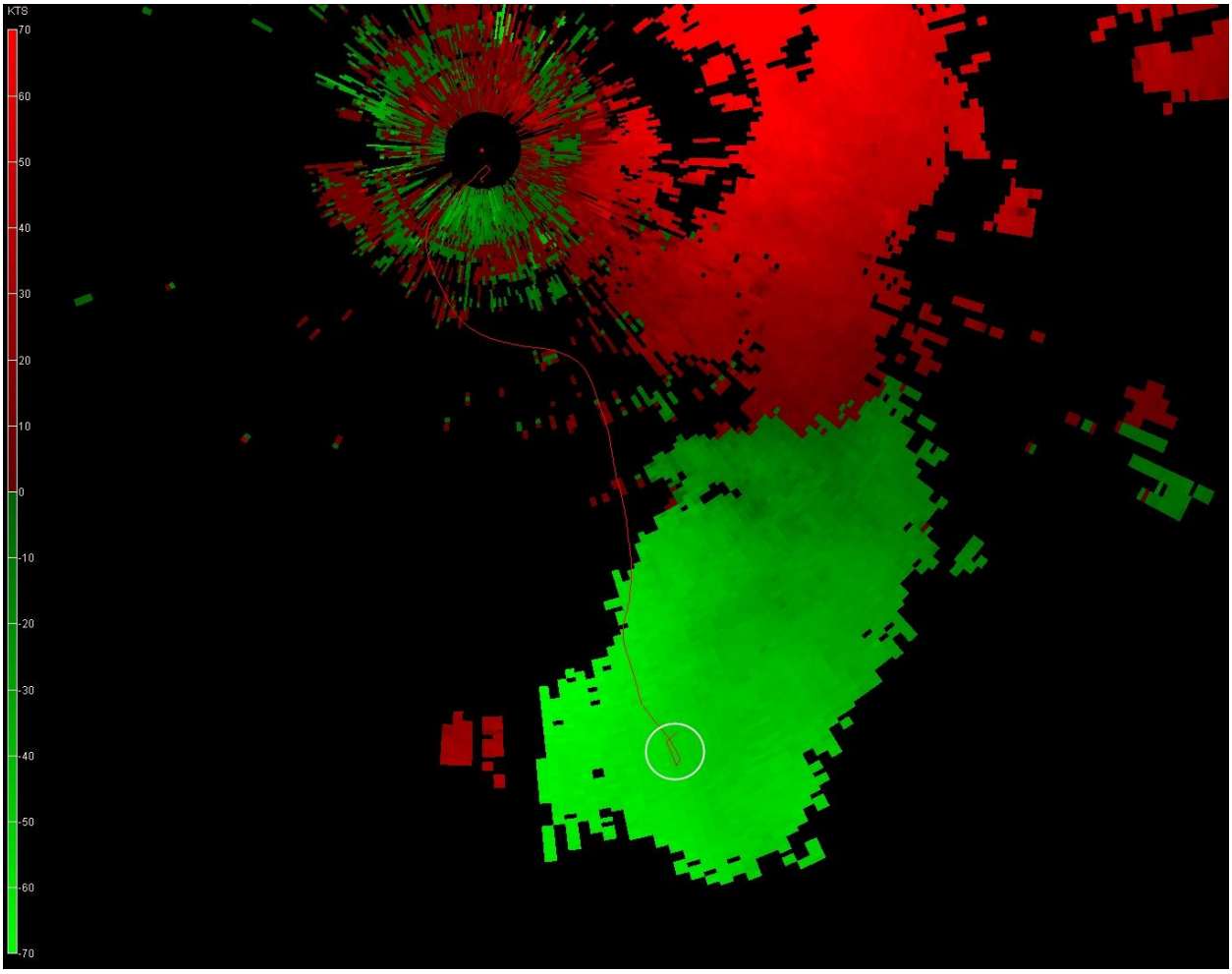

Figure 5 – KAMA 6.43° elevation base velocity image from a sweep that began at about 1804:25 CST. Aircraft flight path presented as red line. Dealiasing accomplished by GR2Analyst program.

3D presentations of base reflectivity isosurfaces from the volume scan initiated at 1801:16 CST are presented in figures 6 and 7 along with a plot of the accident aircraft's flight path. These images indicate that the accident aircraft penetrated values of reflectivity greater or equal to 10 dBZ immediately prior to rapid decent.

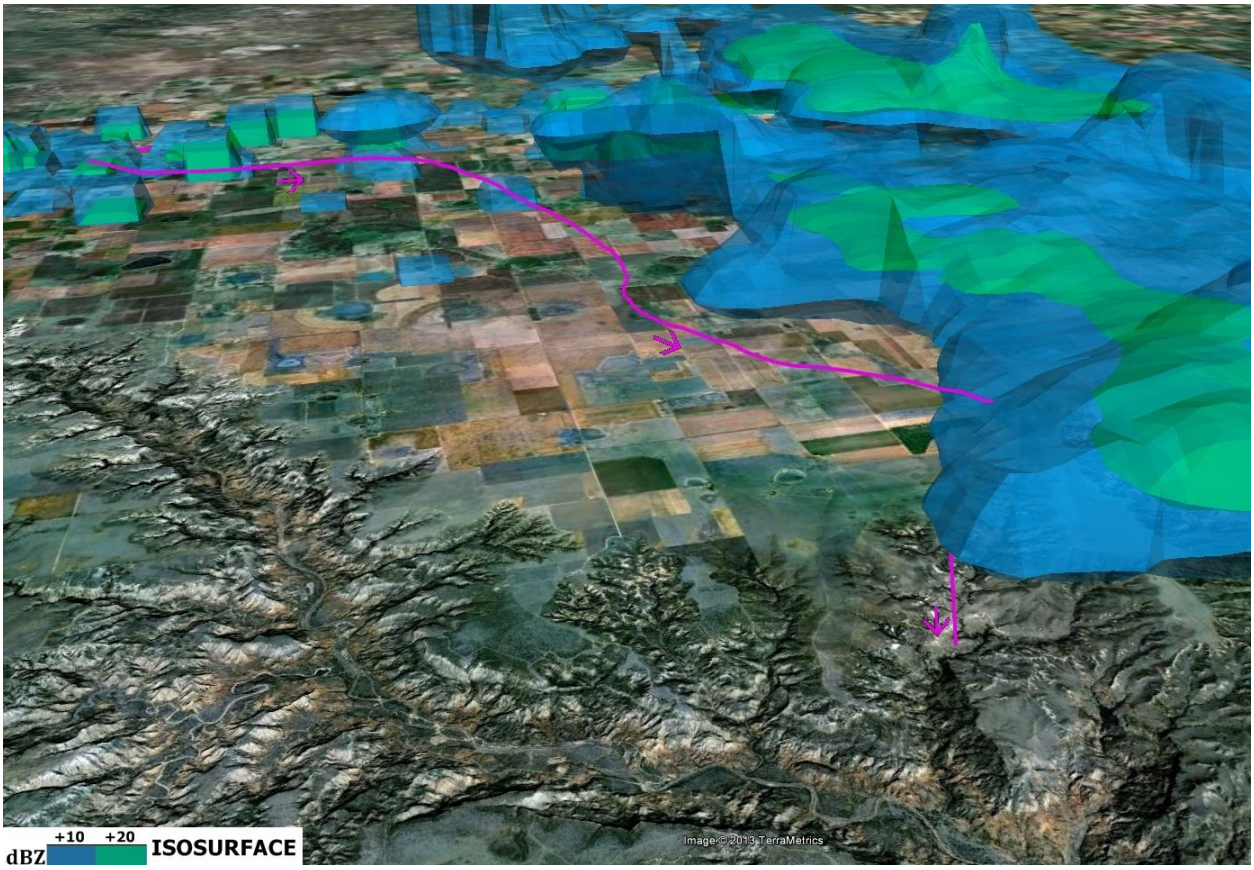

Figure 6 – 3D presentation 10 dBZ and 20 dBZ isosurfaces from base reflectivity volume sensed from 1801:13 through 1805:54 CST. Aircraft flight path presented as pink line.

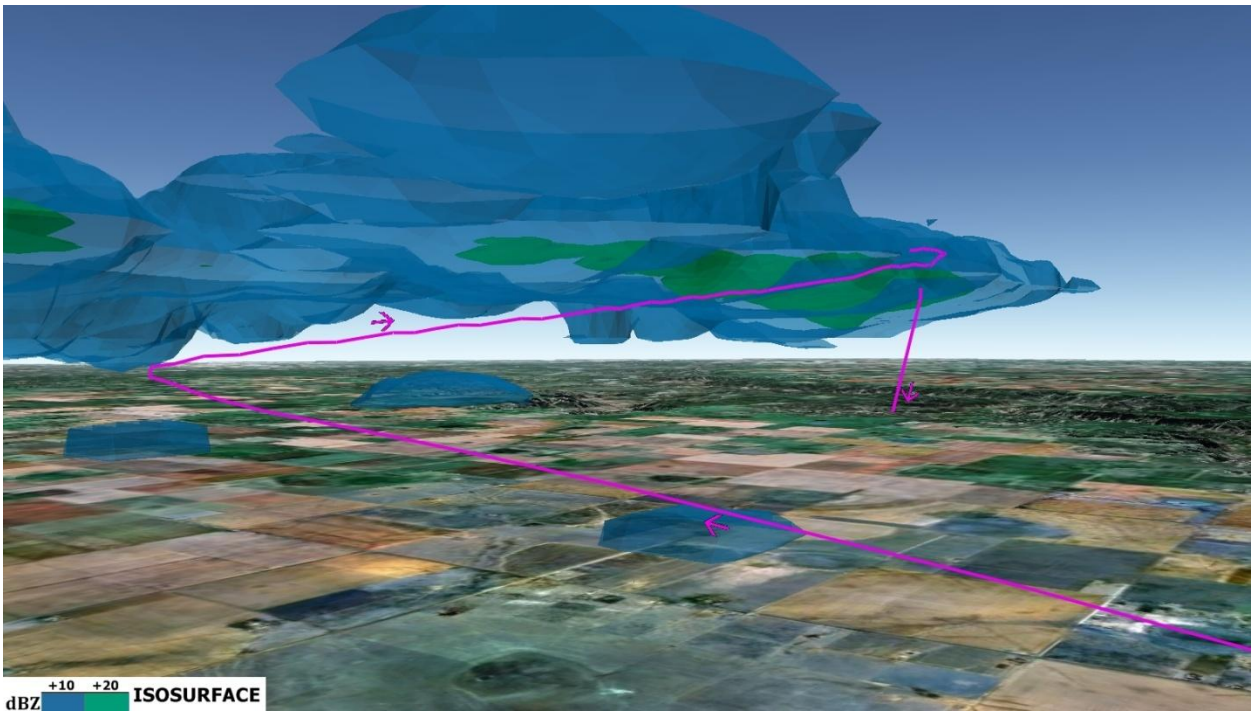

Figure 7 – 3D presentation 10 dBZ and 20 dBZ isosurfaces from base reflectivity volume sensed from 1801:13 through 1805:54 CST. Aircraft flight path presented as pink line.

WSR-88D Level-II dual-polarization 6.43° base product imagery from KAMA is presented in figures 8 and 9, which includes differential reflectivity (ZDR) and correlation coefficient (CC). ZDR values for the area near the final portion of the accident aircraft's flight path range from near 0 to about 4. CC values are close to 1, with pockets of values near 0.95 and below.

ZDR is the logarithm ratio of the horizontal power return to the vertical power return. Positive values of ZDR indicate that there is more horizontal power return than vertical power return. A negative value of ZDR indicates that there is more vertical power return than horizontal power return, which means that the dominant hydrometeors are larger in the vertical than in the horizontal. Near zero values of ZDR indicate that both the horizontal and vertical power return from with the volume scanned are of similar values, meaning the dominant hydrometeors are similar in size in both the vertical and horizontal.

CC is a measure of how similar the horizontal and vertical returned pulse characteristics are among all pulses in the sampled WSR-88D volume. CC provides information about the diversity of hydrometeors within the volume and its values range from 0 to 1. Meteorological echoes tend to have CC values greater than 0.80, with values greater than 0.96 indicating that the meteorological targets within the volume are all very similar in size, shape, type (liquid versus solid), and orientation. CC values between 0.80 and 0.96 indicate that the meteorological targets within the volume have a higher diversity of sizes, shapes, types, and orientations as the CC trends lower. Non-meteorological echoes have CC values less than 0.80 and these non-meteorological echoes can include but are not limited to bugs, chaff, smoke, and birds.

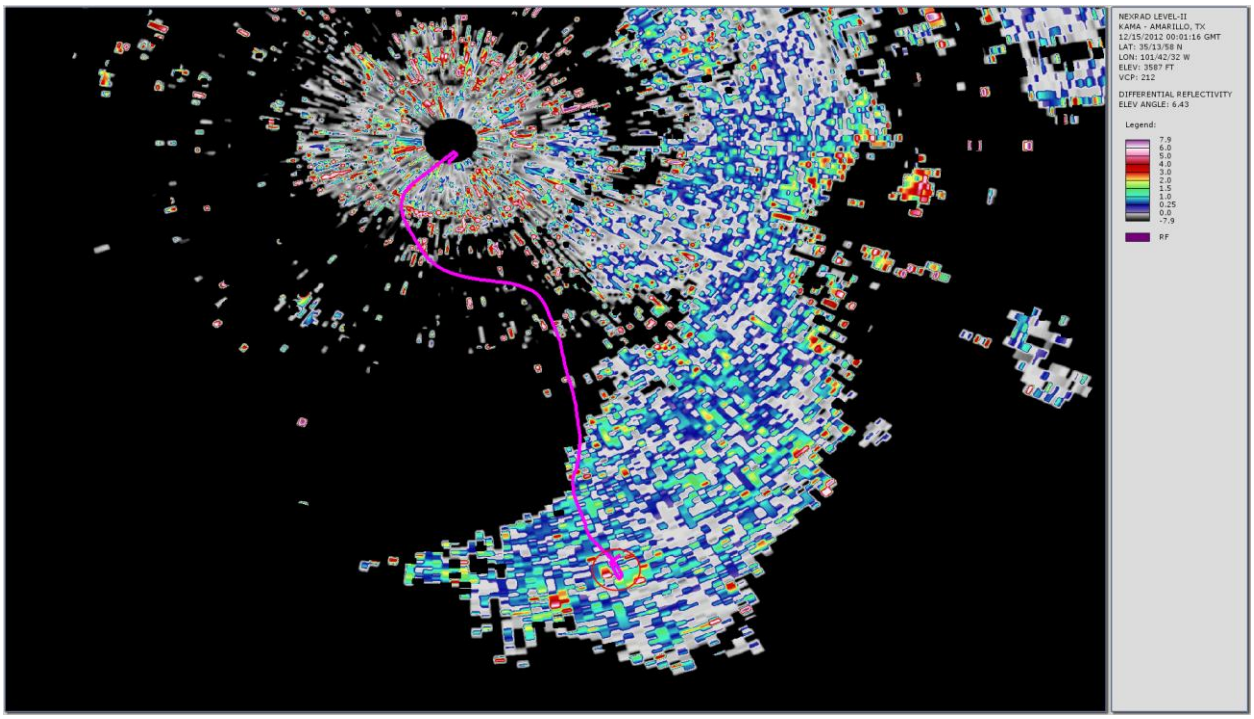

Figure 8 – KAMA differential reflectivity (ZDR) product from the 6.43° sweep initiated at 1804:24 CST. Accident aircraft flight path presented in pink.

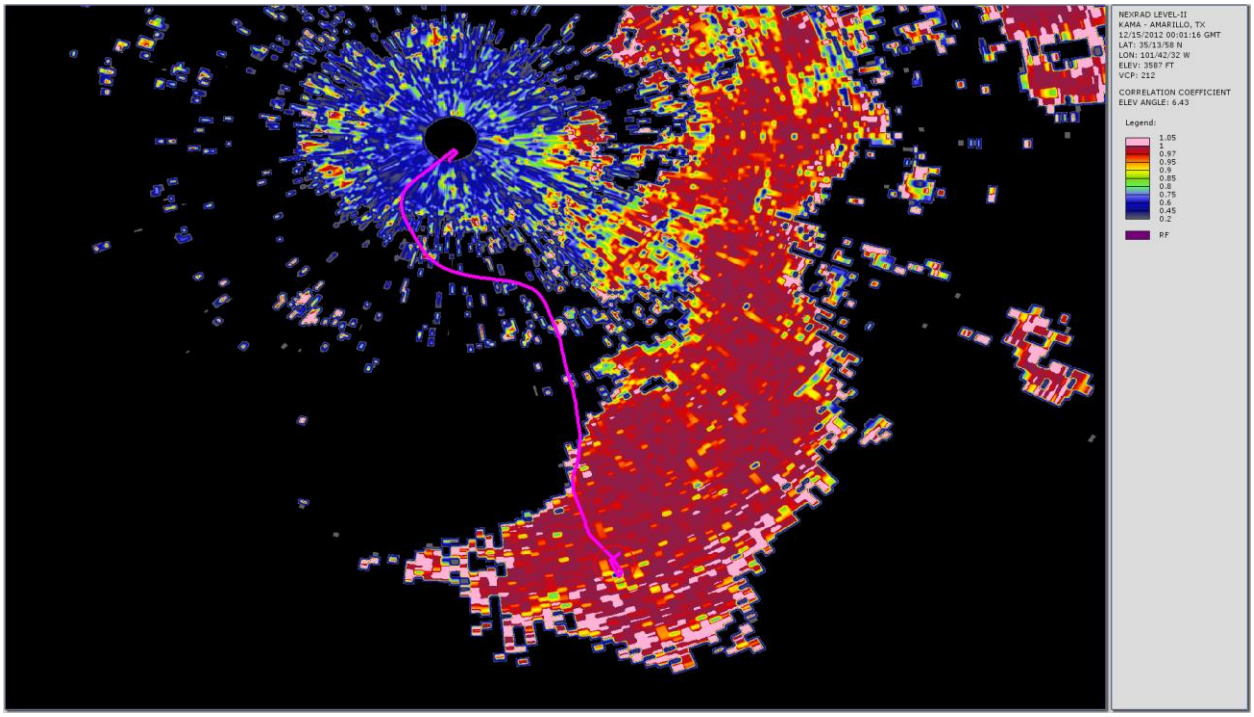

Figure 9 – KAMA correlation coefficient (CC) product from the 6.43° sweep initiated at 1804:24 CST. Accident aircraft flight path presented in pink.

Lightning

No lightning was detected by the Earth Networks Total Lightning Network in the vicinity of the accident location between 1800 and 1810 CST.

Satellite Imagery

Geostationary Operational Environmental Satellite (GOES)-15 infrared (10.7µm) 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). GOES-15 imagery from 1800 CST is presented in figure 10. Cloud-top temperatures in the vicinity of the accident site were approximately -20°C, which, when considering the KAMA rawinsonde data, corresponded to heights of approximately 19,800 feet. It should be noted that all satellite data presented in this section have not been corrected for any parallax error.

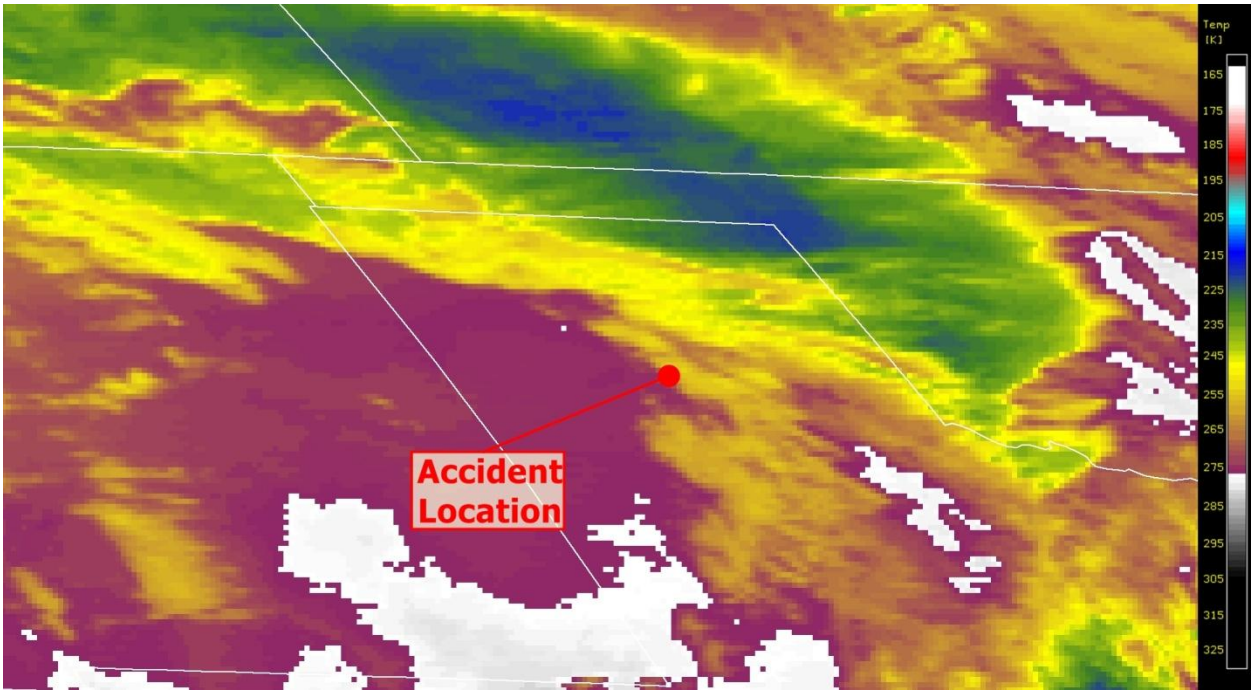

Figure 10 – GOES-15 10.7µm (infrared) color-enhanced imagery from 1800 CST.

Area Forecast

An Area Forecast that included Texas was issued at 1345 CST. The Area Forecast forecasted: for the southwestern quarter of the Texas panhandle until 1900 CST – scattered clouds or a broken ceiling at 8,000 feet msl with cloud tops to 15,000 feet msl, surface visibility of 3-5 miles, blowing dust, widely scattered thunderstorms with light rain, thunderstorms possibly severe, cumulonimbus tops to FL350[6], southerly surface wind of 30 knots with gusts to 40 knots; for the eastern half of the Texas panhandle until 2000 CST – ceiling broken at 3,500 feet msl with layered clouds to FL250, scattered light rain showers and widely scattered thunderstorms with light rain developing between 1400 and 1600 CST, thunderstorms possibly severe, southerly surface wind of 20 knots with gusts to 30 knots.

FAUS44 KKCI 141945
FA4W
_DFWC FA 141945
SYNOPSIS AND VFR CLDS/WX
SYNOPSIS VALID UNTIL 151400
CLDS/WX VALID UNTIL 150800...OTLK VALID 150800-151400
OK TX AR TN LA MS AL
.
SEE AIRMET SIERRA FOR IFR CONDS AND MTN OBSCN.
TS IMPLY SEV OR GTR TURB SEV ICE LLWS AND IFR CONDS.
NON MSL HGTS DENOTED BY AGL OR CIG.
.

[6] Flight Level (FL) - standard nominal altitude of an aircraft, in hundreds of feet. This altitude is calculated from the International standard atmosphere using 1013.25 hPa (29.92 in Hg) for surface pressure.

SYNOPSIS...20Z CDFNT FM SE CO TO ACRS SW PTN TX PNHDL-TX BIG BEND CONTG SSWWD. WRMFNT SW PTN TX PNHDL-S PTN N CNTRL TX-SW PTN NERN TX. HIGH S CNTRL NC. 14Z CDFNT FM LOW SERN NEB ACRS W CNTRL MO-NW AR-NERN TX-S CNTRL TX-EXTRM S PTN TX BIG BEND CONTG WWD AS STNR FNT. WRMFNT NW AR-NW MS. LOW 70S LRD. HIGH NERN GA.

.

NWRN TX

NW 1/4 PNHDL...OVC050 TOP FL250. SCT -SHRA/ISOL -TSRA. TS POSS SEV. CB TOP FL350. WND S 30G40KT. 02Z SCT CI. WND SW 20G30KT. OTLK...VFR WND.

SW 1/4 PNHDL-WRN 1/2 S PLAINS...SCT-BKN080 TOP 150. VIS 3-5SM BLDU. WDLY SCT -TSRA POSS SEV. CB TOP FL350. WND S 30G40KT. 01Z SKC. WND S 20G30KT. OTLK...VFR WND.

ERN 1/2 PNHDL-ERN 1/2 S PLAINS...BKN035 LYRD FL250. SCT -SHRA/WDLY SCT -TSRA DVLPG 20-22Z. TS POSS SEV. WND S 20G30KT. 02Z SKC. OTLK...VFR.

Aviation Section of the Area Forecast Discussion

An Area Forecast Discussion (AFD) was issued at 1743 CST by the NWS WFO in Amarillo, Texas (KAMA). The aviation portion of the AFD is presented here.

FXUS64 KAMA 142343 AAB
AFDAMA
AREA FORECAST DISCUSSION...UPDATED
NATIONAL WEATHER SERVICE AMARILLO TX
543 PM CST FRI DEC 14 2012

.AVIATION...

FOR THE 00Z TAFS...**ASIDE FROM A FEW LINGERING SHOWERS...THE MAIN STORMS ARE WELL EAST OF THE TAF SITES. THUS...EXPECT VFR CONDITIONS FOR THE REMAINDER OF THE TAF PERIOD WITH ONLY FEW HIGH CLOUDS. WINDS WILL REMAIN BREEZY OVERNIGHT...AND COULD INCREASE AGAIN LATE TOMORROW MORNING...BUT SHOULD GENERALLY REMAIN WESTERLY**.

AIRMETs

There were two Airmen's Meteorological Information (AIRMET) advisories issued and active for altitudes below FL180 at the accident location at the accident time (figure 11). One advised of moderate turbulence below FL180 and a second advised of strong surface winds with sustained magnitudes greater than 30 knots expected.

WAUS44 KKCI 142045

WA4T
_DFWT WA 142045
AIRMET TANGO UPDT 5 FOR TURB AND STG SFC WNDS VALID UNTIL 150300
.
AIRMET TURB...OK TX AR LA
FROM 30E OSW TO 60WNW ARG TO 40ESE EIC TO LFK TO 40W IAH TO 20SSW LRD TO 30NW DLF TO 90S MRF TO ELP TO INK TO 30ESE TBE TO 50W LBL TO 30E OSW
MOD TURB BLW FL180. CONDS CONTG BYD 03Z THRU 09Z.
.
AIRMET STG SFC WNDS...TX
FROM 40SE LBL TO CDS TO 40ESE LBB TO 60WSW LBB TO 20WNW TXO TO 60SSE TBE TO 40SE LBL
SUSTAINED SURFACE WINDS GTR THAN 30KT EXP. CONDS ENDG 00-03Z.

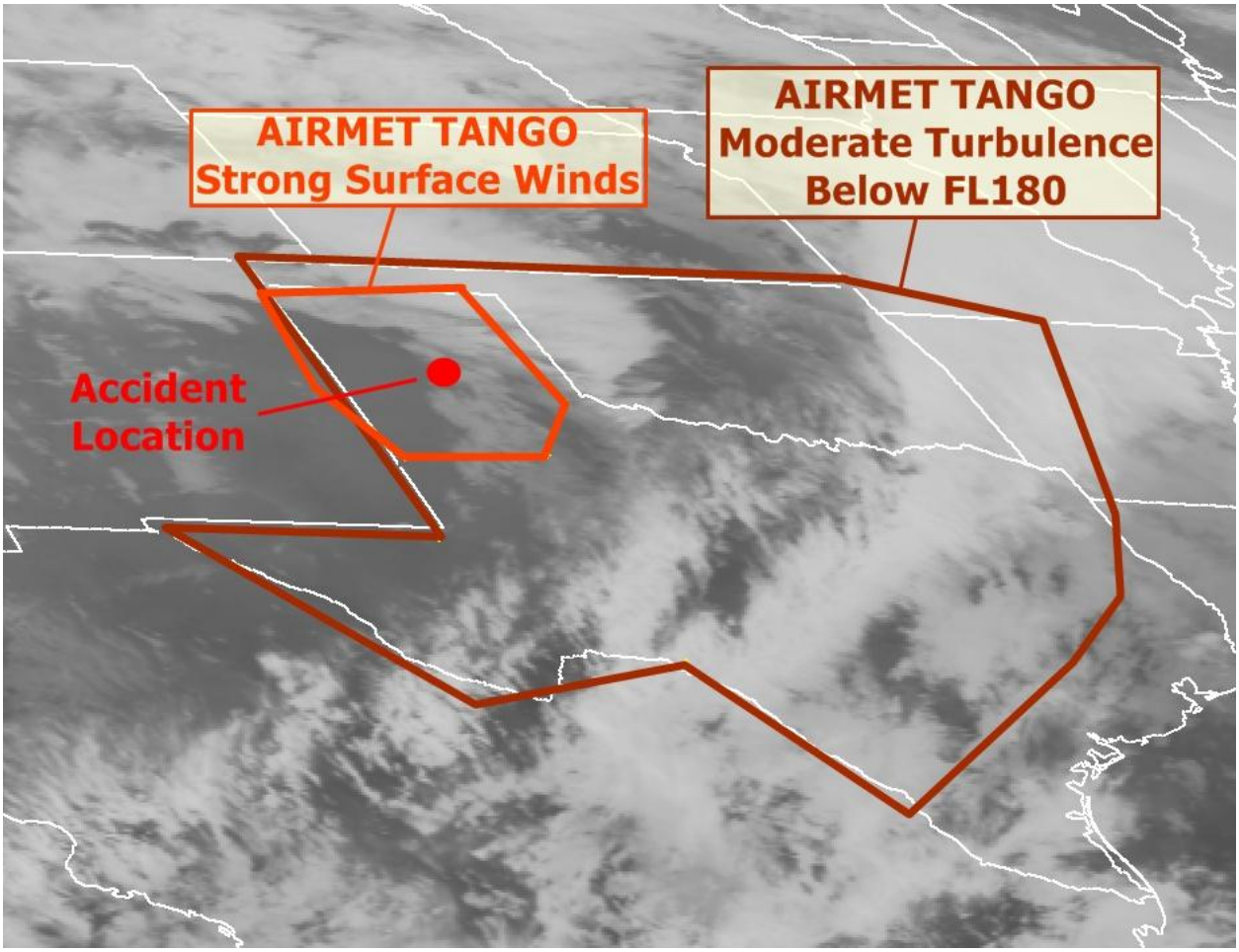

Figure 11 – AIRMETs issued and active for below FL180 at the accident site at the accident time. Products overlaid onto GOES-15 10.7µm image from 1800 CST.

SIGMETs

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

Convective SIGMETs

The Aviation Weather Center in Kansas City, Missouri, issued several Convective SIGMETs for Texas that were valid at the accident time. Figure 12 provides a graphical depiction of these Convective SIGMETs.

WSUS32 KKCI 142355
SIGC
_MKCC WST 142355
CONVECTIVE SIGMET 9C
VALID UNTIL 0155Z
TX OK KS
FROM 30WSW GCK-60NNE CDS-30WNW ABI
LINE SEV TS 40 NM WIDE MOV FROM 24055KT. TOPS TO FL400.
TORNADOES...WIND GUSTS TO 60KT POSS.

WSUS32 KKCI 142255
SIGC
_MKCC WST 142255
CONVECTIVE SIGMET 8C
VALID UNTIL 0055Z
TX OK KS CO
FROM 40W LBL-40ESE AMA-20E MAF
LINE SEV TS 40 NM WIDE MOV FROM 24055KT. TOPS TO FL390.
TORNADOES...WIND GUSTS TO 60KT POSS.

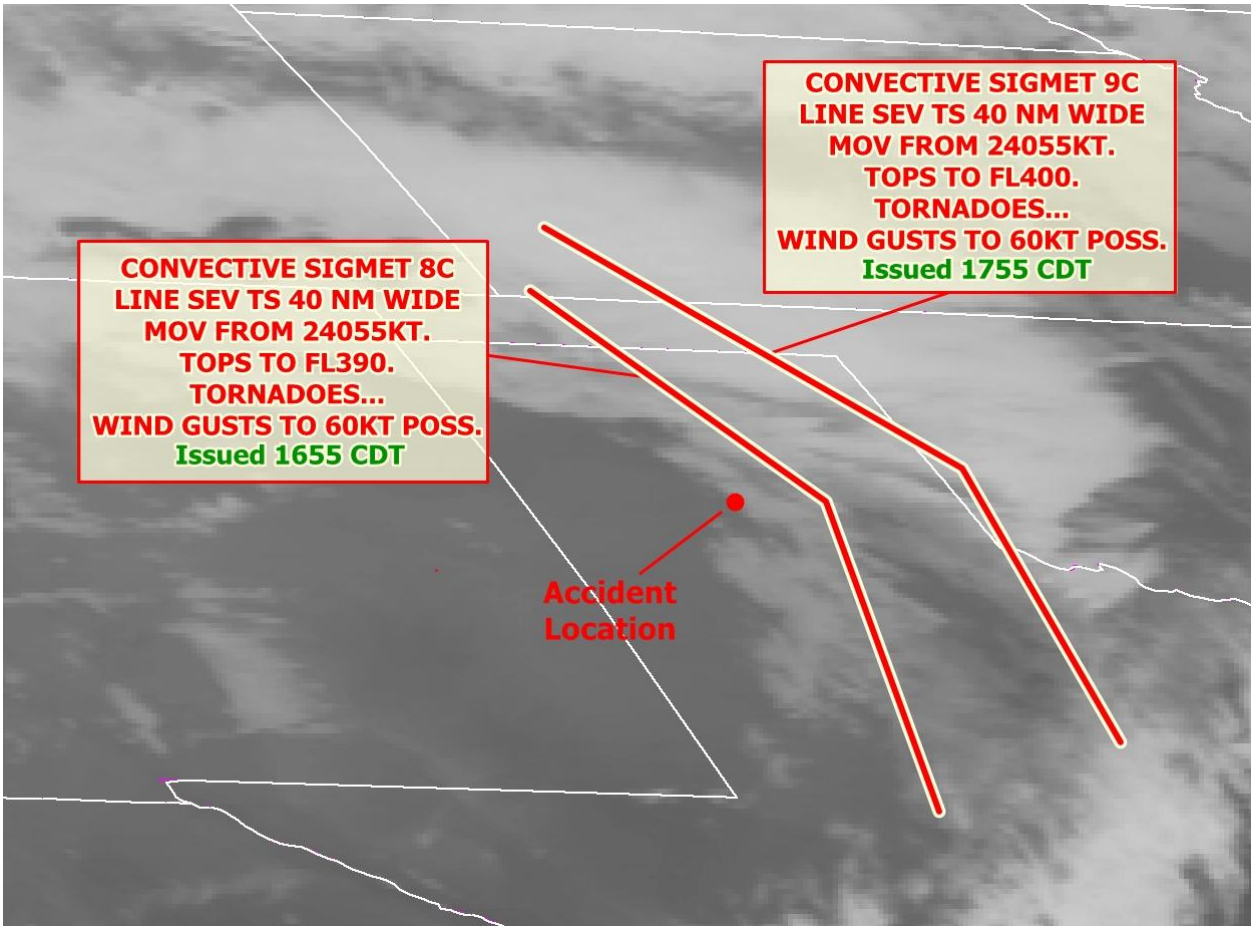

Figure 12 – Convective SIGMETs issued for Texas that were valid through the accident time. Products overlaid onto GOES-13 10.7µm image from 2115 CST.

Center Weather Advisories/Meteorological Impact Statements

There were no Center Weather Advisories or Meteorological Impact Statements from the Center Weather Service Unit at Albuquerque Air Route Traffic Control Center active for the accident location at the accident time.

Convective Outlook

At 1400 CST the Storm Prediction Center (SPC) in Norman, Oklahoma, issued a Convective Outlook that concerned the Texas panhandle. Graphics are included as figures 12-15.

SPC AC 142000

DAY 1 CONVECTIVE OUTLOOK
NWS STORM PREDICTION CENTER NORMAN OK
0200 PM CST FRI DEC 14 2012

VALID 142000Z - 151200Z

...THERE IS A SLGT RISK OF SVR TSTMS ACROSS THE TX PANHANDLE/NORTHWEST TX...

...TX PANHANDLE/NORTHWEST TX TO WESTERN OK/SOUTHWEST KS...
WHILE OVERALL FORECAST SCENARIO HAS NOT CHANGED DRAMATICALLY...HAVE INTRODUCED A CATEGORICAL SLIGHT RISK /15 PERCENT WIND/ BASED ON EARLY AFTERNOON OBSERVATIONAL TRENDS AND SHORT-TERM MODEL GUIDANCE. AS OF MID-AFTERNOON...AN APPROX 150-MILE EAST-WEST WIDE CORRIDOR OF CLEARING EXISTS PER VISIBLE SATELLITE IMAGERY TO THE IMMEDIATE EAST OF A PACIFIC COLD FRONT...WITH THIS CLEARING COINCIDENT WITH A CORRIDOR OF 4-5MB/2HR SURFACE PRESSURE FALLS.

WHILE MOISTURE/BUOYANCY WILL REMAIN MINIMAL...SUFFICIENT MOISTURE SHOULD EXIST FOR THE MATURATION OF LOW-TOPPED TSTMS AND EVENTUAL FAST-MOVING CONVECTIVE BANDS THROUGH LATE AFTERNOON IN THE PRESENCE OF INCREASING FORCING FOR ASCENT AND ROBUST LOWER-MIDDLE TROPOSPHERIC FLOW. THIS SCENARIO IS WELL-SUPPORTED BY VARIOUS 12Z-BASED HIGH-RES CONVECTION ALLOWING GUIDANCE. RECENT CANNON AFB WSR-88D VWP DATA SAMPLES 50+ KT WINDS WITHIN THE LOWEST 1-3 KM. FOR ADDITIONAL INFORMATION...SEE MESOSCALE DISCUSSION 2155.

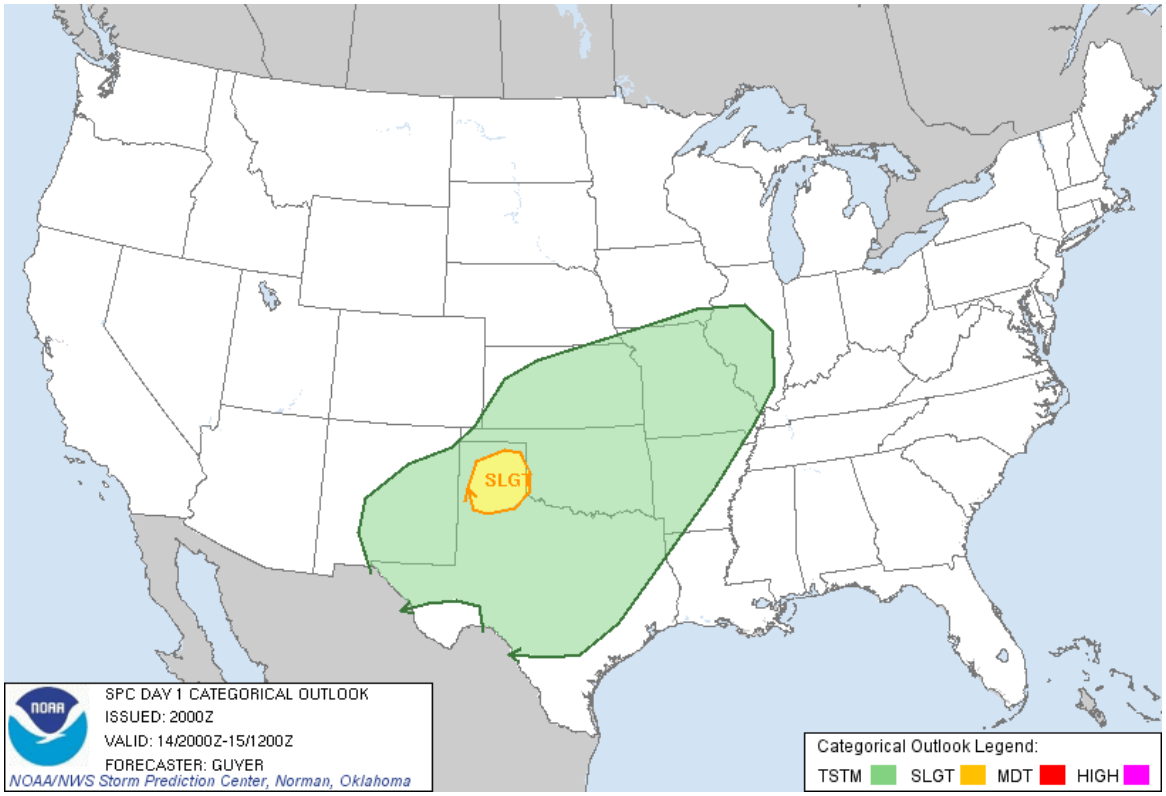

Figure 12 – Categorical outlook for severe thunderstorms. Issued at 1400 CST and valid until 0600 CST on December 15, 2012.

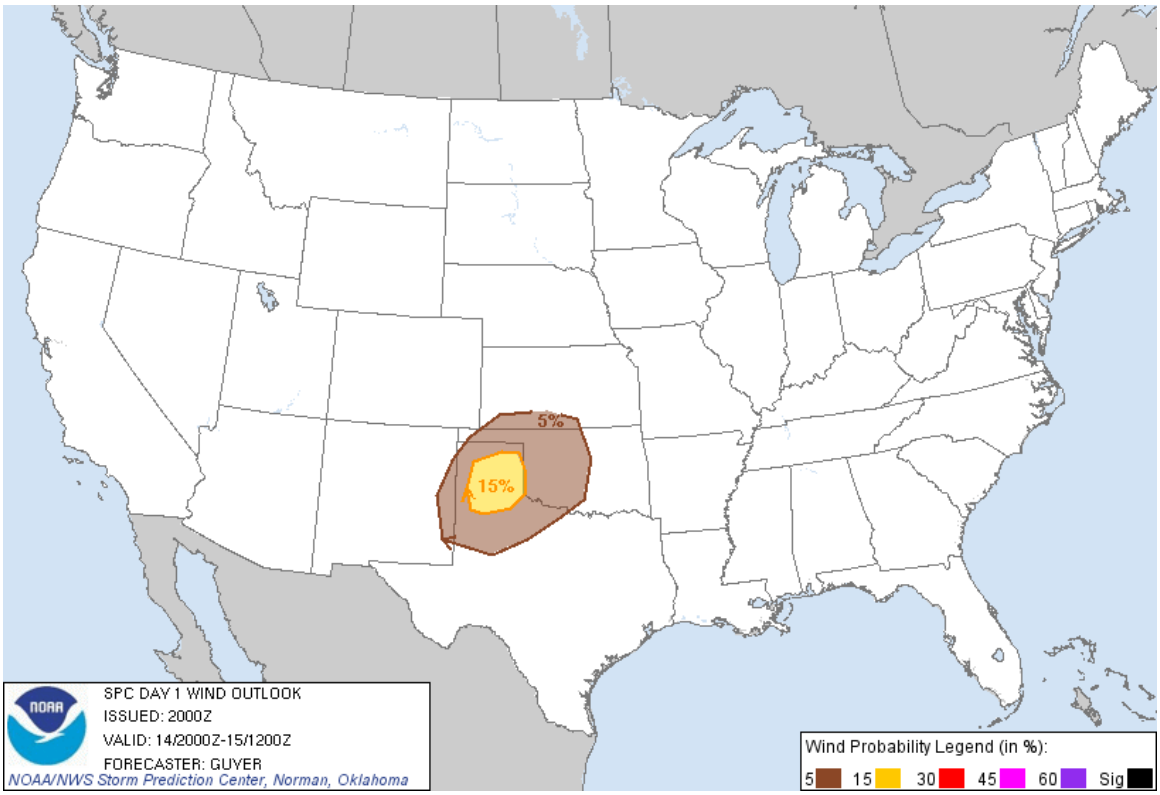

Figure 13 – Probability of a damaging thunderstorm wind or wind gust of 50 knots or higher within 25 miles of a point. Issued at 1400 CST and valid until 0600 CST on December 15, 2012.

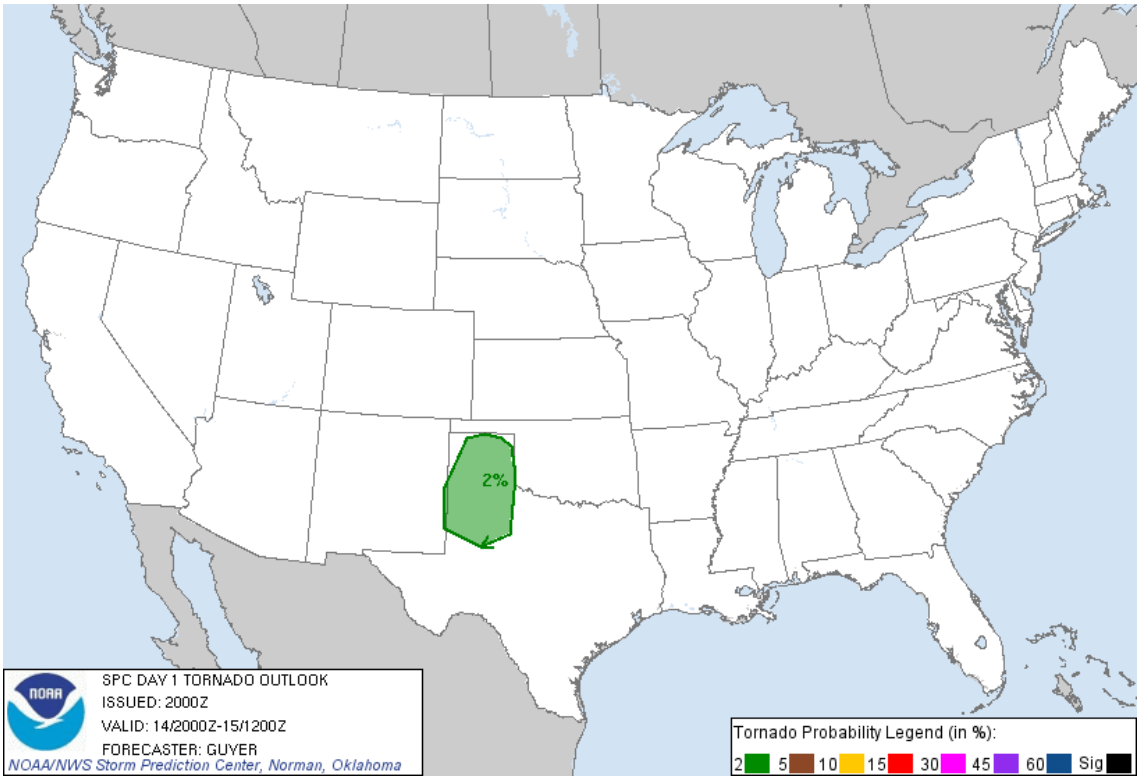

Figure 14 – Probability of a tornado within 25 miles of a point. Issued at 1400 CST and valid until 0600 CST on December 15, 2012.

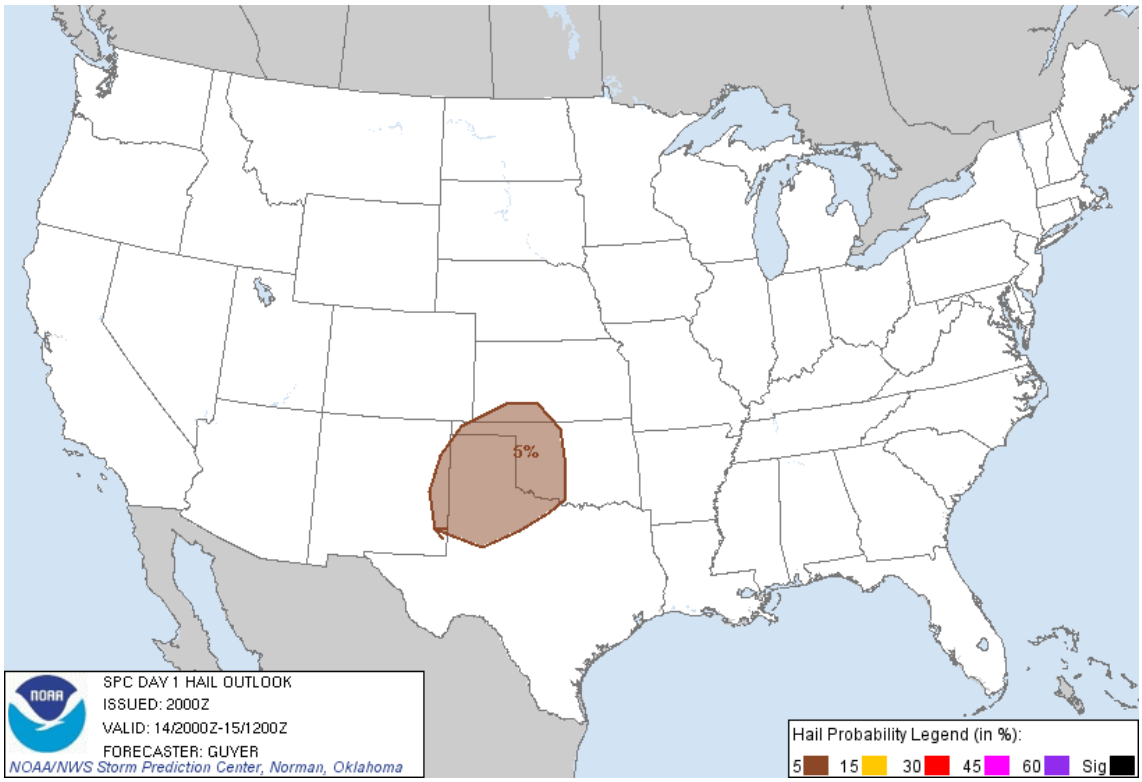

Figure 15 – Probability of hail one inch or larger within 25 miles of a point. Issued at 1400 CST and valid until 0600 CST on December 15, 2012.

Severe Thunderstorm Watch

At 1425 CST, the SPC issued the following severe thunderstorm watch that was valid until 2000 CST and included Armstrong County (the accident county) in Texas. A graphic is included as figure 16.

WOUS64 KWNS 142025
WOU1

BULLETIN - IMMEDIATE BROADCAST REQUESTED
SEVERE THUNDERSTORM WATCH OUTLINE UPDATE FOR WS 681
NWS STORM PREDICTION CENTER NORMAN OK
230 PM CST FRI DEC 14 2012

SEVERE THUNDERSTORM WATCH 681 IS IN EFFECT UNTIL 800 PM CST
FOR THE FOLLOWING LOCATIONS

OKC009-045-055-057-065-129-150200-
/O.NEW.KWNS.SV.A.0681.121214T2030Z-121215T0200Z/

OK
. OKLAHOMA COUNTIES INCLUDED ARE

BECKHAM	ELLIS	GREER
HARMON	JACKSON	ROGER MILLS

TXC011-017-045-065-069-075-079-087-101-107-117-125-129-153-155-169-179-
189-191-195-197-211-219-233-263-269-275-279-295-303-305-341-345-357-359-
369-375-381-393-433-437-445-483-501-150200-
/O.NEW.KWNS.SV.A.0681.121214T2030Z-121215T0200Z/

TX
. TEXAS COUNTIES INCLUDED ARE

ARMSTRONG	BAILEY	BRISCOE
CARSON	CASTRO	CHILDRESS
COCHRAN	COLLINGSWORTH	COTTLE
CROSBY	DEAF SMITH	DICKENS
DONLEY	FLOYD	FOARD
GARZA	GRAY	HALE
HALL	HANSFORD	HARDEMAN
HEMPHILL	HOCKLEY	HUTCHINSON
KENT	KING	KNOX
LAMB	LIPSCOMB	LUBBOCK
LYNN	MOORE	MOTLEY
OCHILTREE	OLDHAM	PARMER
POTTER	RANDALL	ROBERTS
STONEWALL	SWISHER	TERRY
WHEELER	YOAKUM	

ATTN...WFO...OUN...LUB...AMA...

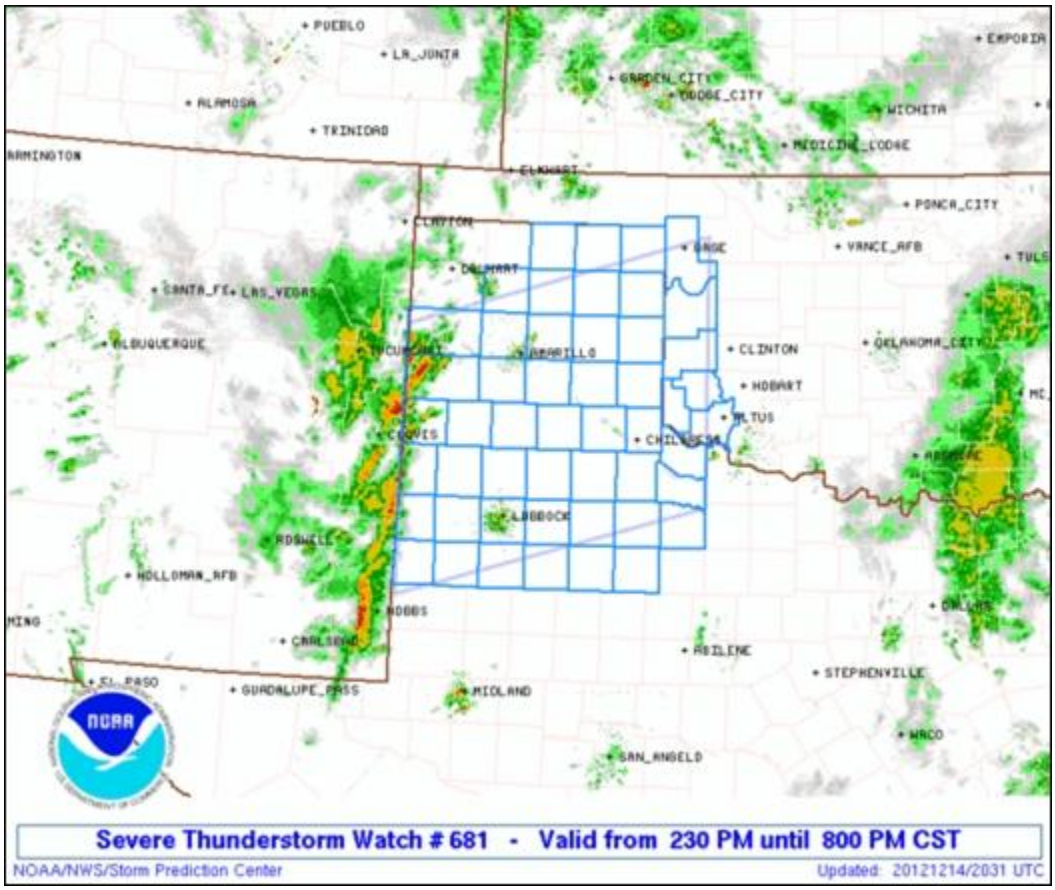

Figure 16 – Graphical depiction of the severe thunderstorm watch valid beginning at 1430 CST.

Mesoscale Discussion

At 1721 CST, the SPC issued the following Mesoscale Discussion for a region that included the accident location. A graphic is included as figure 17.

MESOSCALE DISCUSSION 2157
NWS STORM PREDICTION CENTER NORMAN OK
0521 PM CST FRI DEC 14 2012

AREAS AFFECTED...ERN TX PANHANDLE...NW TX...WRN OK

CONCERNING...SEVERE THUNDERSTORM WATCH 681...

VALID 142321Z - 150045Z

THE SEVERE WEATHER THREAT FOR SEVERE THUNDERSTORM WATCH 681 CONTINUES.

SUMMARY...A SEVERE THREAT IS EXPECTED TO CONTINUE FOR A FEW MORE HOURS ACROSS THE ERN TX PANHANDLE...NW TX INTO WRN OK. WIND DAMAGE WILL LIKELY BE ASSOCIATED WITH THE LINE. AN ISOLATED TORNADO THREAT WILL ALSO EXIST. AS THE LINE MOVES TO THE ERN EDGE OF WW 681...AN EXTENSION IN AREA MAY BE NEEDED.

DISCUSSION...THE LATEST WATER VAPOR IMAGERY SHOWS A NEGATIVELY-TILTED UPPER-LEVEL TROUGH OVER ERN NM WITH A POWERFUL 80 TO 100 KT MID-LEVEL JET MOVING OUT INTO WEST TX. DIFFLUENCE IN THE EXIT REGION OF THE JET ALONG WITH STRONG LARGE-SCALE ASCENT IS SUPPORTING A SQUALL-LINE ONGOING FROM THE ERN TX PANHANDLE SWD INTO NW TX. AHEAD OF THE SQUALL-LINE...SFC DEWPOINTS ARE IN THE LOWER TO MID 50S F AND WSR-88 VWPS SHOW 50 KT AT 1 KM ABOVE THE SFC. THIS ENVIRONMENT ALONG WITH A 50 TO 60 KT EWD FORWARD SPEED OF THE LINE SHOULD SUPPORT A WIND DAMAGE THREAT AS THE LINE MOVES EWD INTO THE WRN OK OVER THE NEXT 1 TO 2 HOURS. 0-3 KM STORM RELATIVE HELICITIES OF 400 TO 500 M2/S2 SHOULD ALSO SUPPORT AN ISOLATED TORNADO THREAT. IN SPITE OF THESE FACTORS...THE CORRIDOR OF INSTABILITY IS VERY NARROW WHICH SHOULD RESULT IN A GRADUAL WEAKENING OF THE LINE AFTER DARK.

..BROYLES/MEAD.. 12/14/2012

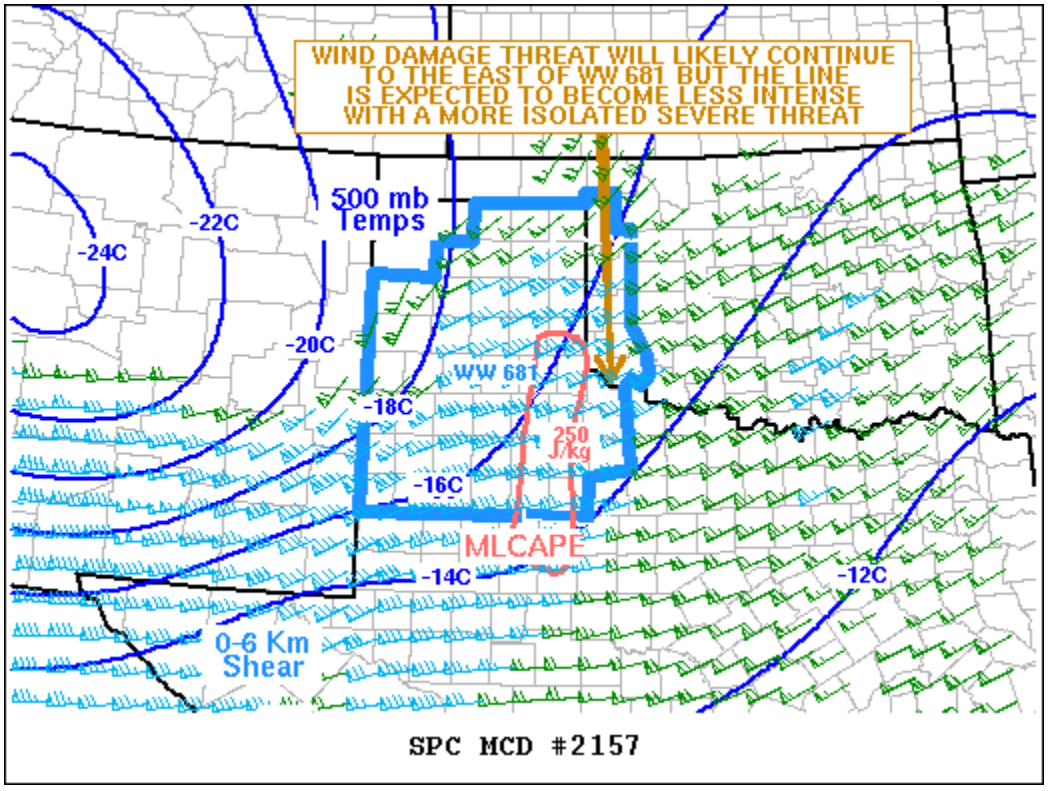

Figure 17 – Graphical depiction of the Mesoscale Discussion that was issued at 1721 CST.

Astronomical Data

The astronomical data obtained from the United States Naval Observatory for 35.0°N and 101.6°W, indicated the following:

SUN	
Sunrise	0747 CST
Sunset	1736 CST
End Civil Twilight	1804 CST
MOON	
Moonrise	0855 CST
Moonset	1929 CST

Submitted by: Mike Richards
NTSB, AS-30