



## **NATIONAL TRANSPORTATION SAFETY BOARD**

Office of Aviation Safety  
Washington, D.C. 20594

October 24, 2016

### **Weather Study**

# **METEOROLOGY**

CEN16FA304

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## **A. AIRCRAFT ACCIDENT**

Location: Jeanerette, Louisiana  
Date: August 3, 2016  
Time: 1047 central daylight time  
1547 Coordinated Universal Time  
Airplane: Schweizer 269C-1 helicopter; Registration: N1549W

## **B. METEOROLOGIST**

Don Eick  
Group Chairman  
Operational Factors Division (AS-30)  
National Transportation Safety Board

## **C. SUMMARY**

On August 3, 2016, about 1047 central daylight time, a Schweizer 269C-1 helicopter, N1549W, was substantially damaged after impacting trees and terrain during a low-altitude cross country flight near Jeanerette, Louisiana. The pilot was fatally injured. The helicopter was registered to and operated by Gulf Coast Helicopters, Inc.; Pearland, Texas, as a *14 Code of Federal Regulations (CFR) Part 91* pipeline patrol flight. Visual meteorological conditions (VMC) prevailed and a visual flight rules (VFR) flight plan had not been filed. The helicopter had departed Louisiana Regional Airport (L38), Gonzales, Louisiana, about 0730 and was destined for Harry P. Williams Memorial Airport (KPTN), Patterson, Louisiana. The accident site was located in a remote cypress swamp in the Atchafalaya Basin about 15 miles east of Jeanerette.

## **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 above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles. NWS airport and station identifiers use standard International Civil Aviation Organization (ICAO) 4-letter station identifiers versus International Air Transport Association (IATA) 3-letter identifiers which deletes the initial country code designator "K" for U.S. airports. Both codes are used intermittently in this report.

The accident site was located at latitude 29.9983° N and longitude 91.4049° W, at an elevation of approximately 2 feet.

## **E. FACTUAL 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 Camp Springs, Maryland. These are the base products used in describing weather features and in the creation of forecasts and warnings. Reference to these charts can be found in the joint NWS and Federal Aviation Administration (FAA) Advisory Circular “Aviation Weather Services”, AC 00-45G.

#### **1.1 National Forecast Chart**

The NWS WPC’s morning forecast for significant weather is included as figure 1. The chart was issued at approximately 0340 CDT on August 3, 2016 and depicts where the NWS was expecting significant weather and highlights the general threat areas across the country for the next 24 hour period. The chart depicted a high pressure system over eastern Texas with a low pressure system over Montana associated with a frontal wave with a warm front changing to a stationary front extending southeastward across South Dakota, Nebraska, and into Kansas. The main threat of severe thunderstorms was ahead of the frontal system over North and South Dakota into Minnesota, with possible flash flooding possible over South Dakota with these storms. Another area of potential flash flooding was over the southwest impacting Arizona, New Mexico, into northern Mexico, with a third area over North and South Carolina associated with another low pressure system and cold front along the eastern United States. Scattered rain showers and thunderstorm were expected over southeastern Louisiana and the eastern portion of the United States associated with summer airmass type convection. The high pressure system over Texas was expected to produce clear skies over Texas, Oklahoma, most of Arkansas, and northern and western Louisiana.

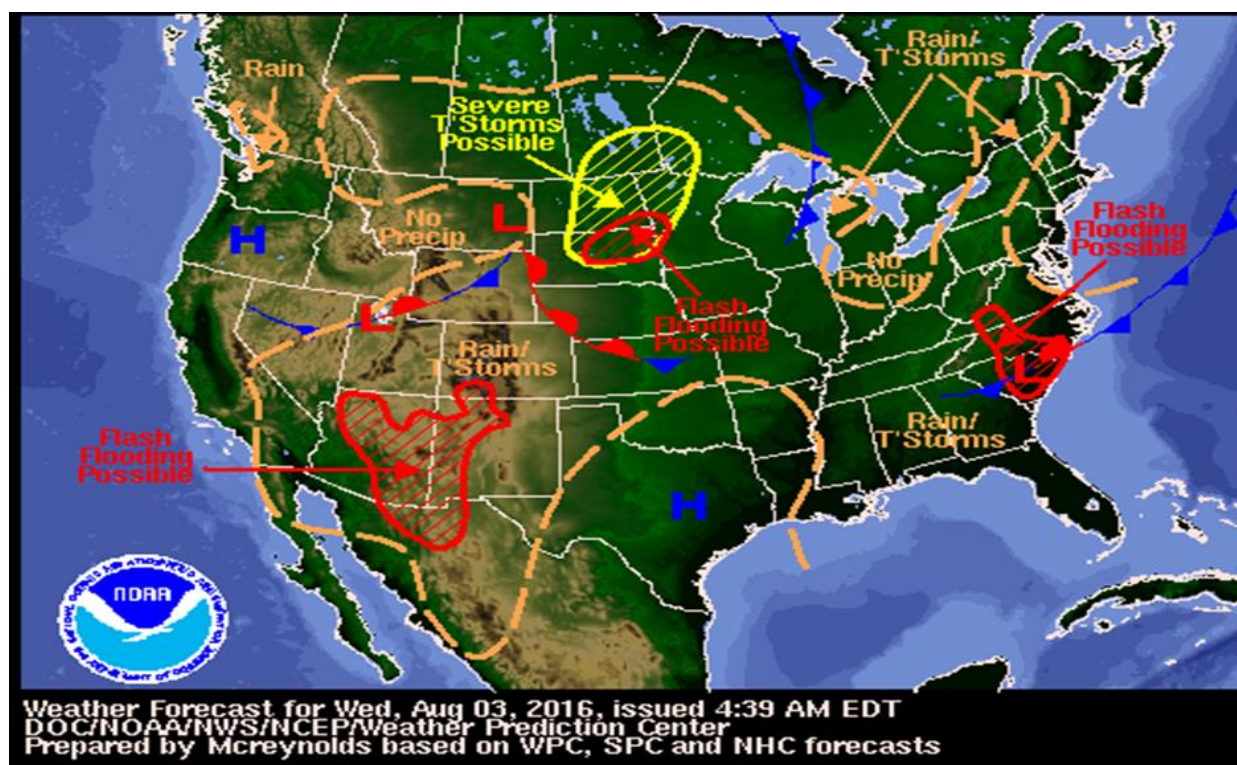


Figure 1 – NWS National Forecast Chart issued at 0340 CDT

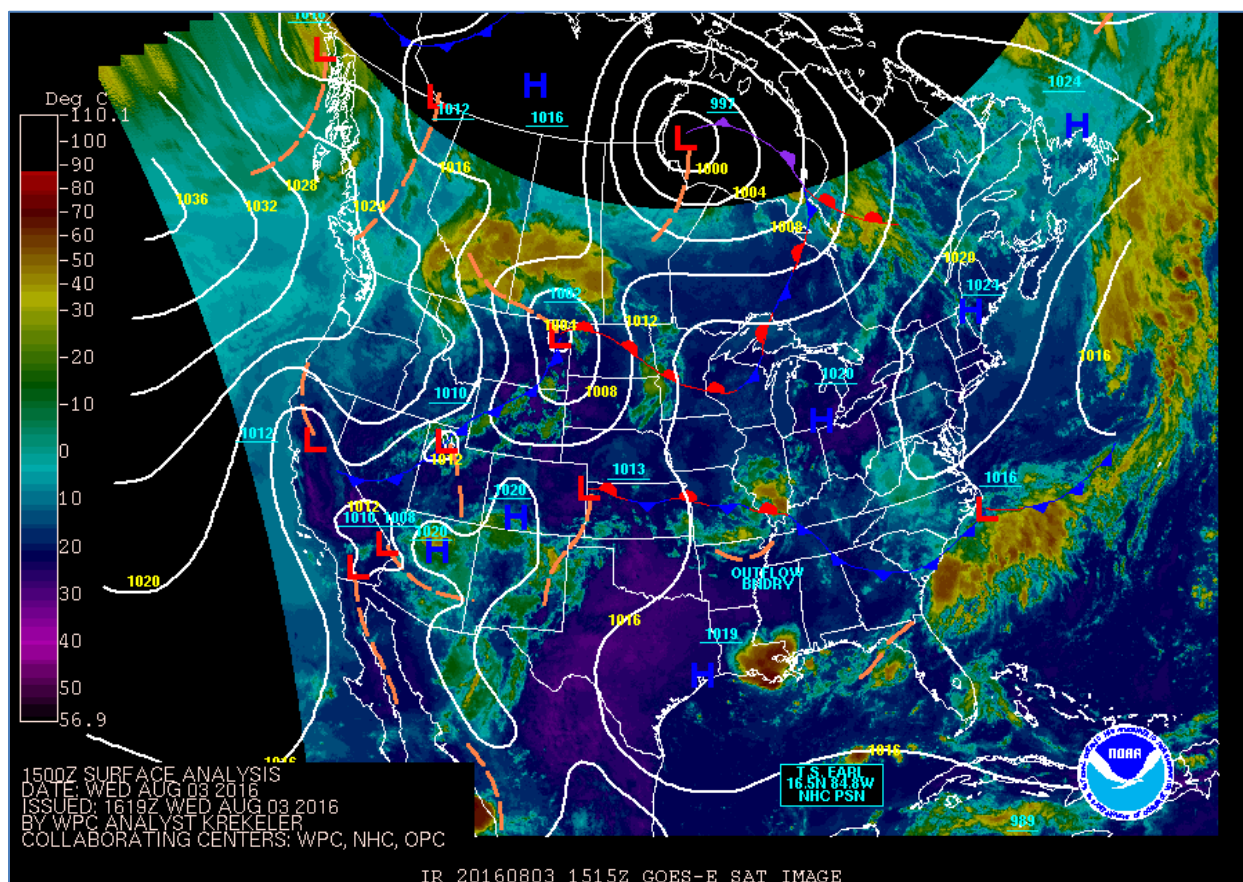
## 1.2 Surface Analysis Chart

The NWS WPC's Surface Analysis Chart with a satellite composite image overlaid for 1000 CDT (1500Z) on August 3, 2016 is included as figure 2. This surface analysis was more detailed than the morning National Forecast in figure 1 and was updated at 3 hour intervals. The chart depicted the low pressure system over northeastern Montana at 1002-hectopascals (hPa)<sup>1</sup> with a warm front extending southeastward from the low over North Dakota, Minnesota, and into Wisconsin. The chart also depicted a second low pressure system was over eastern Colorado near the Kansas border with a stationary front extending eastward across Kansas, Missouri and then east-southeastward into southern Illinois, Kentucky and Tennessee as a cold front and continued across Georgia and then east-northeast into South Carolina and off coastal North Carolina to another low pressure center at 1016-hPa. An outflow boundary was located south of the front over northern Arkansas, associated with an area of thunderstorms over southern Missouri and into northern Arkansas. Another trough of low pressure was also depicted over northern Florida west-southwestward into the Gulf of Mexico. The outflow boundary and trough were not initially depicted in the morning National Forecast. Further south of the accident site, a warning box was depicted in the Gulf of Mexico advising of Tropical Storm Earl which was located south of the Mexican Yucatan Peninsula near latitude 16.5° N and longitude 84.8° W, which was located off the southern section of the chart. Immediately west of the accident site over southeastern Texas was a high pressure system as depicted on the National forecast chart

<sup>1</sup> Hectopascal (hPa) is the new standard term to reference sea level pressure and is interchangeable with the term millibars (mb) with the same units. The international Standard Atmosphere (ISA) is based on a sea level pressure of 1013.25-hPa at 59° Fahrenheit (F) or 15° Celsius (C).

with a central pressure of 1019-hPa and with a ridge of high pressure extending eastward. The chart depicted a weak pressure gradient over Louisiana due to the high pressure ridge and indicated light winds.

The satellite overlay depicted a large circular area of enhanced clouds associated with convective clouds or thunderstorms over Illinois, Missouri, into northern Arkansas behind the outflow boundary and a circular area of echoes centered over southeastern Louisiana, which extended over the accident site. Other convective clouds were observed off the coastal sections in the Gulf of Mexico eastward to Florida coastal waters. The depiction of this area of weather did not match the WPC's earlier morning National Forecast conditions.



**Figure 2 – NWS Surface Analysis and Satellite Composite map for 1000 CDT**

Figure 3 is the southcentral section of the NWS WPC's more detailed Surface Analysis Chart for 1000 CDT with the approximate accident site located within the red circle. The station models surrounding the area indicated an anticyclonic or clockwise wind flow over western Louisiana associated with the high pressure system and ridge over the region with no organized wind flow pattern over the southeastern portion of the state. The wind speeds of 5 knots or less were depicted in the vicinity of the accident site. Cloud cover ranged from clear skies over the northern and western portions of Louisiana to overcast over the New Orleans area with thunderstorms and rain being depicted in that area. The closest station model to the accident site depicted wind from the west at 5 knots, overcast skies, temperature 82° Fahrenheit (F), dew point 75° F.

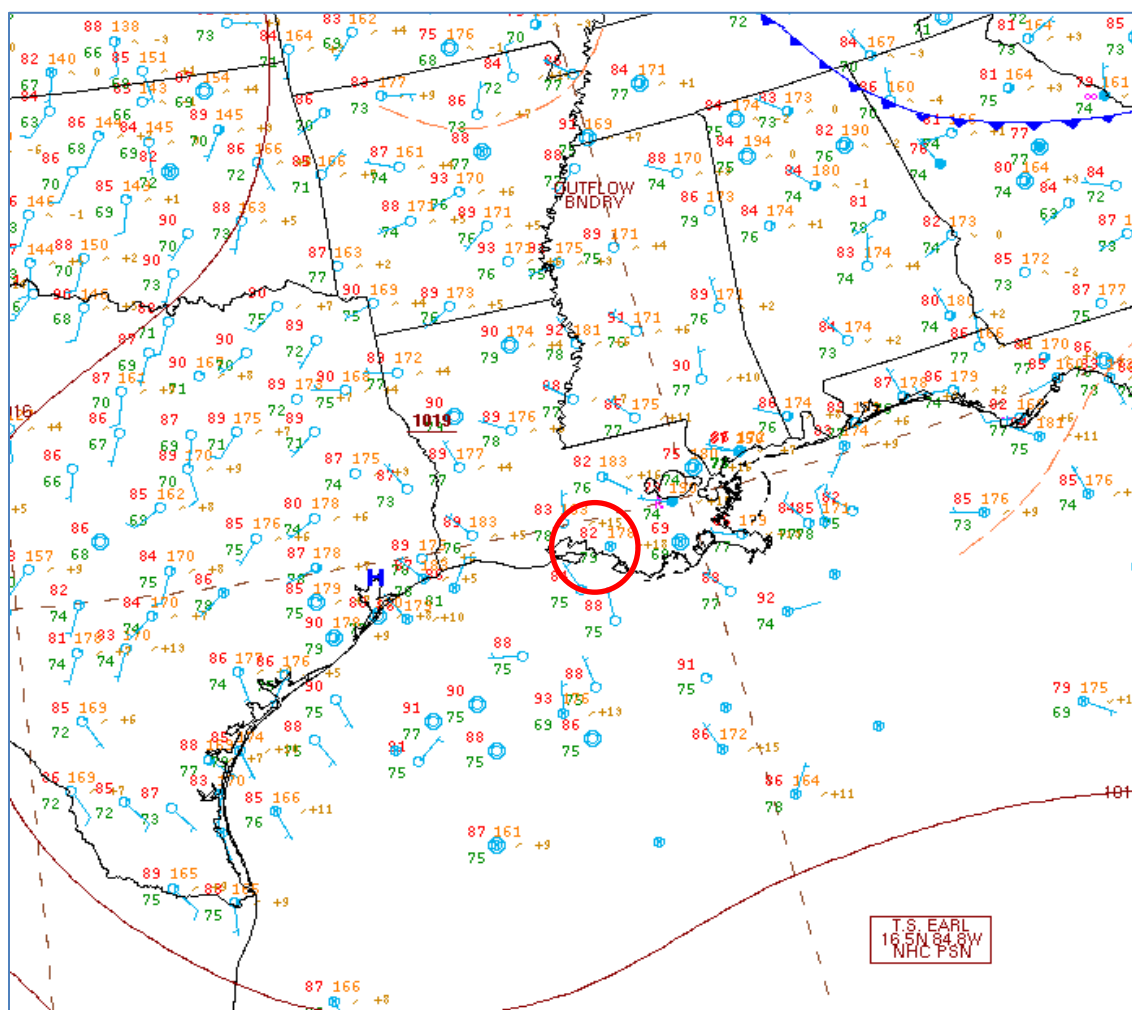
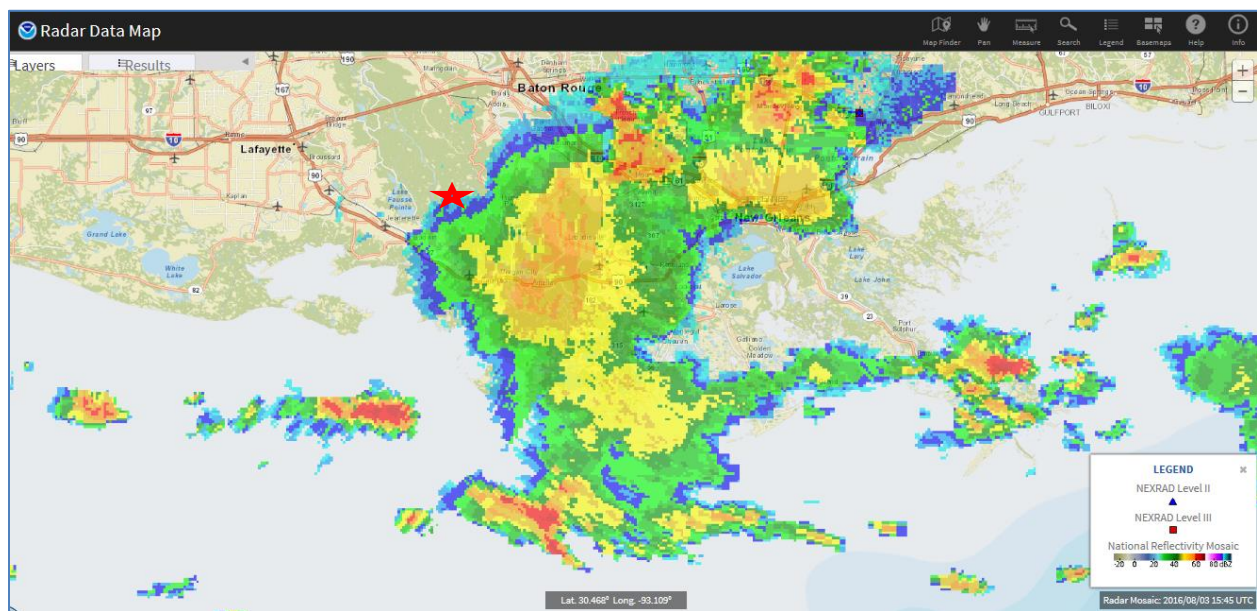


Figure 3 – southcentral section of the NWS Surface Analysis for 1000 CDT

### 1.3 National Radar Mosaic

The southcentral section of the NWS National composite radar mosaic for 1045 CDT is included as figure 4, with the location of the approximate accident site marked by a red star. The image depicted a large area of intense to extreme intensity echoes over southeast Louisiana bordering from the accident site eastward with the strong portion of the echoes between Baton Rouge and New Orleans and extending into northeastern portion of Louisiana, with several strong isolated echo areas off shore. Only very light intensity echoes were depicted bordering the accident site; however, echoes of up to 50 dBZ extended over the route during the period the helicopter was operating from Louisiana Regional Airport.

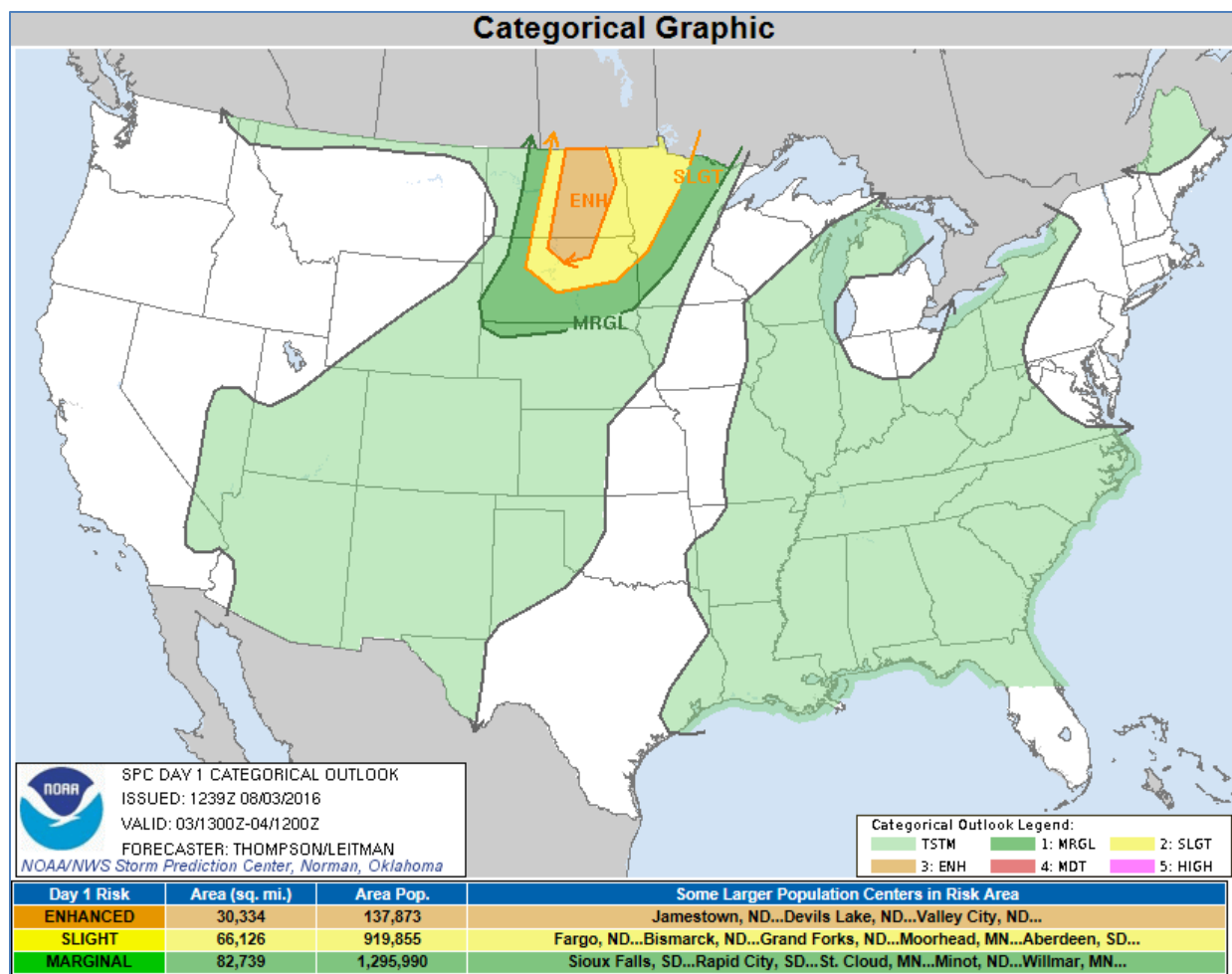
The closest NWS weather surveillance radar will be further documented in section 5.0 of this report to identify any significant echoes or severe weather signatures in the immediate vicinity of the accident site.



**Figure 4 - NWS National Composite Radar Mosaic for 1045 CDT**

## 1.4 Convective Outlook

The NWS Storm Prediction Center's (SPC) Convective Outlook for general and severe thunderstorm development issued at 0739 CDT on August 3, 2016 is included as figure 5, with the narrative bulletin associated with the graphic following. The NWS forecast only expected general thunderstorm development over Louisiana during the period, below the NWS severe storm criteria of storms producing a tornado, damaging hail, or winds of 50 knots or greater. The SPC's main concern for severe thunderstorms during the period was over the Dakota's and Minnesota during the afternoon as depicted in the National Forecast chart in figure 1. The area of weather over the Missouri, Illinois, and Arkansas associated with the outflow boundary, and the large area of echoes over Louisiana was not discussed or identified in the convective outlook or the narrative briefing associated with the chart, which is documented in section 5.0 of this report.



**Figure 5 - NWS Convective Outlook issued at 0739 CDT**

ACUS30 KWNS 030518  
SPC AC 030517  
DAY 1 CONVECTIVE OUTLOOK  
NWS STORM PREDICTION CENTER NORMAN OK  
1217 AM CDT WED AUG 03 2016

VALID 031200Z - 041200Z

...THERE IS AN ENH RISK OF SVR TSTMS OVER A PORTION OF CNTRL AND ERN ND AND NRN SD...

...THERE IS A SLGT RISK OF SVR TSTMS FROM THE DAKOTAS INTO NWRN MN...

...THERE IS A MRGL RISK OF SVR TSTMS FROM THE NRN PLAINS INTO THE UPPER MS VALLEY...

...SUMMARY...

SCATTERED SEVERE THUNDERSTORMS WITH VERY LARGE HAIL AND DAMAGING WIND ARE POSSIBLE IN THE DAKOTAS LATE THIS AFTERNOON AND PERSISTING INTO WESTERN MINNESOTA AND EASTERN SOUTH DAKOTA LATE IN THE EVENING.

...SYNOPSIS...

VIGOROUS SHORTWAVE TROUGH CURRENTLY LOCATED OVER THE NRN ROCKIES EMBEDDED WITHIN BELT OF STRONGER WLYS WILL REACH THE NRN PLAINS THIS AFTERNOON ACCOMPANIED BY A COLD FRONT. A WARM FRONT WILL PRECEDE THE COLD FRONT AND MOVE NWD THROUGH THE ERN DAKOTAS INTO MN.

...DAKOTAS INTO NWRN MN...

A 40-50 KT SLY LLJ WILL DEVELOP EWD THROUGH THE DAKOTAS TODAY IN RESPONSE TO FORCING FOR ASCENT ASSOCIATED WITH EWD-ADVANCING SHORTWAVE TROUGH. THIS FEATURE WILL ADVECT RICHER LOW-LEVEL MOISTURE NWD THROUGH THE DAKOTAS WITH MID-UPPER 60S F DEWPOINTS BENEATH STEEP LAPSE RATES ASSOCIATED WITH AN EWD EXPANDING EML. THESE PROCESSES AND DIABATIC WARMING SHOULD BOOST MLCAPE TO AROUND 2500 J/KG IN PRE-FRONTAL WARM SECTOR. SOME ELEVATED CONVECTION MIGHT BE IN PROGRESS IN ZONE OF ISENTROPIC ASCENT OVER NRN ND. HOWEVER...THIS ACTIVITY SHOULD LIFT NWD INTO CANADA DURING THE MORNING. DESTABILIZATION OF THE BOUNDARY LAYER AND INCREASING DEEP LAYER FORCING FOR ASCENT ASSOCIATED WITH THE PROGRESSIVE SHORTWAVE TROUGH AND ATTENDANT COLD FRONT SHOULD CONTRIBUTE TO THUNDERSTORM INITIATION OVER WCNTL ND BY LATE AFTERNOON. A MID-LEVEL JET ACCOMPANYING THE UPPER TROUGH WILL CONTRIBUTE TO 40-45 KT WLY 0-6 KM SHEAR SUPPORTING SUPERCELLS AS THE INITIAL STORM MODE. PRIMARY THREATS WILL BE VERY LARGE HAIL AND DAMAGING WIND...BUT LOW-LEVEL HODOGRAPHS ARE EXPECTED TO BE SUFFICIENT FOR A THREAT OF A FEW LOW-LEVEL MESOCYCLONES AND A COUPLE OF TORNADOES BEFORE ACTIVITY EVOLVES INTO LINE SEGMENTS/CLUSTERS AS IT CONTINUES TOWARD THE UPPER MS VALLEY THIS EVENING.

..DIAL/GLEASON.. 08/03/2016

## **1.5 Constant Pressure Charts**

The NWS Constant Pressure Charts for 850-, 700-, and 500-hPa for 0700 CDT (1200Z) on August 3, 2016 are included as figures 6 through 8 below. The charts depicted a high pressure system dominating over the region through 18,000 feet with general light winds. The high pressure system supported general subsidence over the region, which typically suppresses vertical motion and promotes a stable atmosphere.

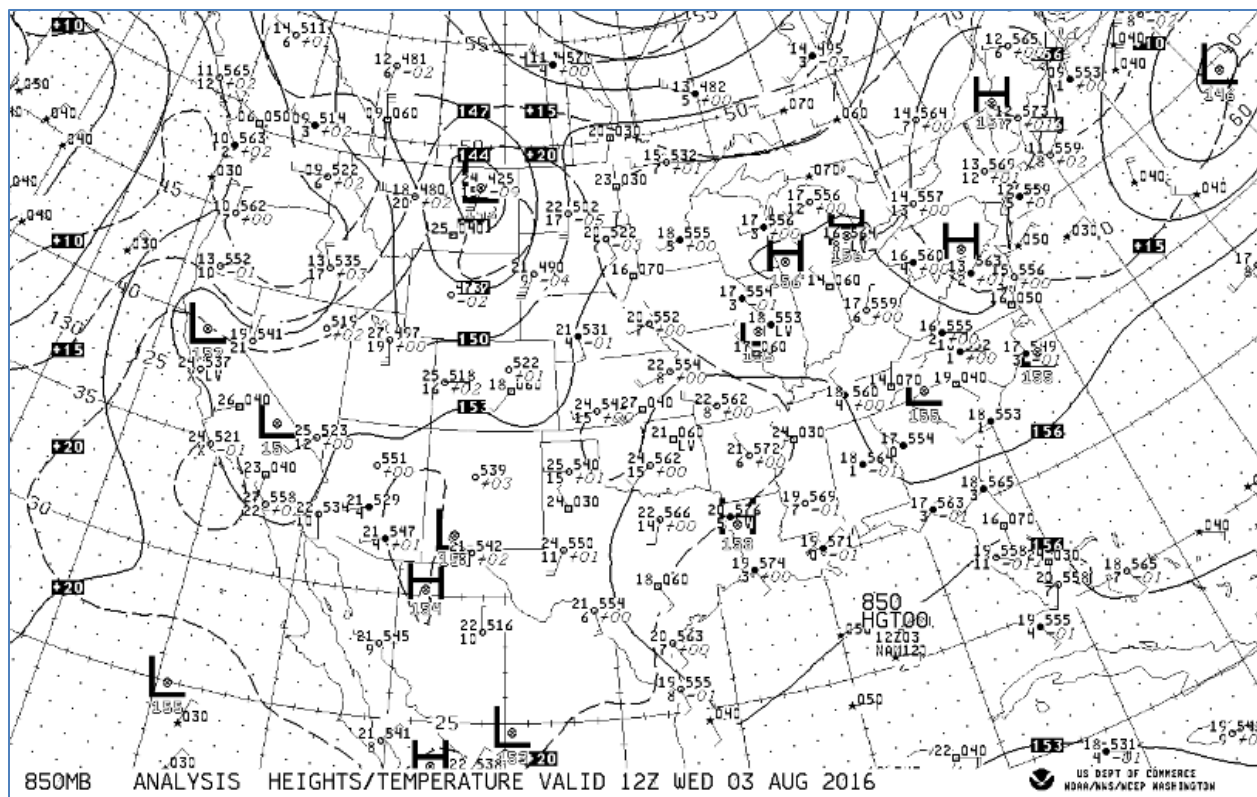


Figure 6 - NWS 850-hPa chart for 0700 CDT for approximately 5,000 feet

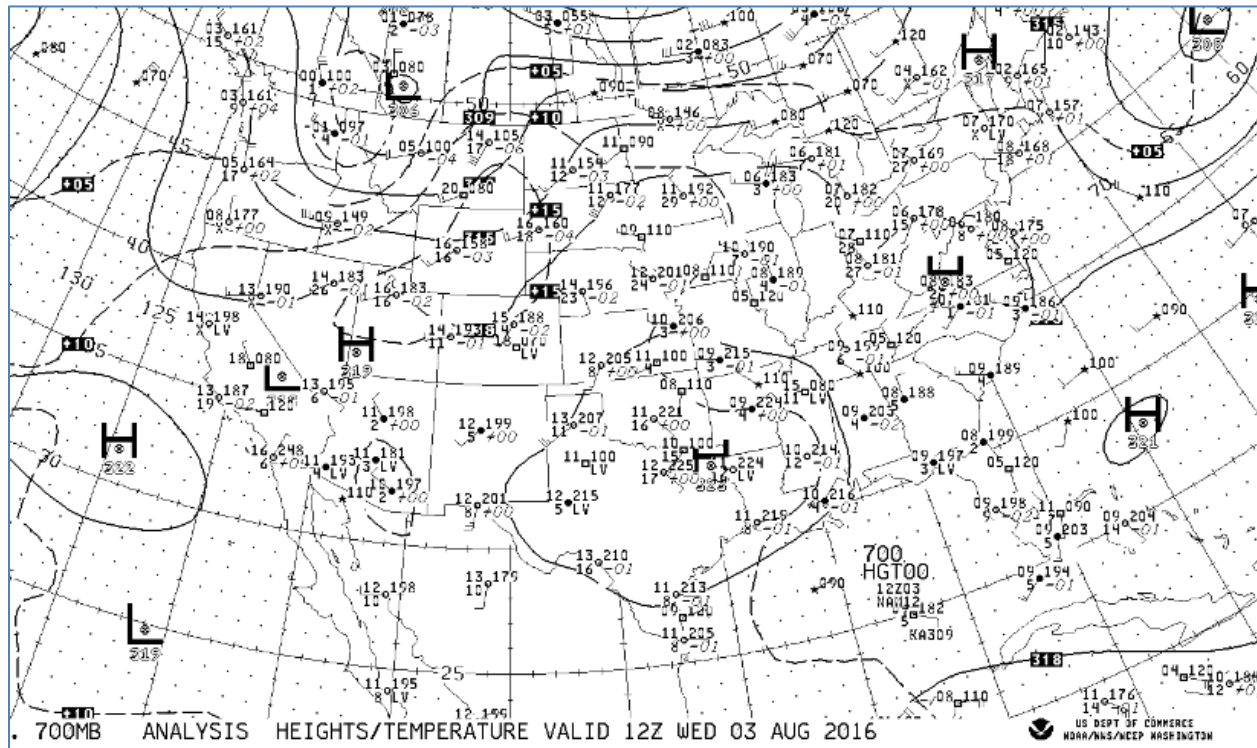
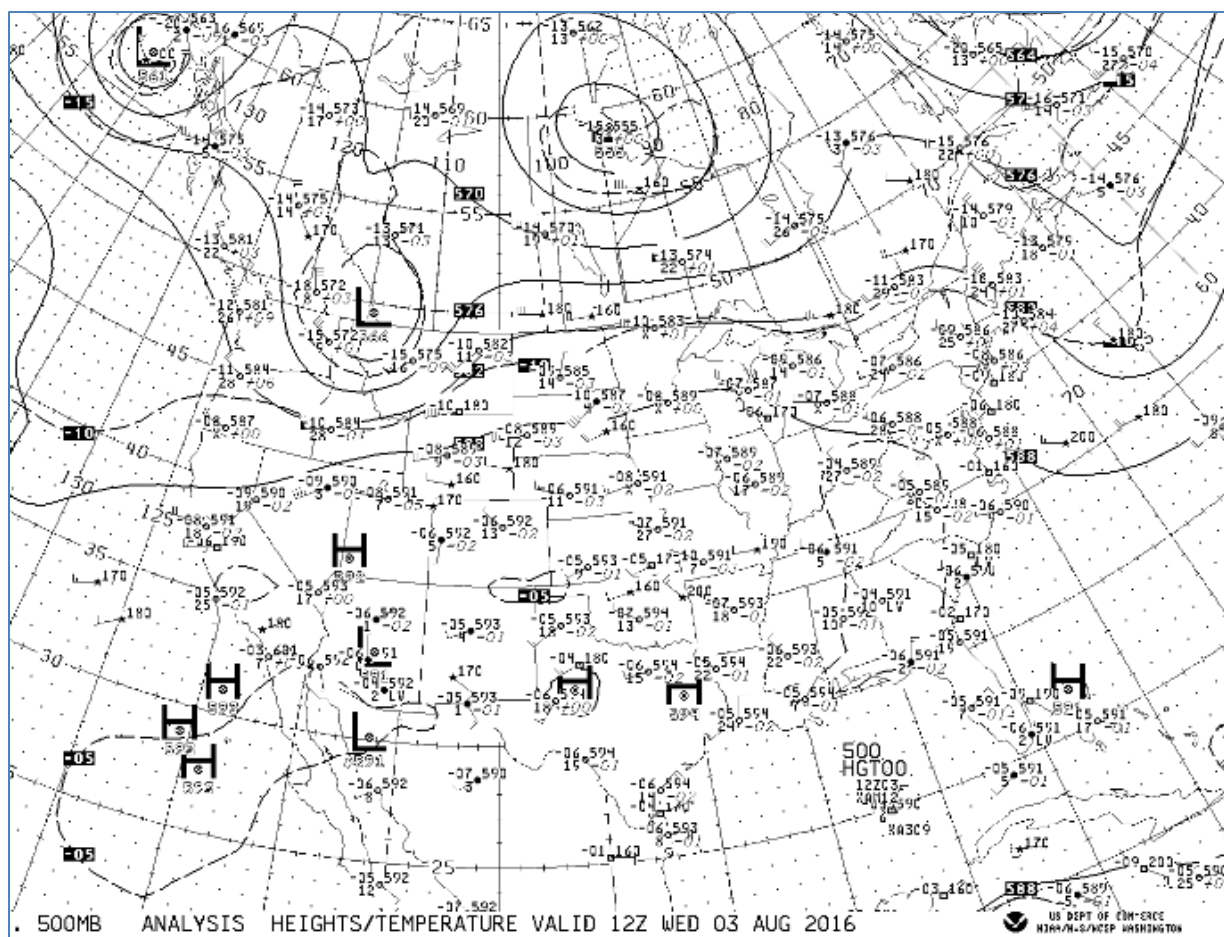


Figure 7 - NWS 700-hPa chart for 0700 CDT for approximately 10,000 feet



**Figure 8 - NWS 500-hPa chart for 0700 CDT for approximately 18,000 feet**

The charts depicted high pressure dominating across the region with light and variable winds and with a warm and moist airmass over the coastal region, with little organized vertical wind shear for any strong or severe convection.

## 2.0 Surface Observations

The official NWS Meteorological Aerodrome Reports (METARs) or aviation routine weather report and special reports (SPECIs) surrounding the period were documented for the departure and the closest airports to the accident site. The magnetic variation over the area was less than 3° and resulted in a minor difference between magnetic and true wind direction, which did not affect reportable values. The cloud heights are reported above ground level (agl).

### 2.1 Harry P. Williams Memorial Airport (KPTN), Patterson, Louisiana

The closest weather reporting facility was Harry P. Williams Memorial Airport (KPTN), Patterson, Louisiana located approximately 18 miles south of the accident site at an elevation of 9 feet. The airport had an Automated Weather Observation System (AWOS) installed and issued the following observation near the time of the accident:

Harry P. Williams Memorial Airport weather 1056 CDT, automated, wind from 100° at 4 knots, visibility 5 miles in moderate rain and mist, a few clouds at 8,000 feet, ceiling overcast at 10,000 feet, temperature 24° Celsius (C), dew point temperature 23° C, altimeter 30.09 inches of mercury (Hg). Remarks: automated observation system<sup>2</sup>, lightning distant northeast and east, and southeast, thunderstorm began at 0957 CDT, ended at 1019 and began again at 1021 and ended at 1049, rain began at 1002 and ended at 1012, and began again at 1029 CDT, sea level pressure 1018.9-hPa, hourly precipitation less than 0.01 inches or a trace, temperature 23.9° C, dew point 22.8° C.

The raw observations and general flight categories<sup>3</sup> were as follows surrounding the period:

VFR METAR KPTN 031356Z AUTO 01005KT 10SM CLR 27/26 A3007 RMK AO2 LTG DSNT NE-S SLP183 T02720261=

MVFR SPECI KPTN 031439Z AUTO 06013KT 8SM FEW014 BKN025 OVC043 26/22 A3009 RMK AO2 LTG DSNT NE AND E=

VFR METAR KPTN 031456Z AUTO 06009KT 10SM SCT029 BKN041 OVC110 24/22 A3010 RMK AO2 LTG DSNT N-E SLP192 60001 T02440222 53022=

VFR SPECI KPTN 031508Z AUTO 06006KT 10SM VCTS -RA FEW035 SCT050 BKN070 24/22 A3009 RMK AO2 LTG DSNT NE AND E TSB1457RAB02 P0000=

VFR SPECI KPTN 031521Z AUTO 06006KT 10SM VCTS FEW050 SCT120 24/22 A3009 RMK AO2 LTG DSNT N-E TSB1457E19B21RAB02E12 P0000=

Accident 1547Z

MVFR METAR KPTN 031556Z AUTO 10004KT 5SM RA BR FEW080 OVC100 24/23 A3009 RMK AO2 LTG DSNT NE AND E AND SW TSB1457E19B21E49RAB02E12B29 SLP189 P0000 T02390228=

VFR METAR KPTN 031656Z AUTO 06007KT 10SM -RA FEW037 BKN045 OVC075 24/23 A3011 RMK AO2 LTG DSNT NE SLP196 P0000 T02440233=

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<sup>2</sup> The “A02” in the report refers to an automated observation system with a precipitation discriminator to report precipitation type or obscuring phenomena. In contrast to a system without a precipitation discriminator “A01” which does not report any type of weather or precipitation.

<sup>3</sup> 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 or lowest layer of clouds reported as broken, overcast or the vertical visibility into a surface based obscuration below 500 feet 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 feet agl and/or visibility 3 to 5 miles.
- Visual Flight Rules (VFR) – ceiling greater 3,000 feet agl and visibility greater than 5 miles.

\* By definition, IFR is a ceiling less than 1,000 feet 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 feet agl and visibility greater than 5 miles while MVFR is a sub-category of VFR.

The observations reported thunderstorms and rain showers in the vicinity prior to the accident, with moderate rain at the time of the accident. Lightning was being reported in the distance towards the accident site. VFR to MVFR conditions prevailed at the station at the time due to the light rain and broken to overcast cloud layer.

## **2.2 Acadiana Regional Airport (KARA), New Iberia, Louisiana**

The next closest weather reporting facility was Acadiana Regional Airport (KARA), located approximately 25 miles west of the accident site in New Iberia, Louisiana, at an elevation of 24 feet. The airport had an Automated Surface Observation System (ASOS) and reported the following conditions:

Acadiana Regional Airport weather observation at 1053 CDT, wind from 100° at 8 knots, visibility unrestricted at 10 miles, a few clouds at 1,100 feet, scattered clouds at 4,500 feet, temperature 28° C, dew point 26° C, altimeter 30.09 inches of Hg. Remarks: automated observation system, sea level pressure 1018.8-hPa, temperature 28.3° C, dewpoint 25.6° C.

The raw observations and general flight category surrounding the period were as follows:

VFR METAR KARA 031253Z 35004KT 10SM CLR 27/26 A3006 RMK AO2 SLP177 T02670256=

VFR METAR KARA 031353Z 36003KT 10SM CLR 28/26 A3007 RMK AO2 SLP180 T02780256=

VFR METAR KARA 031453Z 01006KT 10SM CLR 28/26 A3007 RMK AO2 SLP183 T02830256 51015=

Accident 1547Z

VFR METAR KARA 031553Z 10008KT 10SM FEW011 SCT045 28/26 A3009 RMK AO2 SLP188 T02830256=

VFR METAR KARA 031653Z 13007KT 10SM CLR 29/23 A3009 RMK AO2 SLP189 T02890233=

VFR METAR KARA 031753Z 14008KT 10SM CLR 29/23 A3006 RMK AO2 SLP178 T02940228 10300 20261 58005=

The observation reported VFR conditions during the period with clear to partly cloudy skies with no thunderstorms reported during the period.

## **2.3 Louisiana Regional Airport (KL38), Gonzales, Louisiana**

The next closest weather reporting location was the departure airport, Louisiana Regional Airport (L38), Gonzales, Louisiana located approximately 26 miles north-northeast of the accident site at an elevation of 14 feet. The airport also had an AWOS and issued an observation every 20 minutes. The following conditions were reported at the time of departure and the accident:

Louisiana Regional Airport weather observation at 0715 CDT, automated, wind from 310° at 5 knots, visibility unrestricted at 10 miles with thunderstorms in the vicinity, sky clear below

12,000 feet, temperature 27° C, dew point 26° C, altimeter 30.02 inches of Hg. Remarks: automated observation system, lightning distant east and southeast, temperature 27.1° C, dew point 25.5° C.

Louisiana Regional Airport weather observation at 1035 CDT, automated, wind calm, visibility 7 miles in thunderstorms with light rain, ceiling broken at 400 feet, broken at 700 feet, and overcast at 2,900 feet, temperature and dew point 24° C, and altimeter 30.08 inches of Hg. Remarks: automated observation system, lightning distant all quadrants, east and southeast, temperature 24.1° C, dew point 24.1° C.

The raw observations and flight category surrounding the period were as follows:

VFR METAR KL38 031155Z AUTO 32004KT 10SM VCTS SCT050 27/26 A3002 RMK AO2 LTG DSNT E AND SE 60001 70005 T02720255 10272 20265=

VFR METAR KL38 031215Z AUTO 31005KT 10SM VCTS CLR 27/26 A3002 RMK AO2 LTG DSNT E AND SE T02710255=

*Departed 1230Z*

VFR METAR KL38 031235Z AUTO 32004KT 10SM VCTS CLR 27/26 A3003 RMK AO2 LTG DSNT E AND SE T02700256=

VFR METAR KL38 031255Z AUTO 07004KT 10SM TS SCT039 SCT060 BKN080 27/26 A3005 RMK AO2 LTG DSNT NE THRU SE T02710255=

MVFR METAR KL38 031310Z AUTO 11008KT 10SM TS BKN015 BKN037 OVC080 26/24 A3006 RMK AO2 LTG DSNT NE THRU S T02620236=

MVFR METAR KL38 031335Z AUTO 07004KT 10SM -TSRA SCT013 OVC020 25/23 A3009 RMK AO2 LTG DSNT ALQS T02530230=

IFR METAR KL38 031355Z AUTO 13010KT 1SM +TSRA OVC006 24/24 A3008 RMK AO2 LTG DSNT ALQS T02400239=

MVFR METAR KL38 031415Z AUTO 19004KT 3SM +TSRA SCT006 BKN027 OVC039 24/24 A3008 RMK AO2 LTG DSNT ALQS T02370236=

VFR METAR KL38 031435Z AUTO 00000KT 10SM -TSRA BKN031 OVC036 24/24 A3008 RMK AO2 LTG DSNT ALQS T02380238=

MVFR METAR KL38 031455Z AUTO 00000KT 10SM TS SCT004 OVC029 24/24 A3008 RMK AO2 LTG DSNT E THRU SW P0001 60001 T02400240=

LIFR METAR KL38 031515Z AUTO 15003KT 10SM TS BKN004 OVC029 24/24 A3009 RMK AO2 LTG DSNT ALQS T02410241=

LIFR METAR KL38 031535Z AUTO 00000KT 7SM -TSRA BKN004 BKN007 OVC029 24/24 A3008 RMK AO2 LTG DSNT ALQS T02410241=

*Accident 1547Z*

MVFR METAR KL38 031555Z AUTO 10003KT 7SM -TSRA SCT004 SCT007 BKN025 24/24 A3009 RMK AO2

*LTG DSNT NE THRU SE T02420242=*

*MVFR METAR KL38 031615Z AUTO 08006KT 10SM -TSRA SCT007 BKN025 OVC080 24/24 A3011 RMK AO2  
LTG DSNT ALQS T02400235=*

*MVFR METAR KL38 031635Z AUTO 04009KT 10SM +TSRA SCT007 SCT012 OVC025 24/23 A3012 RMK AO2  
LTG DSNT ALQS T02390231=*

*IFR METAR KL38 031655Z AUTO 03004G32KT 1SM +TSRA BKN011 BKN014 OVC020 23/20 A3010 RMK  
AO2 LTG DSNT ALQS T02270204=*

*VFR METAR KL38 031715Z AUTO 27006KT 10SM -TSRA SCT011 BKN065 OVC100 22/22 A3006 RMK AO2  
LTG DSNT ALQS T02200218=*

*VFR METAR KL38 031735Z AUTO 00000KT 10SM SCT100 22/22 A3004 RMK AO2 T02230223=*

*VFR METAR KL38 031755Z AUTO 00000KT 10SM CLR 23/23 A3003 RMK AO2 60001 T02270227 10272  
20219=*

A review of the observations for Louisiana Regional Airport indicated that thunderstorms were first detected in the vicinity or within 10 miles of the airport prior to the accident at 0655 and continued through 1235 CDT, with a period of LIFR conditions due to heavy rain and low ceilings. Around the time of the accident a low layer of scattered to broken clouds was reported between 400 and 600 feet agl, with thunderstorms and rain showers.

## **2.4 Mesoscale Observations**

A review of the NWS Meteorological Assimilation Data Ingest System (MADIS) network of local observations provided no useful information or report sites over that section of Louisiana, with no other non-federal stations in the area reporting any low clouds or visibility other than the observations listed for Louisiana Regional Airport.

## **3.0 Upper Air Sounding**

The closest upper air sounding was from the NWS Slidell (KSIL), Louisiana Forecast Office, site number 72233, located approximately 90 miles east-northeast from the accident site for 0700 CDT (1200Z on August 3, 2016) was reviewed and documented. The sounding observation was plotted on a standard Skew-T log P diagram<sup>4</sup> from the surface to 500-hPa or 18,000 feet utilizing RAOB software<sup>5</sup>, and is included as figure 9.

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<sup>4</sup> 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.

<sup>5</sup> RAOB – (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Environmental Research Services, Matamoras, Pennsylvania.

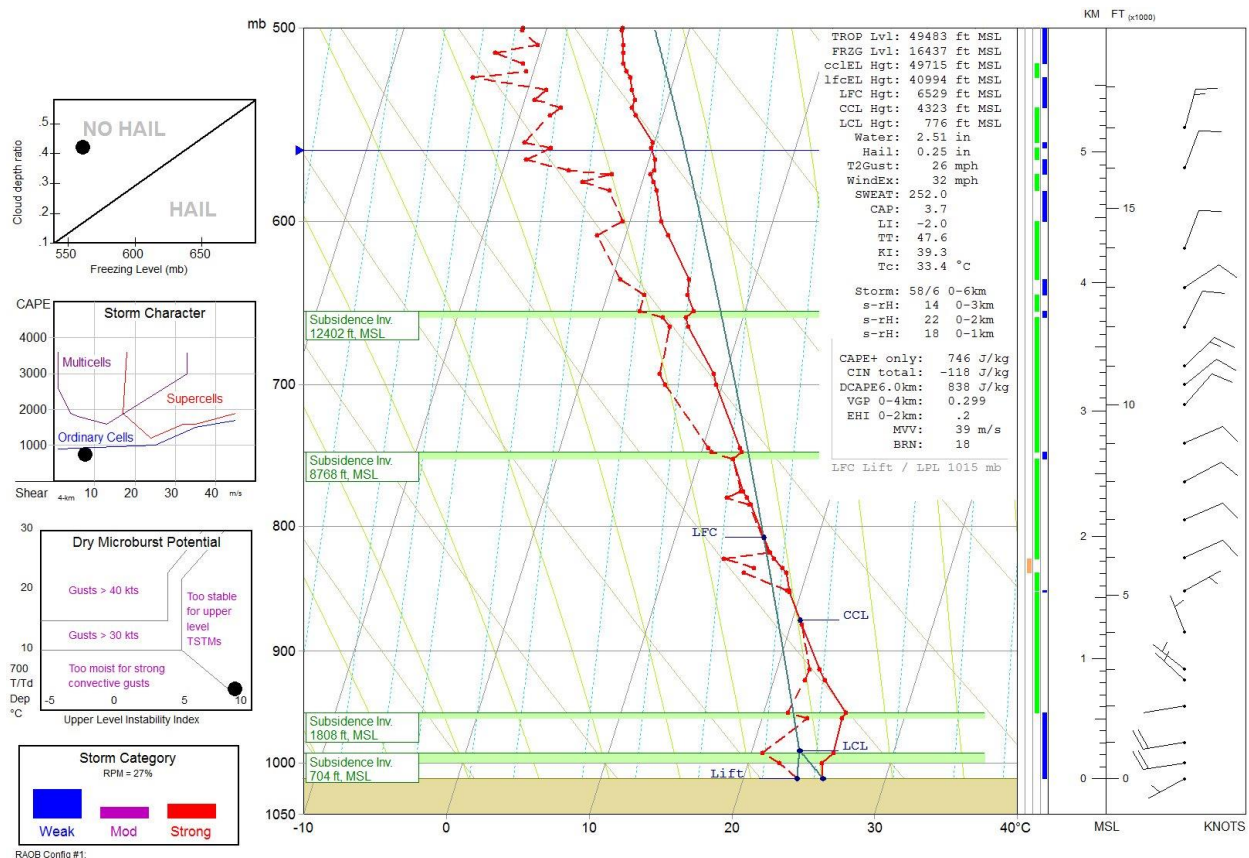


Figure 9 - NWS Slidell, LA 0700 CDT sounding

The NWS Slidell sounding was at an elevation of 10 feet and indicated a surface temperature of 25.6° C, a dew point temperature of 23.8° C, with a relative humidity of 90%. The calculated density altitude was 1,545 feet. A low level temperature inversion was noted immediately above the surface to 700 feet and immediately below the lifted condensation level (LCL)<sup>6</sup> which was identified at 766 feet agl. A marked change in wind speed occurred near this level and resulted in a potential for low-level wind shear (LLWS) and turbulence. The other significant levels included the convective condensation level (CCL)<sup>7</sup> at 4,313 feet agl and the level of free convection (LFC)<sup>8</sup> at approximately 6,500 feet agl. The sounding had a greater than 80% relative humidity from above the LCL to approximately 12,000 feet, with a derived precipitable water value of 2.51 inches. Several other shallow temperature inversions were noted in the sounding which would normally indicate a stable atmosphere associated with the high pressure region; however, the overall sounding was characterized as conditionally unstable with a lifted

<sup>6</sup> Lifting Condensation Level (LCL) - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

<sup>7</sup> Convective Condensation Level (CCL) - The height to which a parcel of air, if heated sufficiently from below, will rise adiabatically until condensation starts. This is typically used to identify the base of cumuliiform clouds, which are normally produced from surface heating and thermal convection.

<sup>8</sup> Level of Free Convection (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.

index (LI)<sup>9</sup> of -2.0 and the K-index<sup>10</sup> of 39.3, which indicated an approximately 90% probability of airmass type convection. The expected convective cloud tops based on the equilibrium level (LFC-EQ)<sup>11</sup> was approximately 41,000 feet, and the tropopause height was at 49,500 feet. The lack of any strong vertical wind shear favored weak or ordinary airmass type convective storms, with potential outflow winds under 30 knots, well below the severe thunderstorm criteria of 50 knots. The freezing level was identified at approximately 16,500 feet.

The sounding wind profile indicated a surface wind from 240° at 7 knots with winds increasing to approximately 20 knots at 1,000 feet, and then decreasing in speed and veering to the east above 5,000 feet through 11,000 feet with speeds of 10 knots. The mean 0 to 6 kilometer or 18,000 feet wind was from 028° at 7 knots. The level of maximum wind was identified above the tropopause at 47,000 feet with wind from 255° at 42 knots.

Figure 10 is the Slidell sounding parameters of height, pressure (Pres), temperature (T), dew point temperature (Td) in °C, relative humidity (RH), and wind direction and speed, with the derived clear air turbulence (CAT), and low-level wind shear (LLWS) potential. The lowest layer shows a potential area of turbulence and wind shear due to the sudden increase in wind immediately above the surface.

| Height<br>(ft-MSL) | Pres<br>(mb) | T<br>(°C) | Td<br>(°C) | RH<br>(%) | DD/FF<br>(deg/kts) | CAT<br>(FAA) | LLWS  |
|--------------------|--------------|-----------|------------|-----------|--------------------|--------------|-------|
| 10                 | 1015         | 25.6      | 23.8       | 90        | 240/4              | SVR          | LIGHT |
| 442                | 1000         | 25.2      | 22.2       | 83        | 260/18             |              |       |
| 704                | 991          | 25.8      | 20.8       | 74        |                    |              |       |
| 1000               | 981          |           |            |           | 260/19             |              |       |
| 1656               | 959          | 25.6      | 23.2       | 87        |                    | XTR<br>LGT   | LIGHT |
| 1808               | 954          | 25.8      | 21.7       | 78        |                    |              |       |
| 2000               | 948          |           |            |           | 260/2              |              |       |
| 2701               | 925          | 23.6      | 22.2       | 92        | 315/6              |              |       |
| 2983               | 916          | 23.0      | 22.3       | 96        | 310/6              | LGT          |       |
| 4000               | 884          |           |            |           | 340/6              |              |       |
| 4197               | 878          | 20.8      | 20.8       | 100       |                    | MDT          |       |
| 5086               | 851          | 19.2      | 19.2       | 100       |                    |              |       |

**Figure 10 - Slidell sounding parameters**

<sup>9</sup> Lifted Index (LI) - A common measure of atmospheric instability. Its value is obtained by computing the temperature that air near the ground would have if it were lifted to 500-hPa or approximately 18,000 feet and comparing that temperature to the actual temperature at that level. Negative values indicate instability - the more negative, the more unstable the air is, and the stronger the updrafts are likely to be with any developing thunderstorms.

<sup>10</sup> K-Index - The measure of thunderstorm potential based on the vertical temperature lapse rate, the moisture content of the lower atmosphere and the vertical extent of the moist layer. The higher the K-Index value the greater the probability of air mass type thunderstorm development across the region.

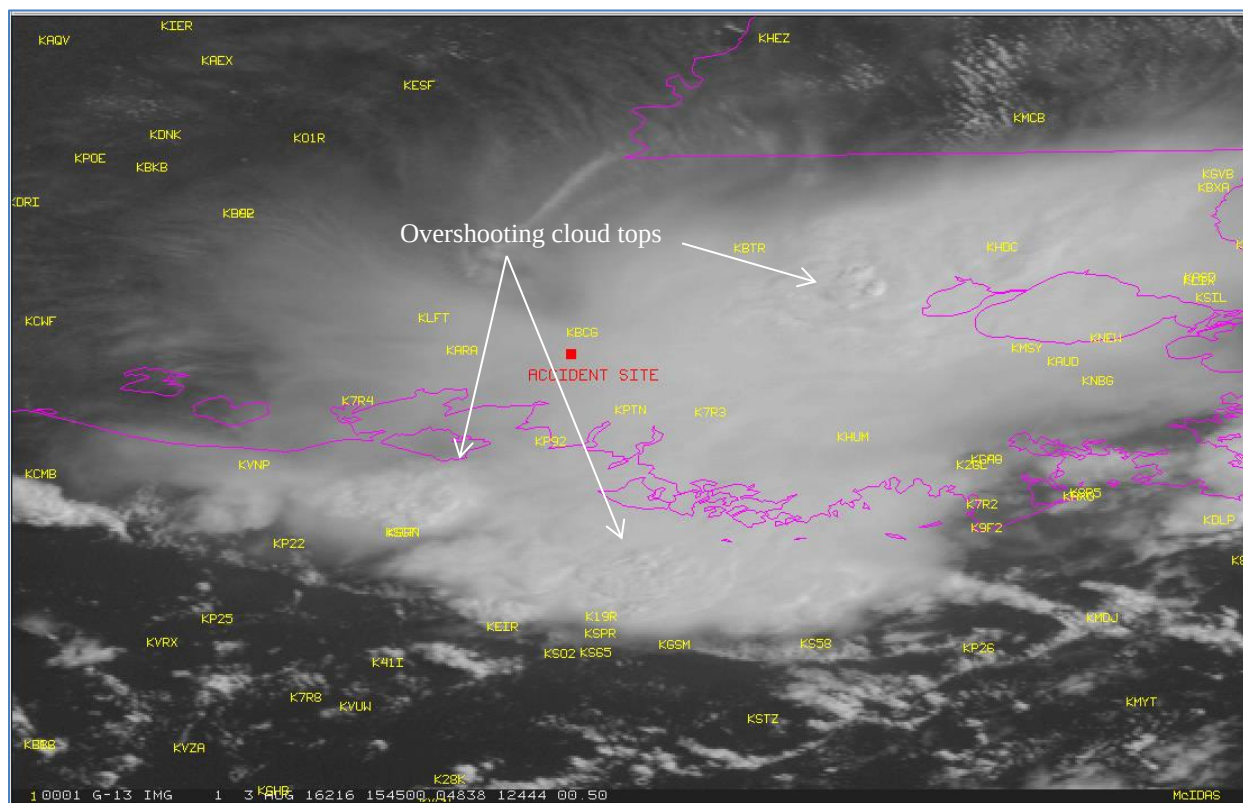
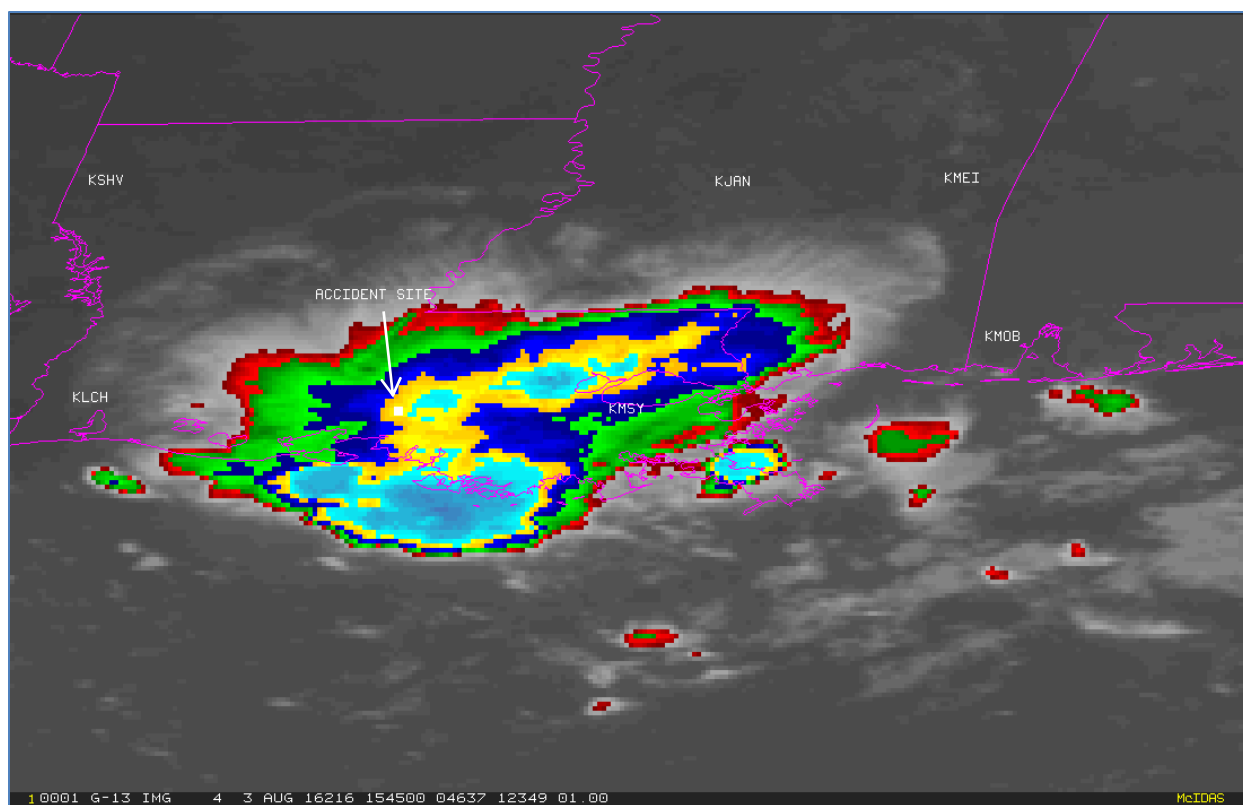
<sup>11</sup> Equilibrium Level (EL) - On a sounding, the level above the level of free convection (LFC) at which the temperature of a rising air parcel again equals the temperature of the environment. The height of the EL is the height at which thunderstorm updrafts no longer accelerate upward. Thus, to a close approximation, it represents the height of expected (or ongoing) thunderstorm tops. However, strong updrafts will continue to rise past the EL before stopping, resulting in storm tops that are higher than the EL. This process sometimes can be seen visually as an overshooting tops or anvil dome. The EL typically is higher than the tropopause, and is a more accurate reference for storm tops.

#### **4.0 Satellite Imagery**

The Geostationary Operational Environmental Satellite number 13 (GOES-13) data was 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. Both the infrared and visible imagery were reviewed and documented surrounding the time of the accident. The infrared long wave imagery (band 4) at a wavelength of 10.7 microns ( $\mu\text{m}$ ) provided standard satellite image with radiative cloud top temperatures with a resolution of 4 km. The visible imagery (band 1) at a wavelength of 0.65  $\mu\text{m}$  provided a resolution of 1 km.

Figure 11 is the GOES-13 infrared image at 1045 CDT (1545Z) at 4X magnification with a standard MB temperature enhancement curve applied to highlight the higher and colder cloud tops typically associated with deep convection. The image depicts a large cluster of cumulonimbus clouds over southeast Louisiana with the radiative cloud top temperature over the accident site of  $212^{\circ}$  Kelvin or  $-61.16^{\circ}$  C, which corresponded to cloud tops near 45,000 feet based on the sounding. The enhanced cloud centers were located northeast through east, and southwest of the accident site.

Figure 12 is the GOES-13 visible image for the same period at 1045 CDT at 2X magnification and depicted the accident site under the anvil outflow or cirrostratus clouds from the cumulonimbus cloud system. Strong active convection was noted in the system to the east of Baton Rouge (KBTR) and off the Louisiana coast with overshooting cloud tops. The overcast cloud cover over the accident site were associated with high cirriform clouds and relatively benign and not part of the active convective portion of the system. Due to the extensive cloud cover it was not possible to determine if any low clouds were in the immediate vicinity of the accident site.



## 5.0 Weather Radar Imagery

The closest Weather Surveillance Radar-1988, Doppler (WSR-88D) to the accident site was from the NWS New Orleans (KLIX) location 84 miles east-northeast from the accident site. The level II and III archive data was obtained from NCEI utilizing the Hierarchical Data Storage System (HDSS) and displayed using the NWS NEXRAD Interactive Viewer and Data Exporter software.

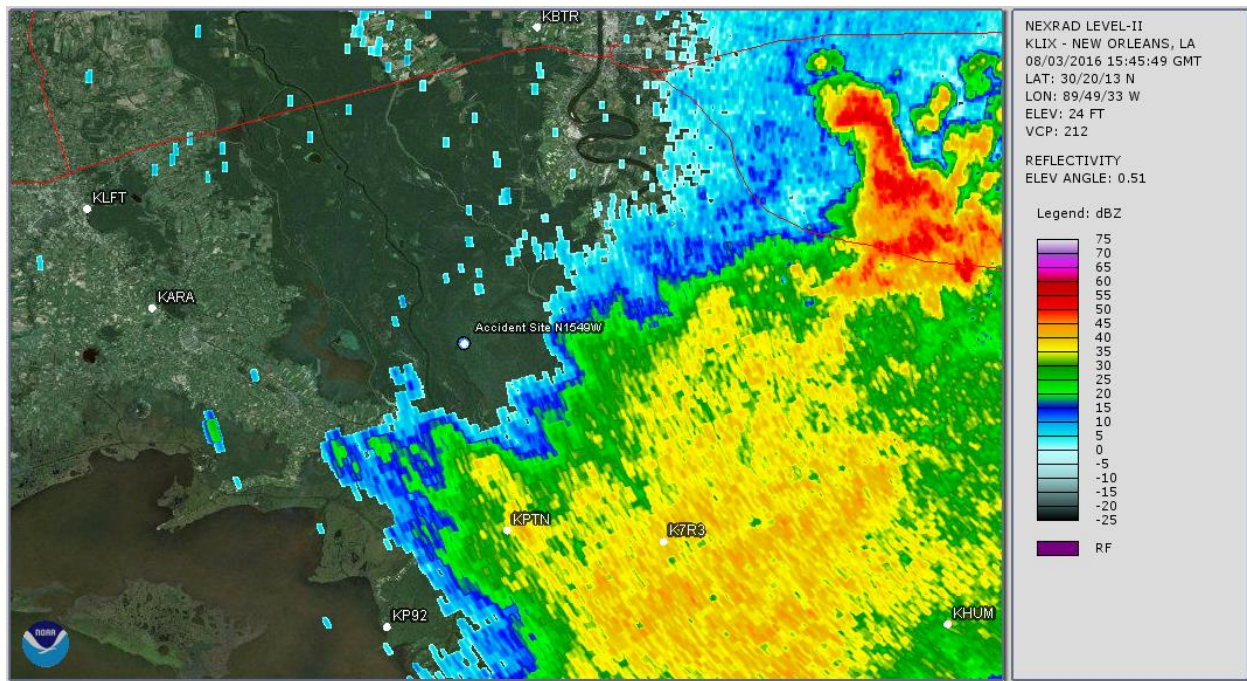
The WSR-88D is a S-band 10 centimeter wavelength radar with a power output of 750,000 watts, with a 28-foot parabolic antenna concentrating the energy into a 0.95° beam width. The radar produces three basic types of products reflectivity, radial velocity, and spectral width. Reflectivity is normally displayed in decibels (dBZ<sup>12</sup>), and is a general measure of echo intensity.

During the period the KLIX WSR-88D was operating in the precipitation mode, volume coverage pattern VCP-212 scanning strategy, which makes 14 different elevation scans in 4 ½ minutes. This scanning strategy is typically used during periods of widespread convective events. Assuming a standard refraction of the 0.95° radar beam, with the KLIX radar antenna height of 179 feet, and a distance of approximately 84 miles the center of the 0.5° base reflectivity beam located at approximately 9,310 feet over the accident site, with the base at 5,080 feet and the top at 13,540 feet.

Figure 13 is the KLIX WSR-88D 0.5° base reflectivity image at 1045 CDT with the accident site noted immediately west of the boundary of a large area of echoes which reach 55 dBZ between Baton Rouge (KBTR) and New Orleans (KMSY), or approximately 40 miles to the east-northeast of the accident site. No significant echoes were identified at low levels in the vicinity of the accident site.

---

<sup>12</sup> dBZ -  $10 \log Z_e$



**Figure 13 - New Orleans WSR-88D 0.5° base reflectivity image at 1045 CDT**

Figure 14 is a composite image of the KLIX WSR-88D 0.5° base reflectivity images from the period from 0958 through 1045 CDT at approximately 10 minute increments up to the time of the accident. The image shows that scattered convective cells were impacting the general area of the flight, which were moving to the southwest and dissipating with time. Several of these cells move across the accident site between 0958 and 1019 CDT, and dissipated as they moved to the southwest. While the accident helicopter may have flown under some precipitation echoes during the flight along the pipe line route; however, no significant echoes were identified in the immediate vicinity of the accident site at the time of the event or any indications of any outflow boundaries to produce low-level turbulence. While some residual low clouds can't be ruled out associated with the dissipating storms across the area, no organized echoes were identified over the accident site at the time of the accident.

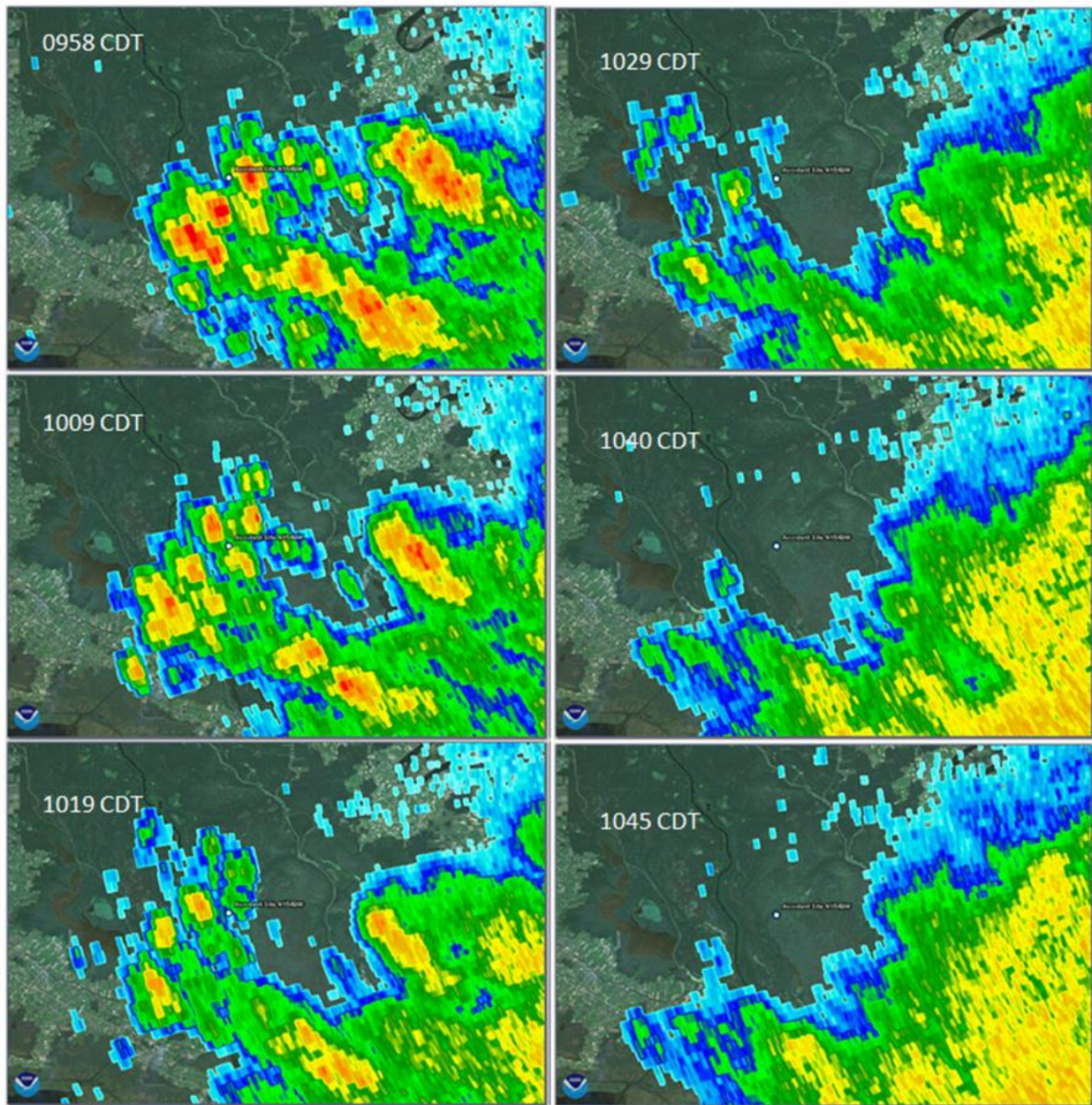


Figure 14 - Composite of New Orleans radar images from 0958 through 1045 CDT

## 6.0 Pilot Reports

The following pilot reports or PIREPs were issued over Louisiana surrounding the time of the accident:

*MSY UA /OV HRV/TM 1133/FL100/TP B373/TB MODERATE=*

*MSY UA /OV 5MI FINAL RWY 29/TM 1213/FL1500/TP PA34/TB SMOOTH RIDE LANDINFGRWY 29=*

*MSY UA /OV 2NM NW OF MSY/TM 1320/FL4500/TP MD88/TB SMOOTH RIDE ON DEPARTURE=*

*MSY UA /OV 20NM SW IF MSY/TM 1357/FL4000/TP B735/TB SMOOTH RIDE/RM LOTS OF LIGHTING=*

While there were some coding issues with the reports, there was only a single report of moderate turbulence at 10,000 feet and one of significant lightning activity both relating to the area of echoes observed near New Orleans. There were no reports below 1,000 feet of any significant turbulence or LLWS as depicted in the Slidell sounding.

## **7.0 Area Forecast**

The Area Forecast (FA) is a forecast of visual Flight Rules (VFR) clouds and weather conditions over an area as large as the size of several states. It must be used in conjunction with the AIRMET Sierra (IFR) bulletin for the same area in order to get a complete picture of the weather. The area forecast together with the AIRMET Sierra bulletin are used to determine forecast enroute weather and to interpolate conditions at airports which do not have a terminal forecast (TAF) issued. The NWS Aviation Weather Center (AWC) located in Kansas City, Missouri, issues the FA at regular intervals and issues specials reports as necessary usually in the form of an AIRMET.

The Dallas Ft. Worth (KDFW) regional forecast that was current at the time of the accident was issued at 0445 CDT and valid through 1700 CDT on August 3, 2016. The forecast portion related to Louisiana was as follows:

*FAUS44 KPCI 030945  
FA4W  
DFWC FA 030945  
SYNOPSIS AND VFR CLDS/WX  
SYNOPSIS VALID UNTIL 040400  
CLDS/WX VALID UNTIL 032200...OTLK VALID 032200-040400  
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.  
.  
SYNOPSIS...SFC RDG FM JUST N OF HILL CNTRY TX-GALVESTON BAY TX.  
04Z SFC TROF MTNS W FAR TX. WK QSTNRY FNT NRN LA-SRN AL.  
.  
LA  
NRN-CNTRL...SCT CI. TIL 12Z VIS 5SM BR. 18Z SCT060. OTLK...VFR.  
SWRN...SCT030. OTLK...VFR 00Z TSRA.  
SERN...SCT-BKN040 TOPS 140. ISOL -TSRA. CB TO FL450. OTLK...VFR TIL 02Z TSRA.*

The accident site was on the border between the two forecasts of southwestern and southeastern Louisiana. The forecast for southwestern portion of the state expected scattered clouds at 3,000 feet, light winds, and no convective activity. The southeast portion expected scattered to broken clouds at 4,000 feet with tops to 14,000 feet with isolated<sup>13</sup> thunderstorms and light rain. The cumulonimbus clouds tops were expected to reach 45,000 feet.

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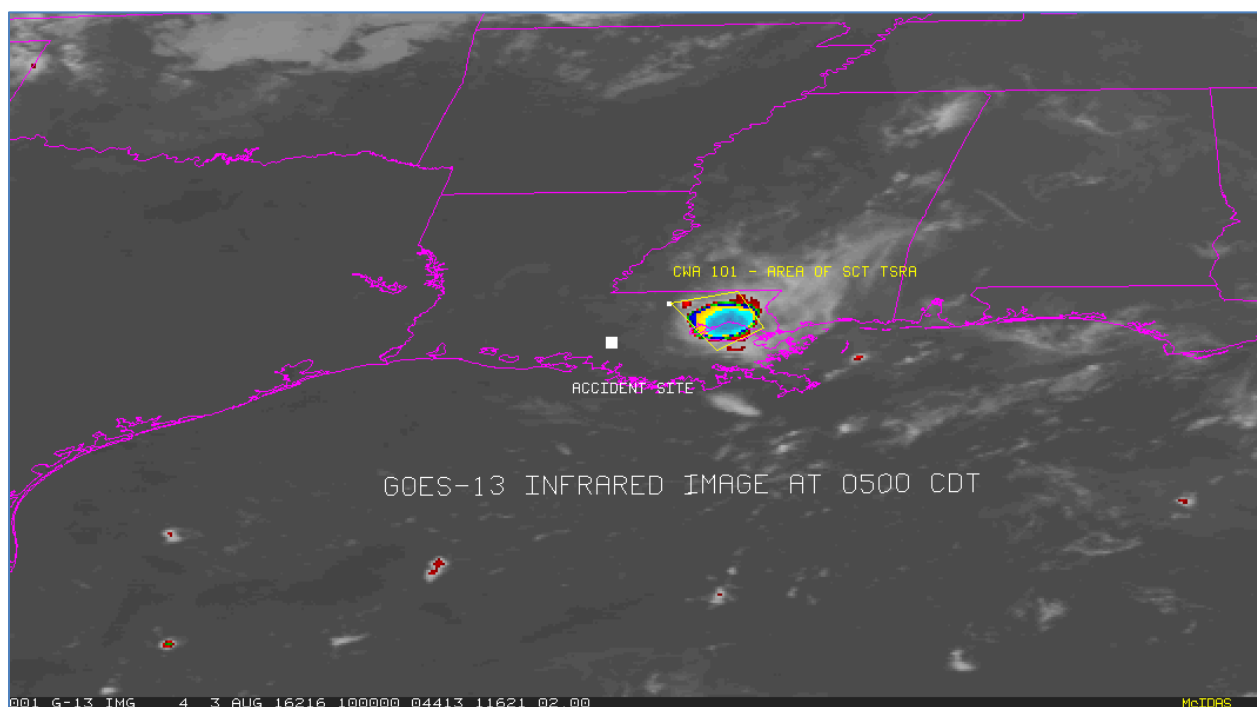
<sup>13</sup> Isolated – with respect to thunderstorms is defined as single cells, with no percentage of coverage. Other adjective terms include widely scattered, scattered or areas, and numerous to widespread in coverage.

## 8.0 In-Flight Weather Advisories

The NWS issues in-flight weather advisories designated as Severe Weather Forecast Alerts (AWW's), Convective SIGMET's (WST's), SIGMET's (WS's), Center Weather Advisories (CWA's), and AIRMET's (WA's). In-flight advisories serve to notify enroute 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. The following advisories were issued by the NWS surrounding the period.

### 8.1 Center Weather Advisory

The NWS Center Weather Service Unit (CWSU) Meteorologist at the Houston (KZHU) Air Route Traffic Control Center (ARTCC) issued a CWA number 101 at 0509 CDT which was valid until 0610 CDT for an area of thunderstorms. The bulletin was as follows with a plot of the advisory over the GOES-13 infrared satellite image for the period is included as figure 15. The accident site was well southwest of the advisory, and did not impact the route of flight but was in the vicinity immediately east.

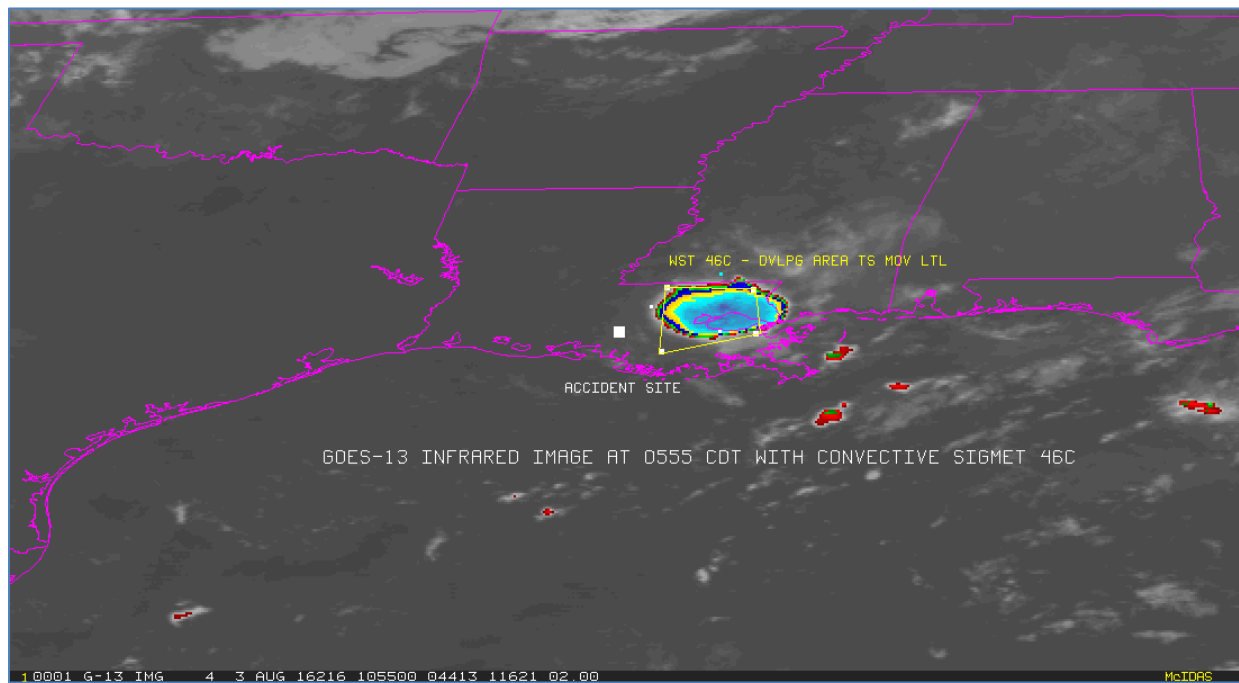


**Figure 15 - GOES-13 infrared image at 0500 CDT with CWA plotted**

*FAUS21 KZHU 031009  
ZHU1 CWA 031010  
ZHU CWA 101 VALID UNTIL 031110  
FROM 25NE LSU-20SE MCB-25NE HRV-15WNW HRV-25NE LSU  
AREA OF SCT TSRA WITH MOD-HVY PCPN. MOV LTL. TOPS TO FL450.*

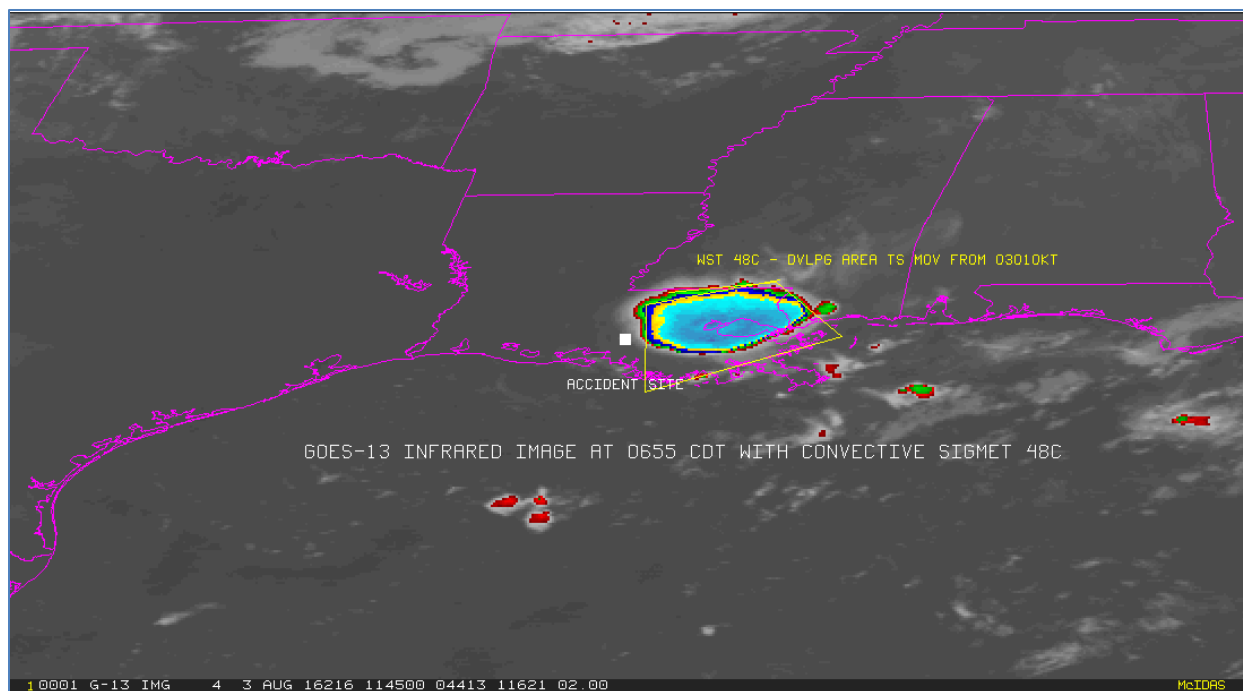
## 8.2 Convective SIGMETs

The NWS Aviation Weather Center (AWC) located in Kansas City and responsible for the issuance of advisories regarding thunderstorms issued the following Convective Significant Meteorological Advisories (SIGMETs) over Louisiana at 0555 through 1055 CDT, which were valid for a two hour period and updated hourly. Figures 16 through 21 are the GOES-13 infrared satellite images for the corresponding time of the Convective SIGMET with the accident site location plotted. The images depict the area of convection increasing with time and the coverage of the Convective SIGMETs expand to enclose the general route of flight and the accident site and at 0945 through 1055 CDT advisories 56C and 58C include the accident site.



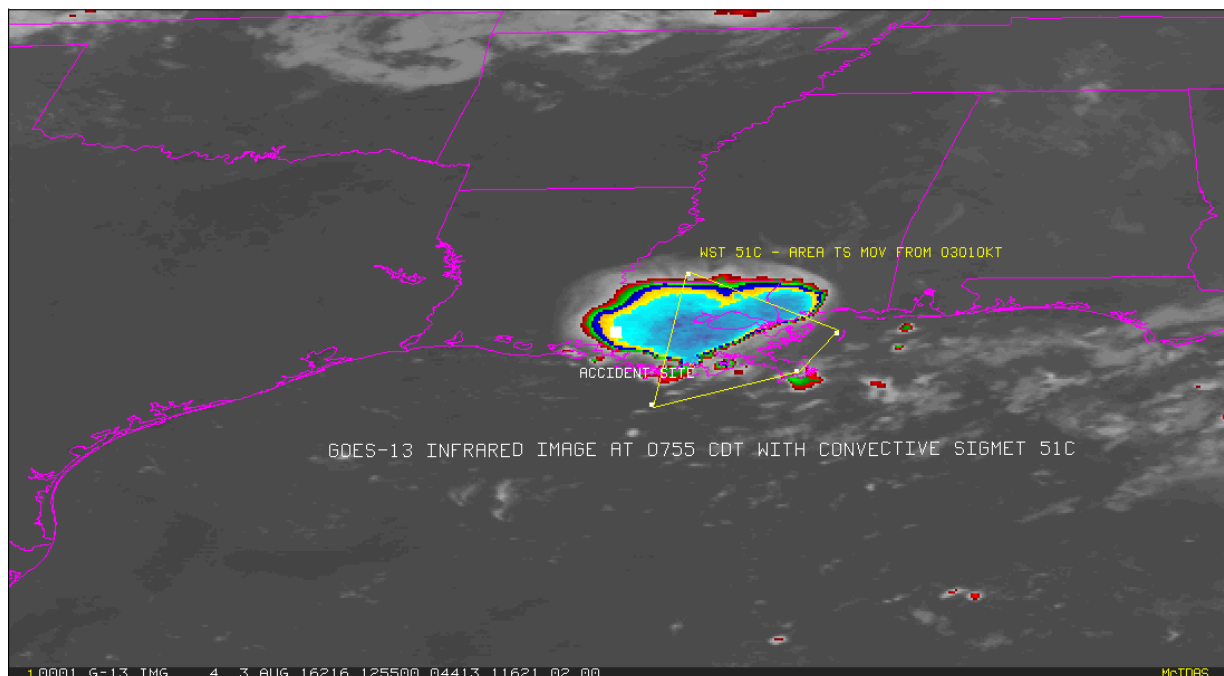
**Figure 16 - Convective SIGMET 46C issued at 0555 CDT over the GOES-13 IR satellite image**

WSUS32 KPCI 031055  
SIGC  
MKCC WST 031055  
**CONVECTIVE SIGMET 46C**  
VALID UNTIL 1255Z  
MS LA  
FROM 20ESE MCB-20E HRV-30SW HRV-30NE LSU-20ESE MCB  
DVLPG AREA TS MOV LTL. TOPS ABV FL450.



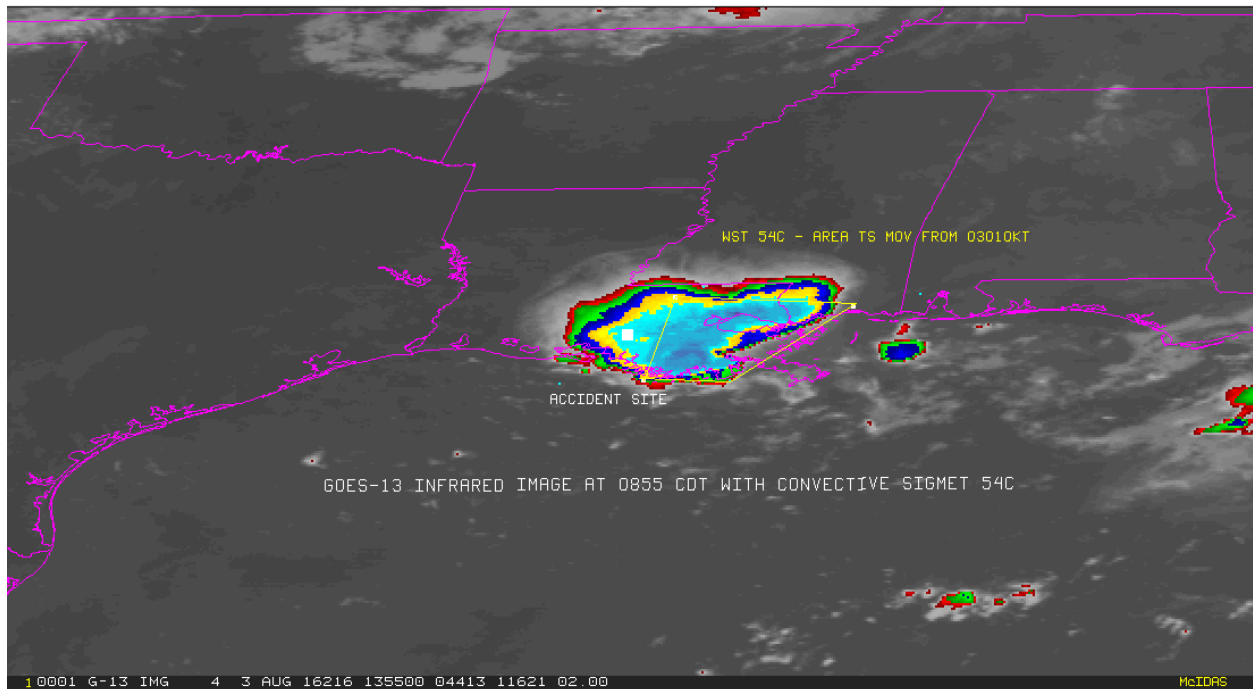
**Figure 17 - Convective SIGMET 48C issued at 0655 CDT over the GOES-13 infrared satellite imagery**

WSUS32 KPCI 031155  
 SIGC  
**CONVECTIVE SIGMET 48C**  
 VALID UNTIL 1355Z  
 MS LA AND CSTL WTRS  
 FROM 20SE MCB-30WSW SJI-20SE HRV-40WSW HRV-10E LSU-20SE MCB  
 DVLPG AREA TS MOV FROM 03010KT. TOPS ABV FL450.



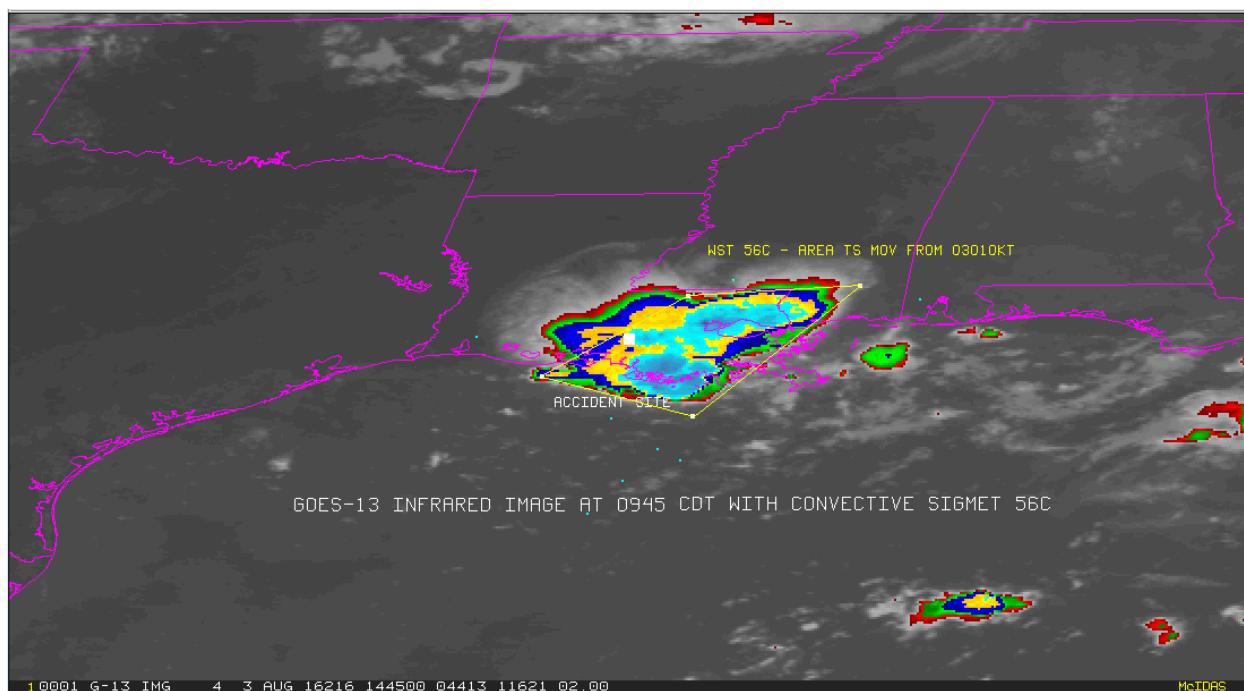
**Figure 18 - Convective SIGMET 51C issued at 0755 CDT over the GOES-13 infrared satellite image**

WSUS32 KPCI 031255  
 SIGC  
 MKCC WST 031255  
**CONVECTIVE SIGMET 51C**  
 VALID UNTIL 1455Z  
 MS LA AND CSTL WTRS  
 FROM 20NE LSU-40WSW SJI-30E LEV-20WSW LEV-20NE LSU  
 AREA TS MOV FROM 03010KT. TOPS ABV FL450.



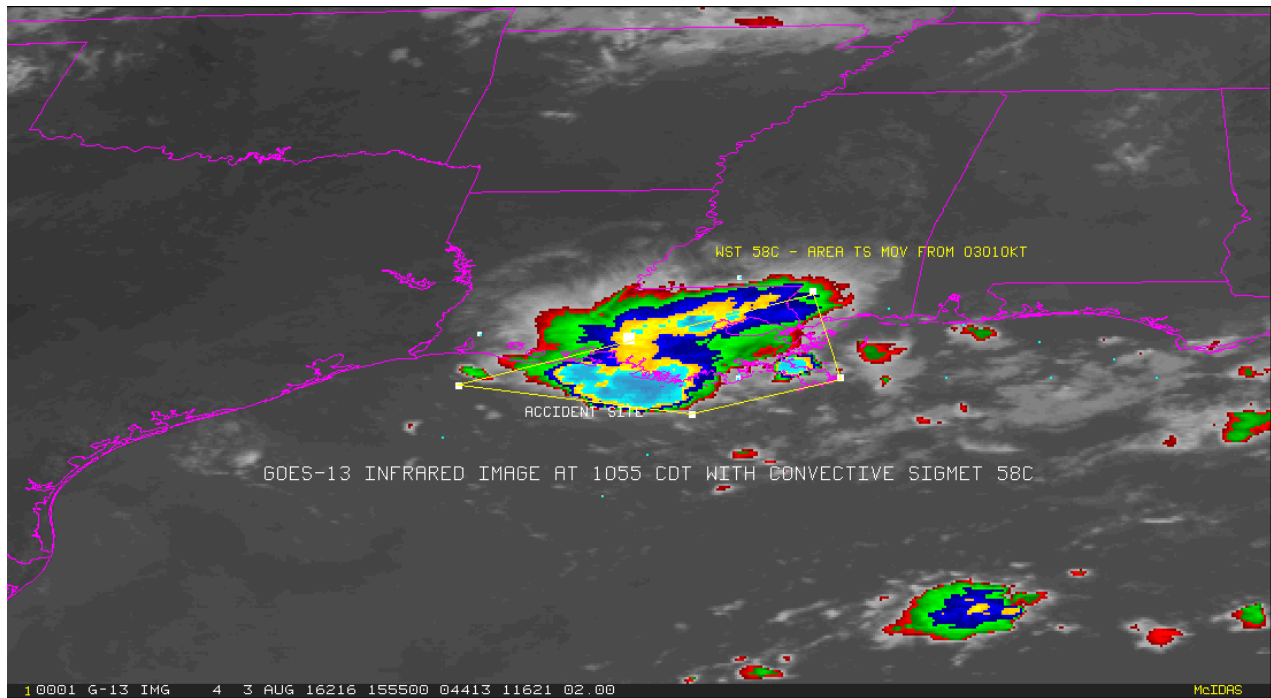
**Figure 19 - Convective SIGMET 54C issued at 0855 CDT over the GOES-13 infrared satellite image**

WSUS32 KPCI 031355  
 SIGC  
 MKCC WST 031355  
**CONVECTIVE SIGMET 54C**  
 VALID UNTIL 1555Z  
 MS LA AND CSTL WTRS  
 FROM 20NE LSU-40WSW SJI-10SSW LEV-50W LEV-20NE LSU  
 AREA TS MOV FROM 03010KT. TOPS ABV FL450.



**Figure 20 - Convective SIGMET 56C issued at 0945 CDT with the GOES-13 infrared satellite image**

WSUS32 KPCI 031455  
 SIGC  
 MKCC WST 031455  
**CONVECTIVE SIGMET 56C**  
 VALID UNTIL 1655Z  
 MS LA AND CSTL WTRS  
 FROM 40WNN SJJ-40SSW LEV-70SE LCH-30NE LSU-40WNN SJJ  
 AREA TS MOV FROM 03010KT. TOPS ABV FL450.



**Figure 21 - Convective SIGMET 58C issued at 1055 CDT with the GOES-13 infrared satellite image**

WSUS32 KPCI 031555  
 SIGC  
 MKCC WST 031555  
**CONVECTIVE SIGMET 58C**  
 VALID UNTIL 1755Z  
 MS LA AND CSTL WTRS  
 FROM 50ESE MCB-60E LEV-50SSW LEV-60S LCH-50ESE MCB  
 AREA TS MOV FROM 03010KT. TOPS ABV FL450.  
 .

### 8.3 AIRMETs

The NWS AWC issued the following AIRMETs during the period. None of the advisories included the Louisiana area or the accident site. No significant areas of instrument flight rule conditions, moderate or greater turbulence, wind shear, or icing were expected outside of convective activity. The advisories issued at 0345 and 0945 CDT were as follows:

WAUS44 KPCI 030845  
 WA4S  
 DFWS WA 030845  
 AIRMET SIERRA UPDT 2 FOR IFR AND MTN OBSCN VALID UNTIL 031500  
 .

AIRMET IFR...TX  
 FROM 40NNW SAT TO 40SSE CWK TO 50SSE SAT TO 60SE DLF TO 40NNE DLF TO 40NNW SAT  
 CIG BLW 010/VIS BLW 3SM BR. CONDS DVLPNG 09-12Z. CONDS ENDG 12-15Z.  
 .

AIRMET IFR...AR TN MO IL IN KY  
 FROM 20SW ORD TO 20N IND TO CVG TO HNN TO HMV TO 20NW BNA TO

20NNW DYR TO 30WNW ARG TO 20SW BUM TO 20SW ORD  
CIG BLW 010/VIS BLW 3SM PCPN/BR/FG. CONDS CONTG BYD 15Z ENDG 15-18Z.

.  
AIRMET IFR...TN MS AL AND CSTL WTRS  
FROM HMV TO GQO TO 50SW PZD TO 40W CEW TO 50SW CEW TO 30S SJI TO  
20NNW DYR TO 20NW BNA TO HMV  
CIG BLW 010/VIS BLW 3SM BR/FG. CONDS ENDG 12-14Z.

.  
AIRMET MTN OBSCN...TN KY  
FROM HNN TO HMV TO GQO TO 50WSW LOZ TO HNN  
MTNS OBSC BY CLDS/BR. CONDS ENDG 12-15Z.

....

WAUS44 KPCI 030845  
WA4T  
DFWT WA 030845  
AIRMET TANGO UPDT 1 FOR TURB VALID UNTIL 031500

.  
NO SGFNT TURB EXP OUTSIDE OF CNVTV ACT.

....

WAUS44 KPCI 030845  
WA4Z  
DFWZ WA 030845  
AIRMET ZULU UPDT 1 FOR ICE AND FRZLVL VALID UNTIL 031500

.  
NO SGFNT ICE EXP OUTSIDE OF CNVTV ACT.

.

FRZLVL...RANGING FROM 145-170 ACRS AREA  
160 ALG 30W LBL-50WSW LBL-50NNW AMA-40S MLC-50W TXK-30SSE LFK-  
120SSE LCH  
160 ALG 20SSE LGC-30NW LGC-30NNE GQO-60SW LOZ

....

Advisories updated at 0945 CDT and current at the time of the accident:

WAUS44 KPCI 031445 2016216 1435  
WA4S  
DFWS WA 031445  
AIRMET SIERRA UPDT 3 FOR IFR VALID UNTIL 032100

.  
NO SGFNT IFR EXP OUTSIDE OF CNVTV ACT.

....

WAUS44 KPCI 031445 2016216 1437  
WA4T  
DFWT WA 031445  
AIRMET TANGO UPDT 2 FOR TURB VALID UNTIL 032100

.  
NO SGFNT TURB EXP OUTSIDE OF CNVTV ACT.

....

WAUS44 KPCI 031445 2016216 1432  
WA4Z  
DFWZ WA 031445  
AIRMET ZULU UPDT 2 FOR ICE AND FRZLVL VALID UNTIL 032100

.  
NO SGFNT ICE EXP OUTSIDE OF CNVTV ACT.  
.

FRZLVL...RANGING FROM 145-170 ACRS AREA

160 ALG LBL-40NNE AMA-40E AMA-40SW MLC-50WSW HRV-60SW LEV

160 ALG 40NW PZD-60S LGC-30WSW LGC-30NNW GQO-60SW LOZ

....

The advisories indicated that no large scale areas, defined as covering an area of over 3,000 square miles of IFR conditions, turbulence, high winds, or icing conditions were expected over the area except for in convective activity.

## 9.0 Mesoscale Prediction Discussion

The NWS WPC's morning forecast of Quantitative Precipitation Forecast (QPF) issued at 0700 CDT for areas of expected precipitation is included as figure 22. The precipitation forecast indicated several areas with greater than 1.00 inch or greater areas of precipitation, which were included in the National Forecast flash flood potential areas in figure 1, but also missed the area over Missouri and Illinois. The morning forecast indicated a chance of precipitation between 0.01 to 0.10 inches over the accident site.

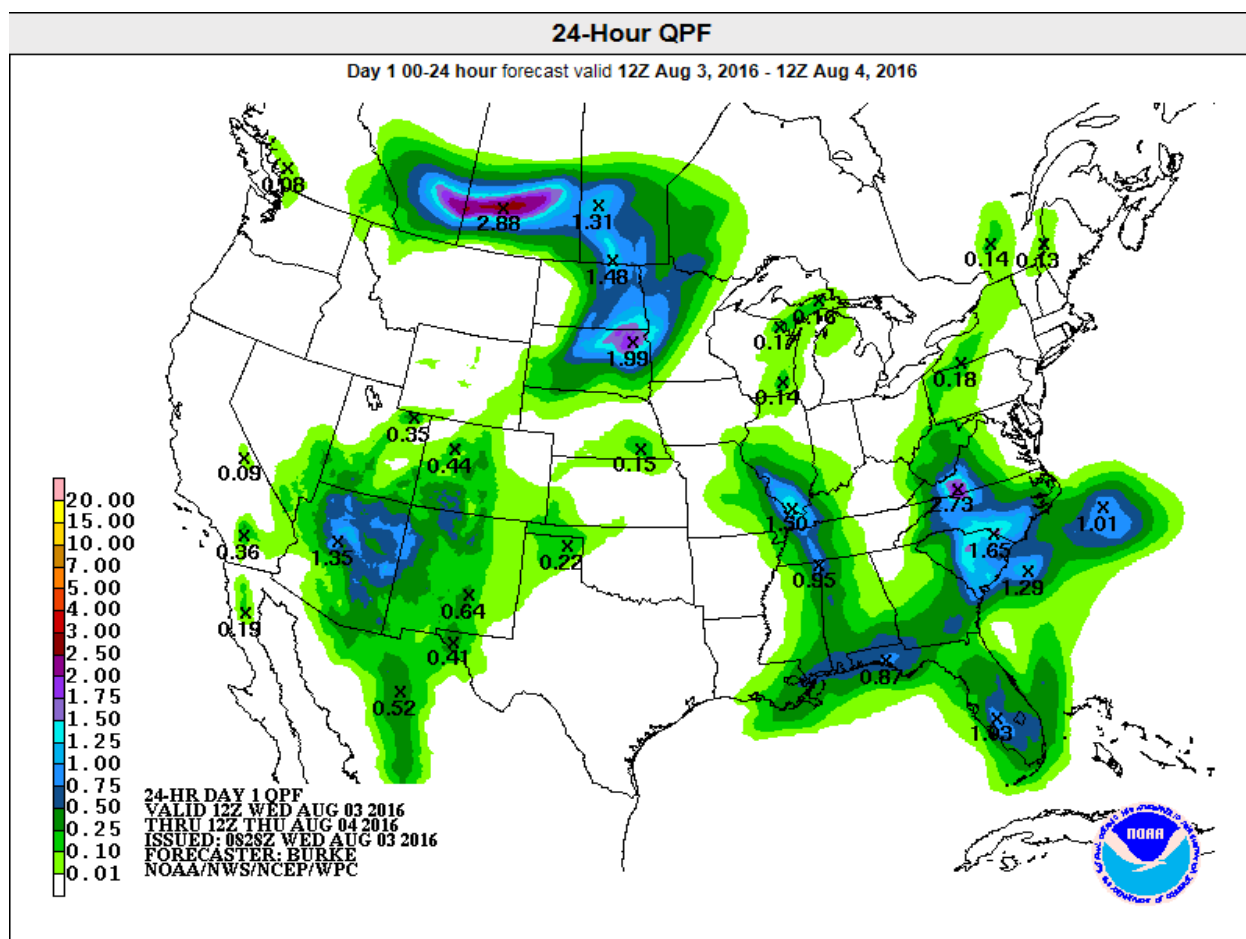
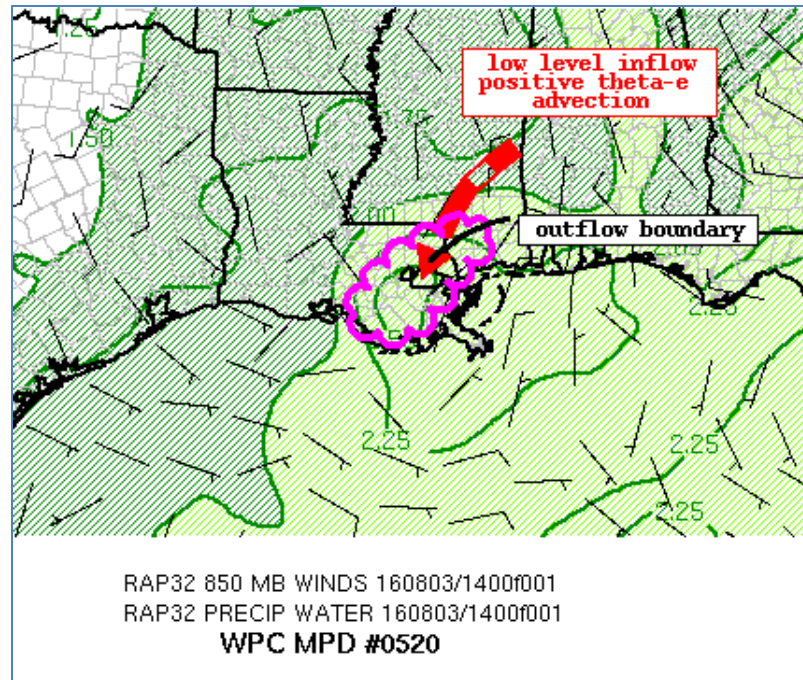


Figure 22 - NWS Quantitative Precipitation Forecast for 0700 CDT on August 4, 2016

At 1017 CDT the NWS WPC issued a Mesoscale Precipitation Discussion (MPD) regarding the storm system over Louisiana and modified the forecast for precipitation over the area. The graphic discussion is included as figure 23 with text bulletin in plain language following.



**Figure 23 - NWS Mesoscale Precipitation Discussion issued at 1017 CDT**

*MESOSCALE PRECIPITATION DISCUSSION 0520  
NWS WEATHER PREDICTION CENTER COLLEGE PARK MD  
1117 AM EDT WED AUG 03 2016*

*AREAS AFFECTED...SOUTHEASTERN LA...SOUTHERN MS*

*CONCERNING...HEAVY RAINFALL...FLASH FLOODING POSSIBLE*

*VALID 031516Z - 031846Z*

*SUMMARY...BACKBUILDING TRAINING CONVECTION IS EXPECTED TO CONTINUE WITH  
ADDITIONAL FLASH FLOODING POSSIBLE.*

*DISCUSSION...RECENT SURFACE OBSERVATIONS ALONG WITH KLIx RADAR IMAGERY SHOW THAT  
AN OUTFLOW FROM ONGOING CONVECTION ACROSS SOUTHWESTERN LA HAS PUSHED  
NORTHWEST ALONG A NORTHEAST-SOUTHWEST ORIENTED LINE TO JUST SOUTH OF HBG TO  
HDC. THIS OUTFLOW INTERACTING WITH POSITIVE LOW LEVEL THETA-E ADVECTION AND  
SUPPORTING UPPER LEVEL DIVERGENCE HAS BECOME A NEW FOCUS FOR BACKBUILDING -  
TRAINING CONVECTION. DEEP MOISTURE IS ALREADY IN PLACE ACROSS THE REGION....WITH  
THE 12Z LIX SOUNDING SHOWING VERY ANOMALOUS MOISTURE IN PLACE...WITH PWAT VALUES  
APPROACHING 2.50 INCHES. EXPECT RAINFALL RATES IN THE 1 TO 1.50 INCH RANGE WITHIN THE  
MORE ROBUST CELLS. FOR THE 3-HR PERIOD ENDING AT 18 UTC...THE 14 UTC RUNS OF THE  
OPERATIONAL AND PARALLEL HRRR SHOW ADDITIONAL AMOUNTS OF 2-INCHES ACROSS THE  
SOUTHERN PORTION OF THE HIGHLIGHTED AREA...WITH MARKEDLY LIGHTER AMOUNTS TO THE*

NORTH. HOWEVER...GIVEN THE RAPIDLY COOLING TOPS ON THE NORTHERN FLANK OF THIS BATCH OF THUNDERSTORMS SUSPECT THESE AMOUNTS ARE UNDERDONE.

PEREIRA

ATTN...WFO...JAN...LCH...LIX...MOB...

ATTN...RFC...LMRFC...

LAT...LON 31048920 30798907 30288968 30108980 29609021

29359079 29649141 30459079 30868981

## 10.0 Storm Reports

The NWS SPC Storm Reports for the August 3, 2016 is included as figure 24 and indicated no significant reports of damage from any thunderstorm over the region, which would have included tornadoes, large hail, or damaging winds of 50 knots or more.

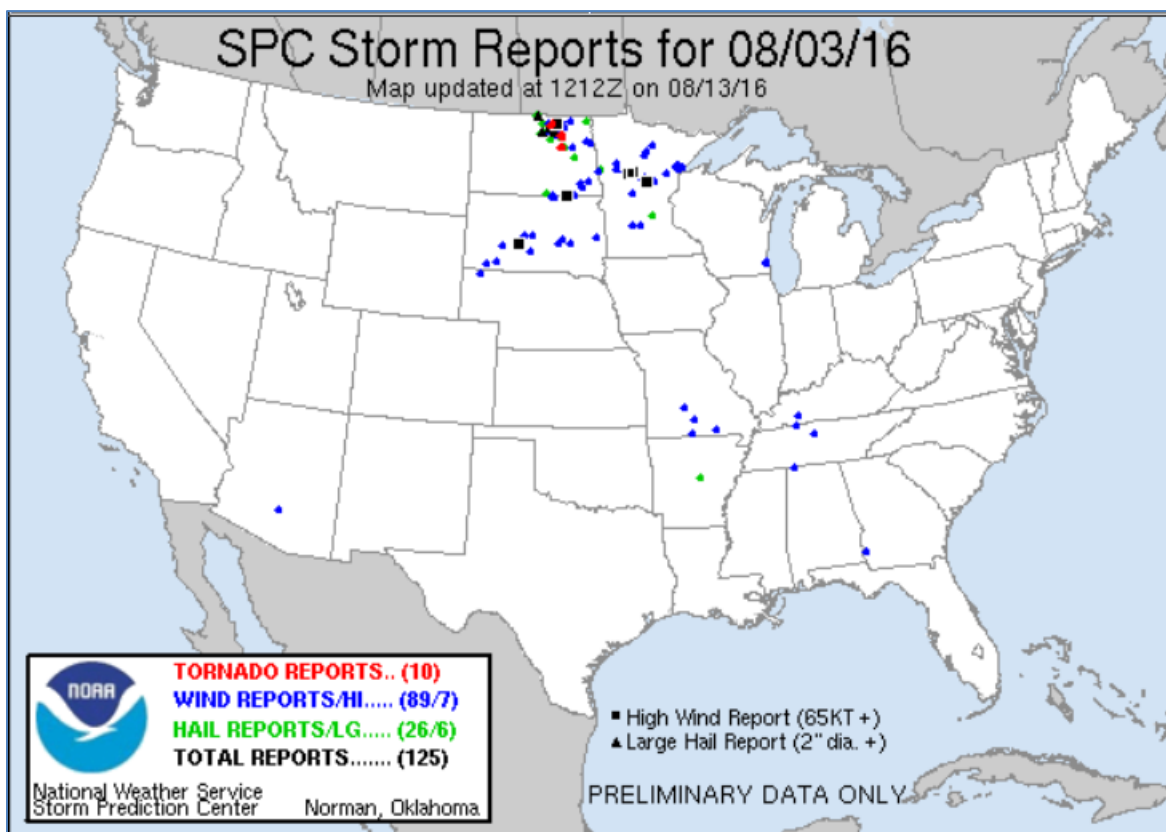


Figure 24 - NWS SPC Storm Reports on August 3, 2016

Submitted by:  
Don Eick  
Senior Meteorologist

