



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

February 2, 2017

Weather Study

METEOROLOGY

CEN17LA067

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A. ACCIDENT

Location: 4 miles west-northwest of Brookfield, Wisconsin
Date: January 4, 2017
Time: 1208 central standard time
1808 Coordinated Universal Time (UTC)
Airplane: BD-4, N311SD

B. METEOROLOGIST

Paul Suffern
Group Chairman
Operational Factors Division (AS-30)
National Transportation Safety Board

C. SUMMARY

On January 4, 2017, about 1208 central standard time, an experimental, amateur-built Demmer BD-4 airplane, N311SD, sustained substantial damage during takeoff when it veered off the left side of runway 21 (3,010 ft by 44 ft, asphalt) at the Capitol Airport (02C), Brookfield, Wisconsin, and impacted a parked vehicle. The pilot was fatally injured; one passenger received serious injuries; and one passenger was not injured. The pilot owned and operated the airplane under the provisions of the 14 *Code of Federal Regulations* Part 91 as a personal flight. Visual meteorological conditions prevailed at the time of the accident. The flight was departing 02C under visual flight rules (VFR) with New River Valley Airport (PSK), Dublin, Virginia, as the destination. The flight had an instrument flight plan on file, but the pilot had not contacted air traffic control to obtain the clearance.

D. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's (NTSB) Meteorologist did not travel for this investigation and gathered the weather data for this investigation from the NTSB's Washington D.C. office and from official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources including the National Centers for Environmental Information (NCEI). All times are central standard time (CST) on January 4, 2017, and are based upon the 24-hour clock, where local time is -6 hours from UTC, and UTC=Z (unless otherwise noted). Directions are referenced to true north and distances in nautical miles. Heights are above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles.

The accident site was located at latitude 43.0902° N, longitude 88.1781° W, at an approximate elevation of 839 feet.

E. FACTUAL INFORMATION

1.0 Synoptic Situation

The synoptic or large scale migratory weather systems influencing the area were documented using standard NWS charts issued by the National Center for Environmental Prediction and the Weather Prediction Center, located in College Park, Maryland. These are the base products used in describing synoptic weather features and in the creation of forecasts and warnings for the NWS. Reference to these charts can be found in the joint NWS and Federal Aviation Administration Advisory Circular “Aviation Weather Services”, AC-0045H.

1.1 Surface Analysis Chart

The NWS Surface Analysis Chart for 1200 CST is provided as figure 1 with the approximate location of the accident site marked within the red circle. The chart depicted a stationary front located well north of the accident in eastern Lake Superior with the stationary front stretching northeastward into central Canada. There were no surface high or low pressure centers near the accident site; however, the surface pressure gradient was identified as strong by the isobars (lines of constant pressure on the chart) being relatively close together near the accident site. The station models around the accident site at 1200 CST depicted air temperatures in the mid 10’s degrees Fahrenheit (°F), with temperature-dew point spreads of 10° F or more, a west wind up to 20 knots, and clear skies. Given the lack of surface moisture and no frontal boundaries or surface low pressure systems near the accident site, this was not a favorable environment for the formation of clouds and precipitation, but the strong surface pressure gradient was favorable for relatively higher surface wind speeds.

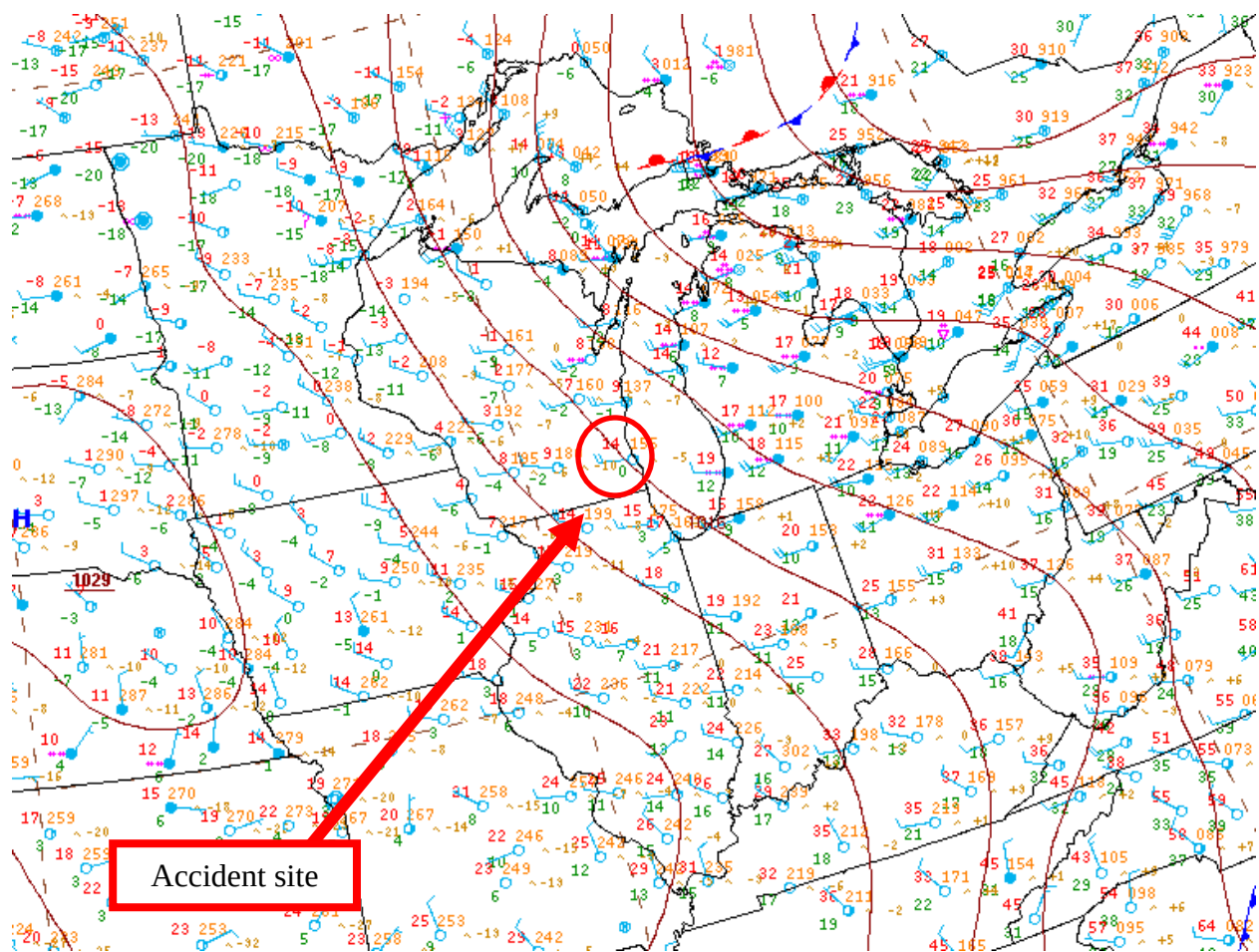


Figure 1 – NWS Surface Analysis Chart for 1200 CST

1.2 Upper Air Charts

The NWS Storm Prediction Center Constant Pressure Charts for 0600 CST at 925-, 850-, 700-, 500-, and 300-hectopascals (hPa) are presented in figures 2 through 6. The accident site was located in between two low-level troughs¹ with the isoheights (lines of equal height, figures 2 through 6) relatively close together. With the isoheights relatively close together higher wind conditions would be expected. There was a mid-level trough east of the accident site at 0600 CST. With no troughs relatively close to the accident site at the accident time no clouds or precipitation would be expected, however, with the isoheights relatively close together stronger wind conditions would be expected in the area of the accident site at the accident time. There was a west wind of 30 knots at 925-hPa (figure 2) with the wind becoming west-northwesterly by 700-hPa with the wind increasing in speed to 40 knots (figure 4). The 40-knot west-northwesterly wind at 700-hPa became a 80-knot westerly wind by 300-hPa (figure 6).

¹ Trough – An elongated area of relatively low atmospheric pressure or heights.

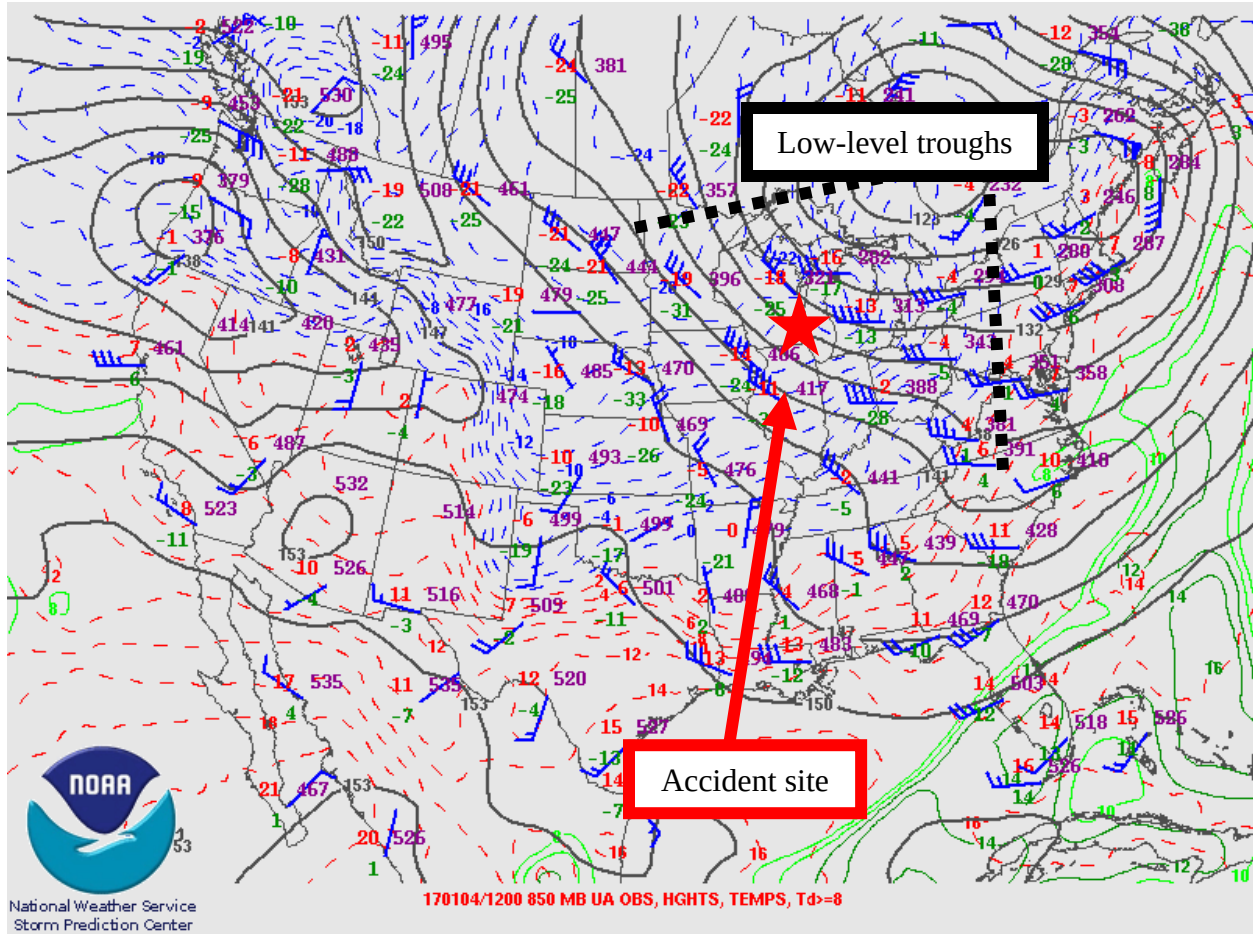


Figure 3 – 850-hPa Constant Pressure Chart for 0600 CST

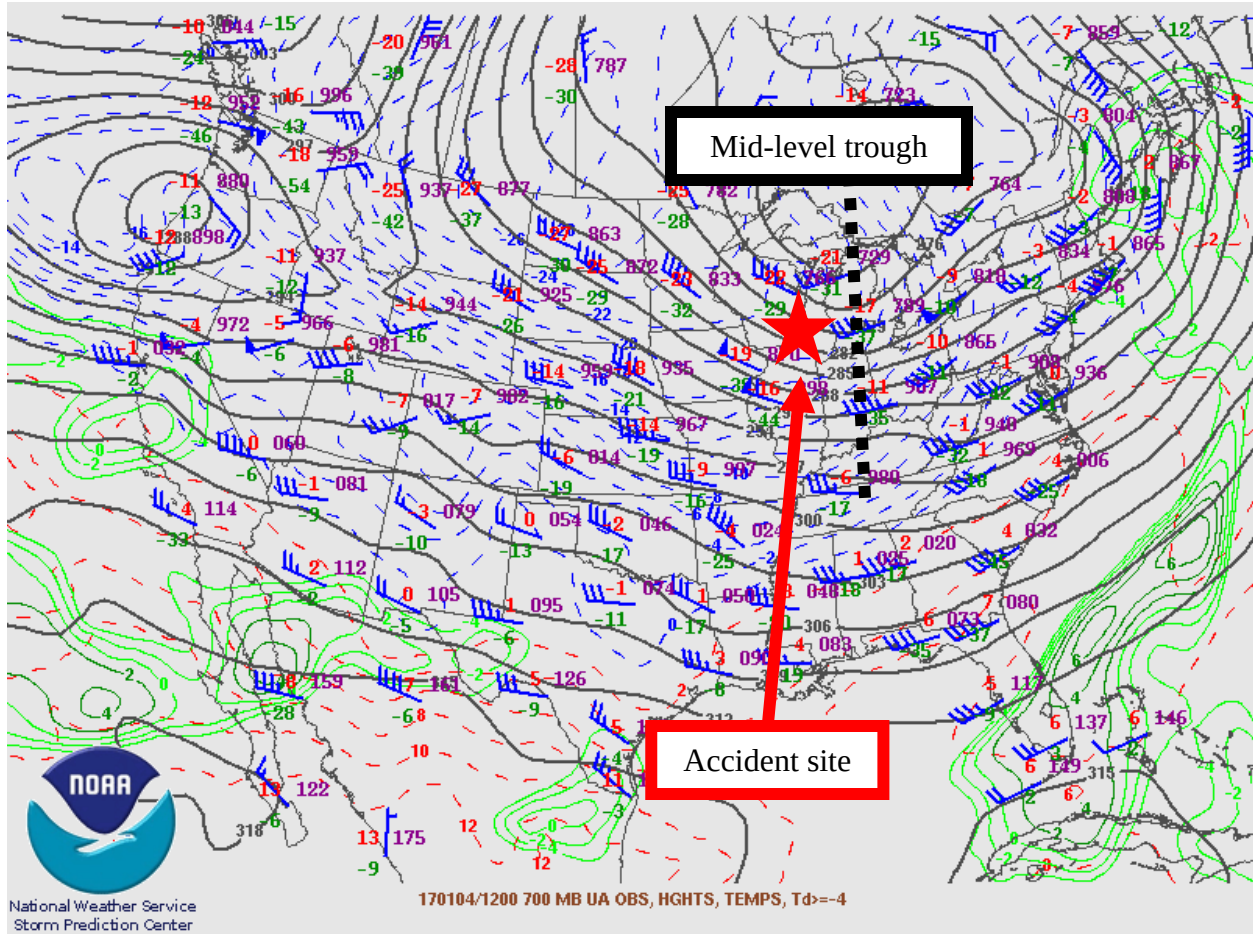


Figure 4 – 700-hPa Constant Pressure Chart for 0600 CST

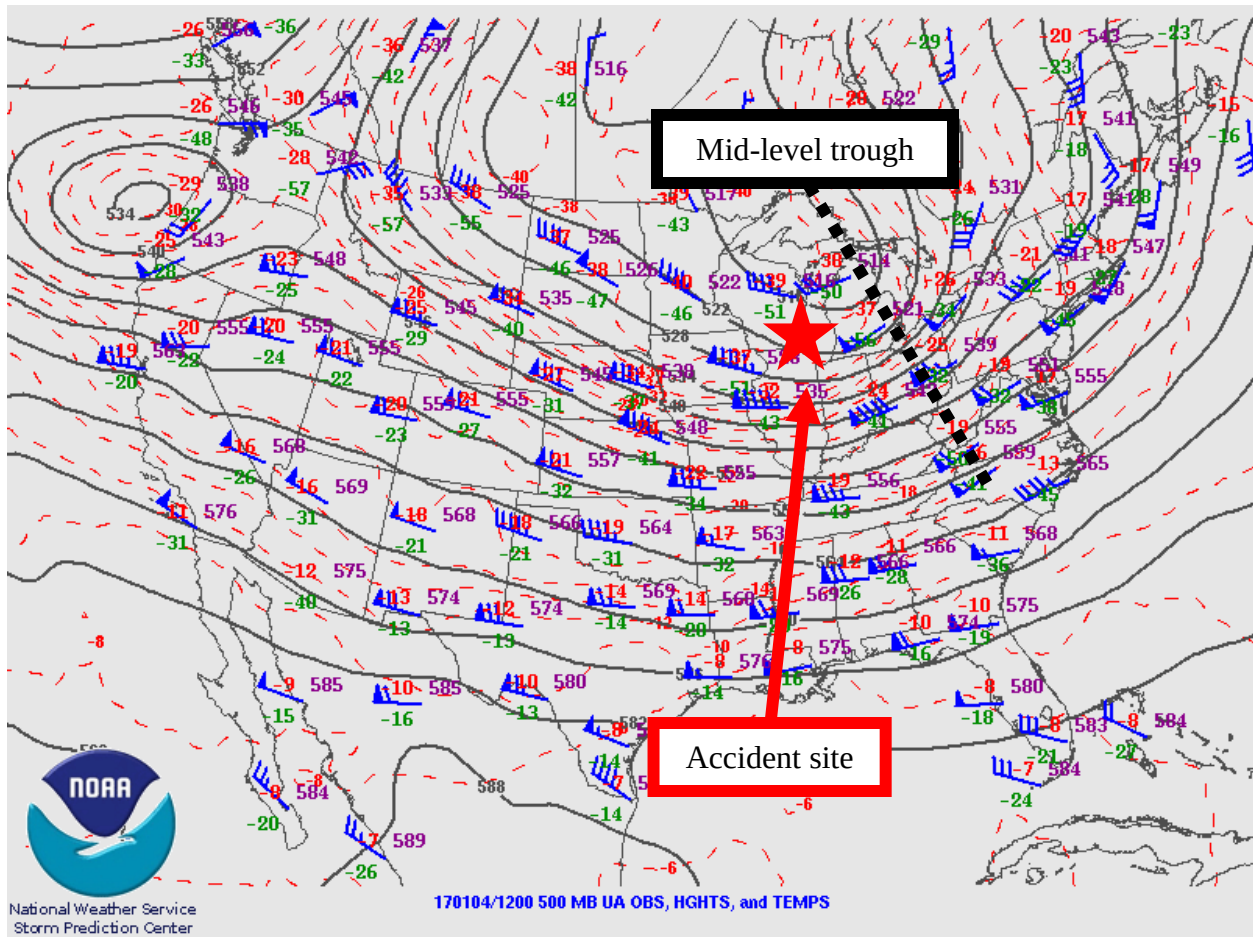


Figure 5 – 500-hPa Constant Pressure Chart for 0600 CST

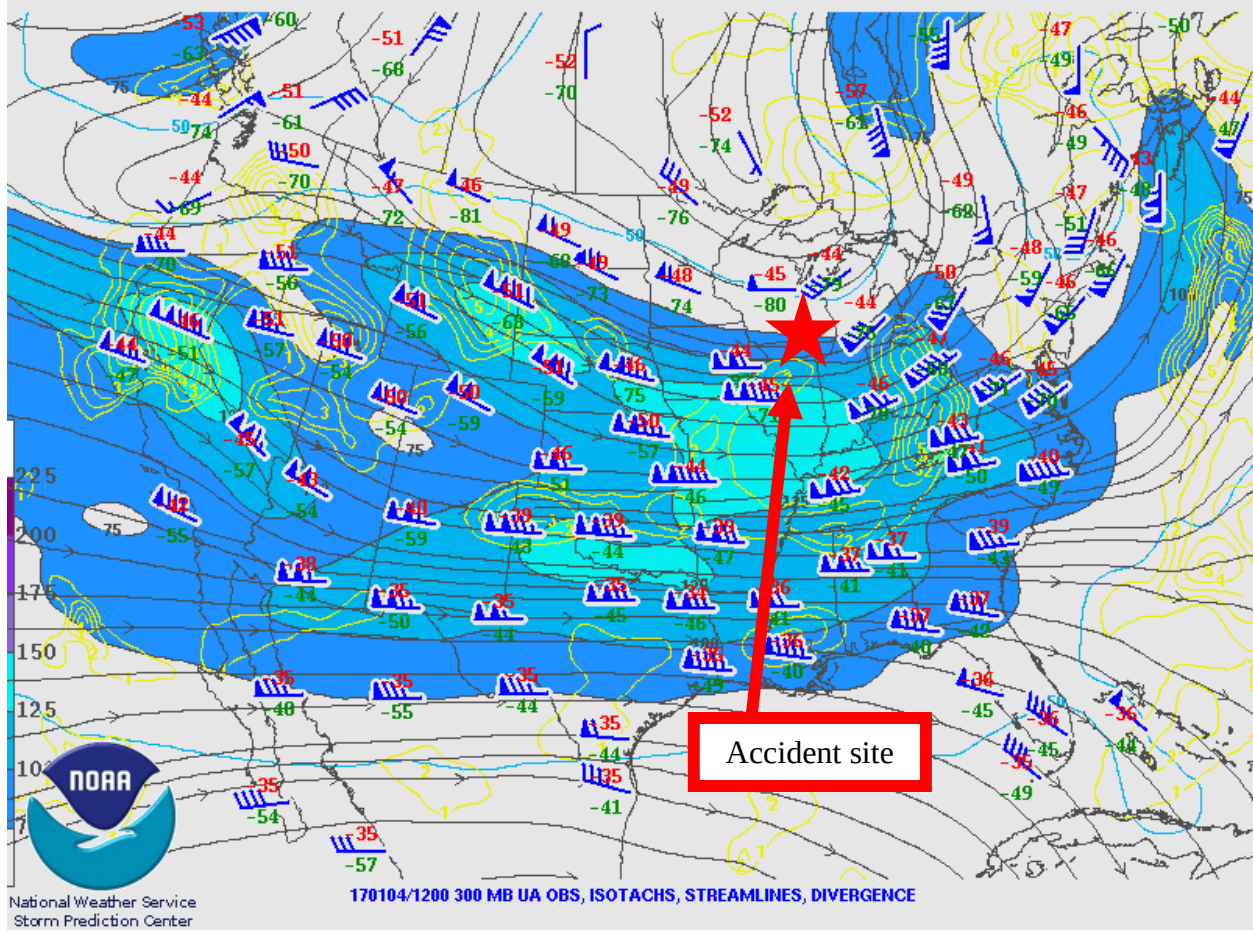


Figure 6 – 300-hPa Constant Pressure Chart for 0600 CST

2.0 Storm Prediction Center Products

There were no thunderstorms forecast for the accident site at the accident time.

3.0 Surface Observations

The area surrounding the accident site was documented utilizing official NWS Meteorological Aerodrome Reports (METARs) and Specials (SPECIs). The following observations were taken from standard code and are provided in plain language. Figure 7 is a sectional chart with the accident site and the closest weather reporting locations marked.

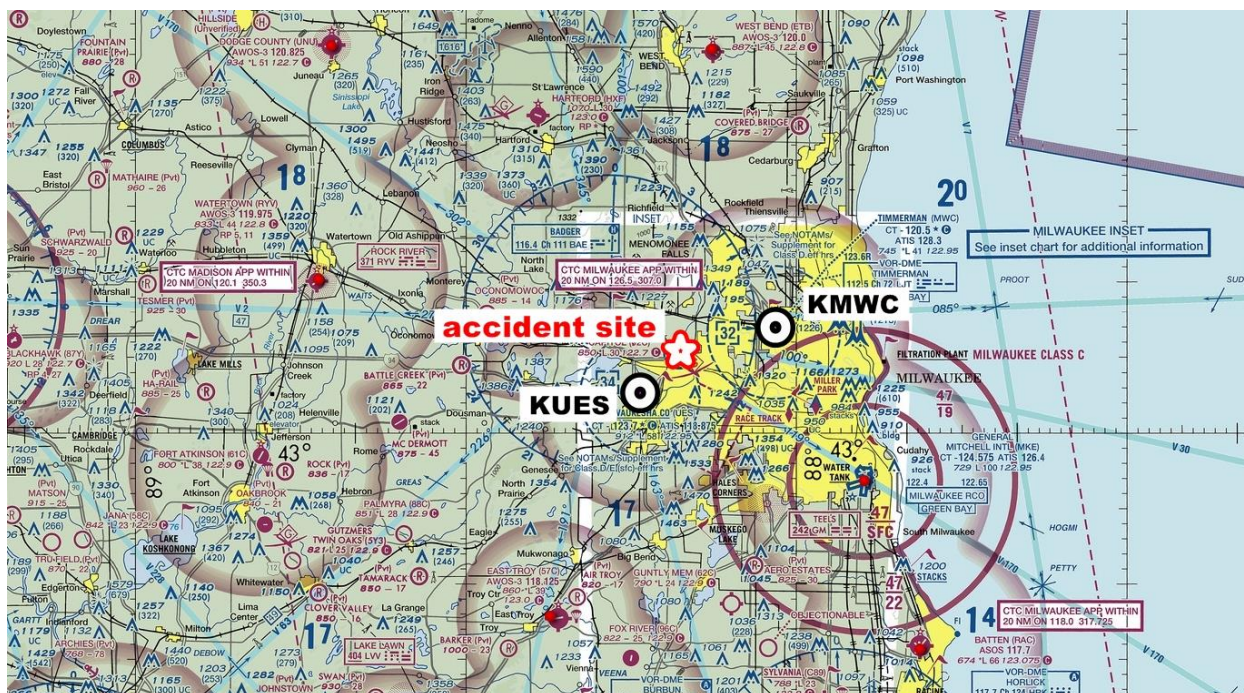


Figure 7 – Sectional chart of accident area with the location of the accident site and surface observation sites

Waukesha County Airport (KUES) was the closest official weather station to the accident site, located 2 miles north of Waukesha, Wisconsin. KUES had an Automated Weather Observing System (AWOS²) whose reports were supplemented by air traffic control. KUES was located 4 miles southwest of the accident site, at an elevation of 912 feet, and had a 1° westerly magnetic variation³ (figure 7). The following observations were taken and disseminated during the times surrounding the accident:⁴

[0545 CST] METAR KUES 041145Z 29015G25KT 10SM SCT020 M14/M18 A2994=
 [0645 CST] METAR KUES 041245Z 29015G26KT 10SM OVC018 M14/M18 A2995=
 [0745 CST] METAR KUES 041345Z 27015G22KT 10SM BKN018 M15/M18 A2995=

² AWOS – Automated Weather Observing System is equipped with meteorological instruments to observe and report temperature, dewpoint, wind speed and direction, visibility, cloud coverage and ceiling up to twelve thousand feet, and altimeter setting.

³ Magnetic variation – The angle (at a particular location) between magnetic north and true north. 1990, latest measurement taken from <http://www.airnav.com/airport/KUES>

⁴ The bold sections in this NWS product and the rest of products in this report are intended to highlight the sections that directly reference the weather conditions that affected the accident location around the accident time. The local times in section 3.0 next to the METARs are provided for quick reference between UTC and local times around the accident time.

[0845 CST] METAR KUES 041445Z 28022G29KT 10SM SCT018 M14/M18 A2997=

[0945 CST] METAR KUES 041545Z 27021G28KT 10SM SCT020 M14/M18 A2998=

[1045 CST] METAR KUES 041645Z 28020G28KT 10SM SCT022 M13/M18 A2998=

[1145 CST] METAR KUES 041745Z 28020G28KT 10SM SCT022 M13/M18 A2995=

ACCIDENT TIME 1208 CST

[1245 CST] METAR KUES 041845Z 26015G25KT 10SM FEW022 M12/M18 A2994=

[1345 CST] METAR KUES 041945Z 27020G28KT 10SM FEW022 M12/M18 A2994=

[1445 CST] METAR KUES 042045Z 28018G23KT 10SM FEW022 M12/M18 A2995=

[1545 CST] METAR KUES 042145Z 27016G22KT 10SM SKC M12/M18 A2997=

KUES weather at 1045 CST, wind from 280° at 20 knots with gusts to 28 knots, 10 miles visibility, scattered clouds at 2,200 feet above ground level (agl), temperature of -13° Celsius (C), dew point temperature of -18° C, and an altimeter setting of 29.98 inches of mercury.

KUES weather at 1145 CST, wind from 280° at 20 knots with gusts to 28 knots, 10 miles visibility, scattered clouds at 2,200 feet agl, temperature of -13° C, dew point temperature of -18° C, and an altimeter setting of 29.95 inches of mercury.

KUES weather at 1245 CST, wind from 260° at 15 knots with gusts to 25 knots, 10 miles visibility, few clouds at 2,200 feet agl, temperature of -12° C, dew point temperature of -18° C, and an altimeter setting of 29.94 inches of mercury.

KUES weather at 1345 CST, wind from 270° at 20 knots with gusts to 28 knots, 10 miles visibility, few clouds at 2,200 feet agl, temperature of -12° C, dew point temperature of -18° C, and an altimeter setting of 29.94 inches of mercury.

Lawrence J Timmerman Airport (KMWC) was the next closest official weather station to the accident site, located 5 miles northwest of Milwaukee, Wisconsin. KMWC had an AWOS whose reports were supplemented by air traffic control. KMWC was located 6 miles east of the accident site, at an elevation of 745 feet, and had a 2° westerly magnetic variation⁵ (figure 7). The following observations were taken and disseminated during the times surrounding the accident:

[0655 CST] METAR KMWC 041255Z AUTO 28017G25KT 10SM SCT021 M13/M17 A2996
RMK AO2=

[0705 CST] SPECI KMWC 041305Z 28014G23KT 10SM BKN021 M13/M18 A2996=

⁵ Magnetic variation – The angle (at a particular location) between magnetic north and true north. 1990, latest measurement taken from <http://www.aimav.com/airport/KMWC>

[0745 CST] METAR KMWC 041345Z 28014G24KT 10SM BKN021 M13/M18 A2995=

[0845 CST] METAR KMWC 041445Z 28021G29KT 10SM SCT021 M13/M18 A2996=

[0945 CST] METAR KMWC 041545Z 28017G23KT 10SM SKC M12/M18 A2998=

[1045 CST] METAR KMWC 041645Z 28018G26KT 10SM SKC M12/M18 A2998=

[1145 CST] METAR KMWC 041745Z 26017G22KT 10SM SKC M11/M18 A2996=

ACCIDENT TIME 1208 CST

[1245 CST] METAR KMWC 041845Z 25014G22KT 10SM SKC M11/M18 A2994=

[1345 CST] METAR KMWC 041945Z 28015G24KT 10SM SKC M11/M19 A2994=

[1445 CST] METAR KMWC 042045Z 28016G26KT 10SM SKC M11/M19 A2995=

[1545 CST] METAR KMWC 042145Z 29015G22KT 10SM SKC M11/M19 A2997=

KMWC weather at 1045 CST, wind from 280° at 18 knots with gusts to 26 knots, 10 miles visibility, skies clear, temperature of -12° C, dew point temperature of -18° C, and an altimeter setting of 29.98 inches of mercury.

KMWC weather at 1145 CST, wind from 260° at 17 knots with gusts to 22 knots, 10 miles visibility, skies clear, temperature of -11° C, dew point temperature of -18° C, and an altimeter setting of 29.96 inches of mercury.

KMWC weather at 1245 CST, wind from 250° at 14 knots with gusts to 22 knots, 10 miles visibility, skies clear, temperature of -11° C, dew point temperature of -18° C, and an altimeter setting of 29.94 inches of mercury.

KMWC weather at 1345 CST, wind from 280° at 15 knots with gusts to 24 knots, 10 miles visibility, skies clear, temperature of -11° C, dew point temperature of -19° C, and an altimeter setting of 29.94 inches of mercury.

The observations from KUES and KMWC surrounding the accident time indicated VFR⁶ conditions around the accident site at the accident time. There were strong surface wind gusts at both KUES and KMWC surrounding the accident time with gusts between 22 and 28 knots. The strong surface wind conditions would have been expected given the surface pressure gradient conditions (section 1.1) and weather forecasts (sections 8.0 through 13.0).

⁶ Visual Flight Rules – Refers to the general weather conditions pilots can expect at the surface. VFR criteria means a ceiling greater than 3,000 feet agl and greater than 6 miles visibility.

4.0 Upper Air Data

A High-Resolution Rapid Refresh (HRRR)⁷ model sounding was created for the accident site for 1200 CST. The 1200 CST sounding was plotted on a standard Skew-T log P diagram⁸ with the derived stability parameters included in figure 8 (with data from the surface to 700-hPa, or 9,200 feet msl.) This data was analyzed using the RAOB⁹ software package. The sounding depicted the lifted condensation level (LCL)¹⁰ at 2,836 feet msl, a convective condensation level (CCL)¹¹ of 10,807 feet, and a level of free convection (LFC)¹² at 2,836 feet. The surface was well below freezing. The precipitable water value was 0.09 inches.

⁷ 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.

⁸ Skew T log P diagram – is a standard meteorological plot using temperature and the logarithmic of pressure as coordinates, used to display winds, temperature, dew point, and various indices used to define the vertical structure of the atmosphere.

⁹ RAOB – (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Environmental Research Services, Matamoras, Pennsylvania.

¹⁰ Lifting Condensation Level (LCL) - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

¹¹ Convective Condensation Level (CCL) – The level in the atmosphere to which an air parcel, if heated from below, will rise dry adiabatically, without becoming colder than its environment just before the parcel becomes saturated.

¹² 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.

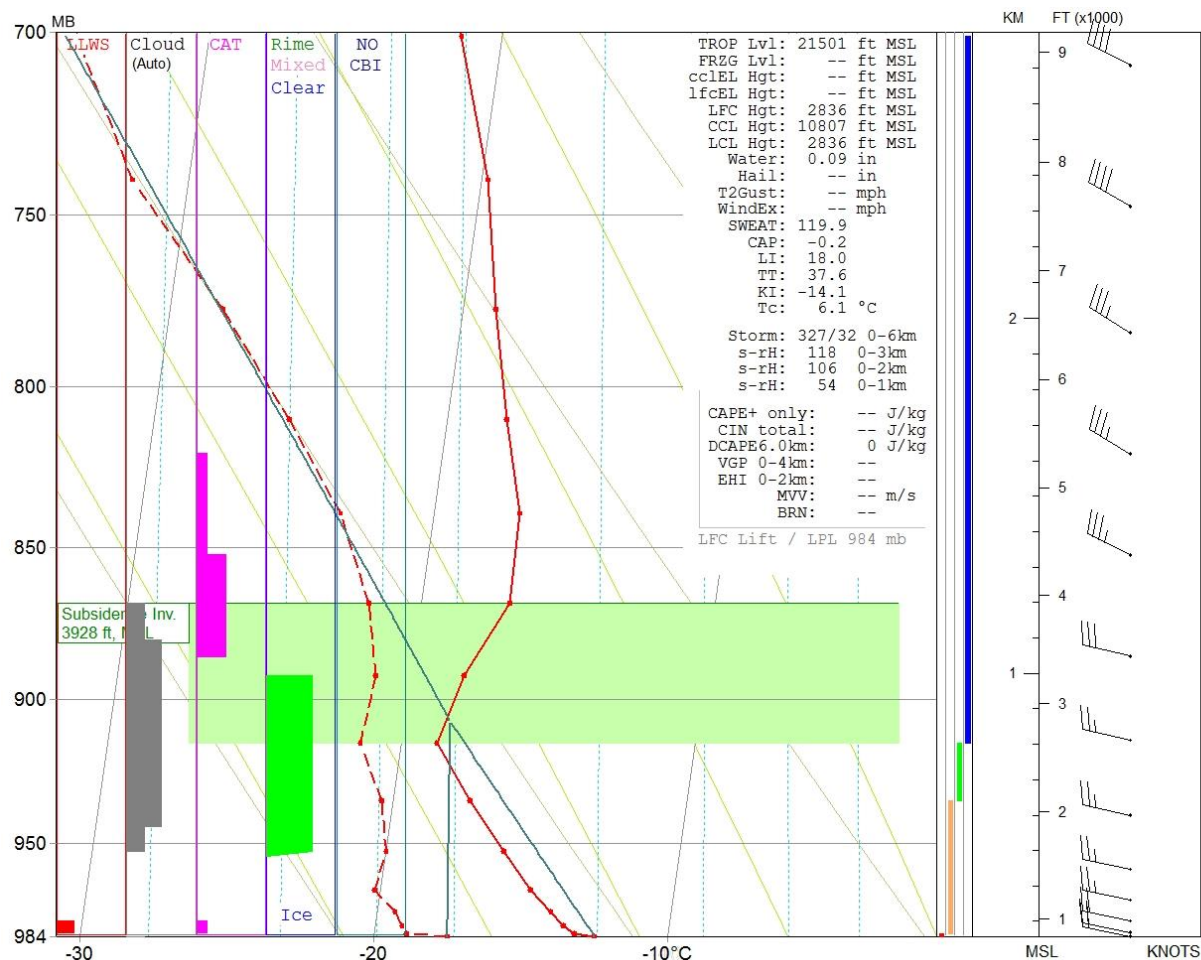


Figure 8 – 1200 CST HRRR sounding for the accident site

The 1200 CST HRRR sounding indicated an unstable layer between the surface and 2,000 feet with a conditionally unstable layer between 2,000 feet and 2,600 feet, and finally a stable layer above 2,600 feet. The unstable layer would have created a favorable environment for gusty wind conditions between the surface and 2,000 feet; allowing any strong winds from 2,000 feet to mix downward to the surface. RAOB indicated clouds between 1,800 feet and 4,000 feet along with rime icing conditions located within that cloud layer.

The 1200 CST HRRR sounding wind profile indicated a surface wind from 282° at 19 knots with the wind remaining primarily westerly to northwesterly through 9,200 feet. The wind speed increased to 25 knots by 1,500 feet, and then increasing to near 40 knots by 7,500 feet. RAOB indicated the possibility of low-level wind shear between the surface and 1,100 feet with clear-air turbulence near the surface and between 3,500 and 5,500 feet.

5.0 Satellite Data

Visible and infrared data from the Geostationary Operational Environmental Satellite number 13 (GOES-13) data was obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System software. Visible and infrared imagery (GOES-13 bands 1 and 4) at wavelengths of 0.65 microns (μm) and 10.7 μm , respectively, were retrieved for the period. Satellite imagery surrounding the time of the accident, from 1000 CST through 1400 CST at approximately 15-minute intervals were reviewed, and the closest images to the time of the accident are documented here.

Figures 9 and 10 present the GOES-13 visible imagery from 1145 and 1215 CST at 2X magnification with the accident site highlighted with a red square. The visible imagery indicated no cloud cover over the accident site at the accident time. There were “lake effect” clouds forming and moving eastward in Lake Michigan. The visible imagery only indicated snow on the ground throughout the state of Wisconsin at the accident time. It should be noted these figures have not been corrected for any parallax error.

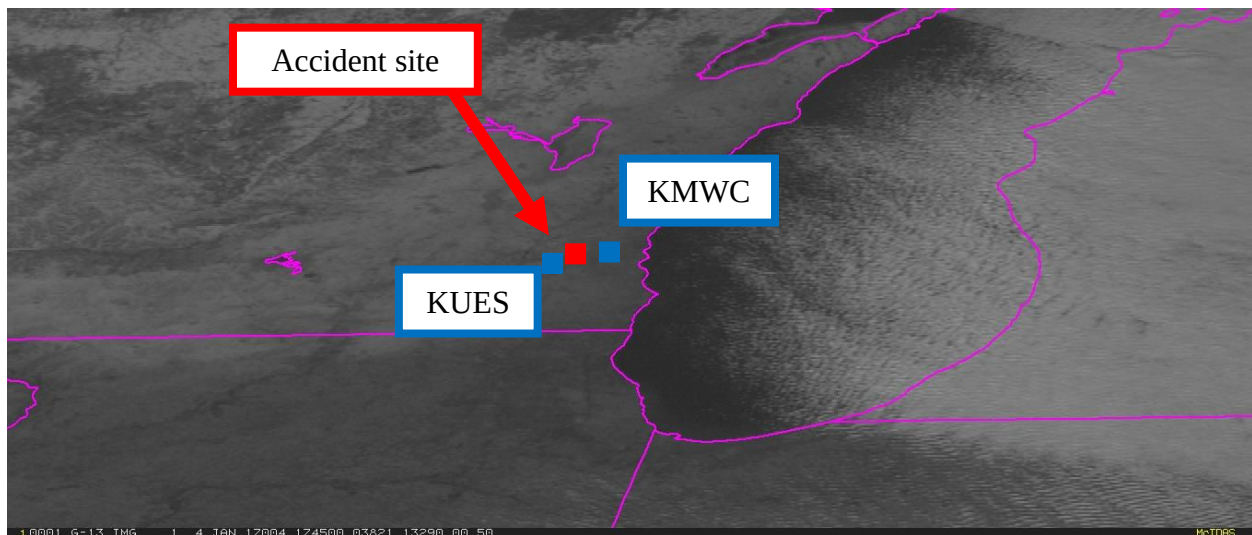


Figure 9 – GOES-13 visible image at 1145 CST

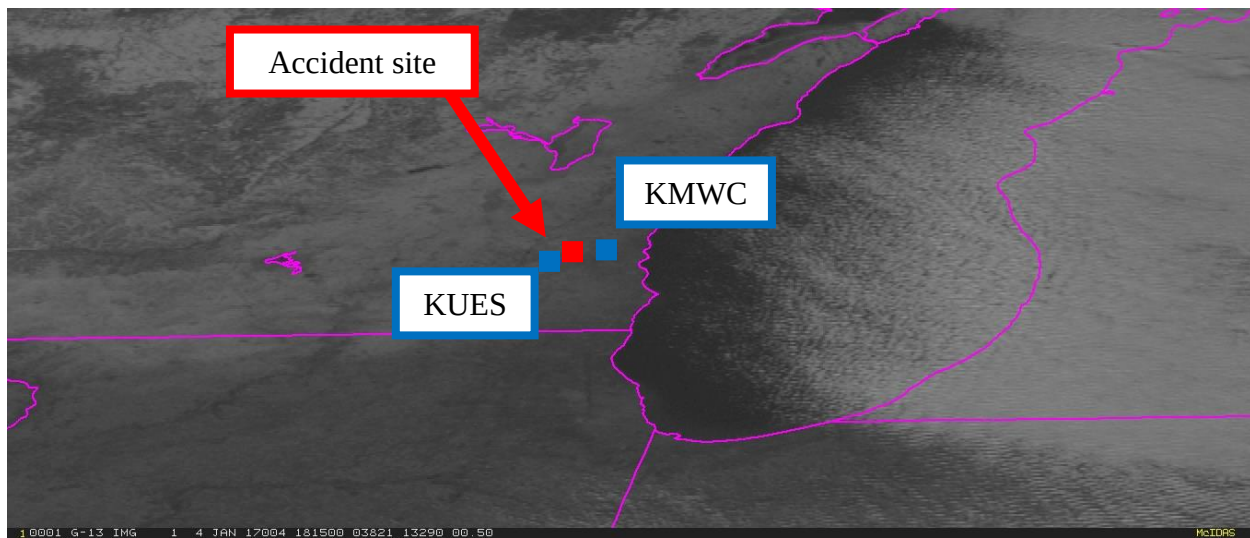


Figure 10 – GOES-13 visible image at 1215 CST

6.0 Radar Imagery Information

The closest NWS Weather Surveillance Radar-1988, Doppler (WSR-88D)¹³ to the accident site was the Milwaukee, Wisconsin, radar (KMKX), which was located 18 miles west-southwest of the accident site at an elevation of 958 feet. Level II and III archive radar data were obtained from the NCEI utilizing the NEXRAD Data Inventory Search and displayed using the NOAA's Weather and Climate Toolkit software. No reflectivity targets were located above the accident site at the accident time.

7.0 Pilot Reports¹⁴

All pilot reports (PIREPs) close to the accident site from about three hours prior to the accident time to about three hours after the accident time were reviewed. The only PIREP for below FL150¹⁵ is provided below:

IKK UA /OV IKK135015 /TM 2004 /FL023 /TP C172 /SK SCT030 /TA M10 /TB LGT CHOP=

Routine pilot report (UA); 15 miles from Kankakee, Illinois, on the 135° radial; Time – 1404 CST (2004Z); Altitude – 2,300 feet; Type aircraft – Cessna 172; Sky – Scattered clouds at 3,000 feet; Temperature – -10° C; Turbulence – Light chop.

¹³ The WSR-88D is an S-band 10-centimeter wavelength radar with a power output of 750,000 watts, and with a 28-foot parabolic antenna that concentrates the energy between a 0.87° and 0.96° beam width. The radar produces three basic types of products: base reflectivity, base radial velocity, and base spectral width.

¹⁴ Only pilot reports with the WMO header UBIL** and those UBWI** identifier were considered.

¹⁵ Flight Level – A Flight Level (FL) is a standard nominal altitude of an aircraft, in hundreds of feet. This altitude is calculated from the International standard pressure datum of 1013.25 hPa (29.92 inHg), the average sea-level pressure, and therefore is not necessarily the same as the aircraft's true altitude either above mean sea level or above ground level.

8.0 SIGMET and CWSU Advisory

There were no SIGMETs were valid for the accident site at the accident time.

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

9.0 AIRMETs

AIRMET Tango was issued at 0845 CST and valid at the accident time for the accident site (figures 11 through 15). The AIRMET forecasted moderate turbulence below 8,000 feet:

WAUS43 KPCI 041445

WA3T

_CHIT WA 041445

AIRMET TANGO UPDT 2 FOR TURB AND STG SFC WNDZ VALID UNTIL 042100

.
AIRMET TURB...ND SD NE KS MN IA MO WI LM MI IL IN KY
FROM 60WSW DIK TO 30W MSP TO 40WSW PMM TO FWA TO CVG TO HNN TO
HNV TO 50WNW ARG TO 50SSW OBH TO BFF TO 70SW RAP TO 60WSW DIK
MOD TURB BTN FL180 AND FL320. CONDS CONTG BYD 21Z THRU 03Z.

.
AIRMET TURB...KS MO OK TX AR TN LA MS AL
FROM OSW TO RZC TO 50WNW ARG TO HNV TO GQO TO 20SW LGC TO 40SSW
MLU TO 40W MRF TO ELP TO INK TO 30ESE TBE TO 50W LBL TO 20SSW
MMB TO OSW
MOD TURB BTN FL240 AND FL370. CONDS CONTG BYD 21Z THRU 03Z.

.
AIRMET TURB...MN WI LM LS MI LH IL IN
FROM YQT TO SSM TO YVV TO 30SE ECK TO FWA TO 50SW ROD TO 60S JOT
TO 40SW DLL TO DLH TO YQT
MOD TURB BLW 080. CONDS CONTG BYD 21Z THRU 03Z.

.
AIRMET STG SFC WNDZ...MI LH
FROM 70NW YVV TO 30ENE ECK TO 20S ASP TO 30N ASP TO 70NW YVV
SUSTAINED SURFACE WINDS GTR THAN 30KT EXP. CONDS DVLPG 15-18Z.
CONDS CONTG BYD 21Z ENDG 21-00Z.

.
OTLK VALID 2100-0300Z
AREA 1...TURB ND SD NE MN IA MO WI LM MI IL IN KY
BOUNDED BY 50WSW DIK-40ENE ABR-30SE ECK-FWA-CVG-HNN-HNV-40WSW
BWG-20ENE STL-30SE ANW-70SW RAP-50WSW DIK
MOD TURB BTN FL180 AND FL320. CONDS CONTG THRU 03Z.

.
AREA 2...TURB KS MO KY OK TX AR TN LA MS AL
BOUNDED BY GLD-OSW-70W ARG-40NE ARG-40WSW BWG-HNV-GQO-30S LGC-
50E LFK-50SSW MRF-ELP-INK-30ESE TBE-50W LBL-GLD
MOD TURB BTN FL240 AND FL370. CONDS CONTG THRU 03Z.

....

WAUS43 KPCI 041445

WA3S

_CHIS WA 041445

AIRMET SIERRA UPDT 2 FOR IFR AND MTN OBSCN VALID UNTIL 042100

.
 AIRMET IFR...WI LM LS MI
 FROM 20ESE YQT TO SSM TO 70SW SSM TO 40N RHI TO 40E DLH TO 20ESE
 YQT
 CIG BLW 010/VIS BLW 3SM PCPN. CONDS CONTG BYD 21Z THRU 03Z.

.
 AIRMET IFR...LM LS MI LH IN
 FROM SSM TO 60NNE ASP TO 30W MBS TO 60SSE GRR TO 30WSW GIJ TO
 50NW TVC TO SSM
 CIG BLW 010/VIS BLW 3SM PCPN. CONDS CONTG BYD 21Z THRU 03Z.

.
 AIRMET IFR...SD NE
 FROM 60NW RAP TO 60WNW OVR TO 60S OBH TO 40SE SNY TO BFF TO 70SW
 RAP TO 60NW RAP
 CIG BLW 010/VIS BLW 3SM PCPN. CONDS CONTG BYD 21Z THRU 03Z.

.
 AIRMET MTN OBSCN...KY TN
 FROM HNN TO HNV TO GQO TO 60SW LOZ TO HNN
 MTNS OBSC BY CLDS/BR. CONDS ENDG 15-18Z.

.
 OTLK VALID 2100-0300Z...IFR SD NE KS IA MO
 BOUNDED BY 60NNW RAP-50W FSD-40W FOD-30NW IRK-MCI-40SE MCK-GLD-
 BFF-70SW RAP-60NNW RAP
 CIG BLW 010/VIS BLW 3SM PCPN. CONDS CONTG THRU 03Z.

....
 WAUS43 KPCI 041445
 WA3Z
 _CHIZ WA 041445
 AIRMET ZULU UPDT 2 FOR ICE AND FRZLVL VALID UNTIL 042100

.
 AIRMET ICE...WI LM LS MI LH
 FROM 70ESE YQT TO SSM TO YVV TO 30SE ECK TO 40WSW DXO TO 30WNW
 GIJ TO 70SSE SAW TO 60NNW RHI TO 70ESE YQT
 MOD ICE BLW 070. CONDS CONTG BYD 21Z THRU 03Z.

.
 AIRMET ICE...SD NE KS IA MO
 FROM 70SW RAP TO 50E ONL TO 30SE IRK TO 50W COU TO 40WSW MCI TO
 GLD TO BFF TO 70SW RAP
 MOD ICE BTN 040 AND FL180. CONDS CONTG BYD 21Z THRU 03Z.

.
 OTLK VALID 2100-0300Z...ICE SD NE KS IA MO IL IN
 BOUNDED BY 70SW RAP-40NNE DSM-20SSW JOT-30ESE IND-40NNE PXV-70WSW
 FAM-20ENE BUM-50WSW MCI-30E GCK-GLD-BFF-70SW RAP
 MOD ICE BTN 040 AND FL180. CONDS CONTG THRU 03Z.

.
 FRZLVL...RANGING FROM SFC-120 ACRS AREA
 MULT FRZLVL BLW 120 BOUNDED BY 50SSW GLD-50SSW TUL-60SE DYR-
 40SE LOZ-HMV-GQO-40WNW ATL-20E AEX-30SW IAH-50WNW PSX-
 50ESE DLF-70W INK-INK-30ESE TBE-50W LBL-50SSW GLD
 SFC ALG 50SE BWG-30S HNN

....



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NOAA NATIONAL WEATHER SERVICE



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INFO

METARs

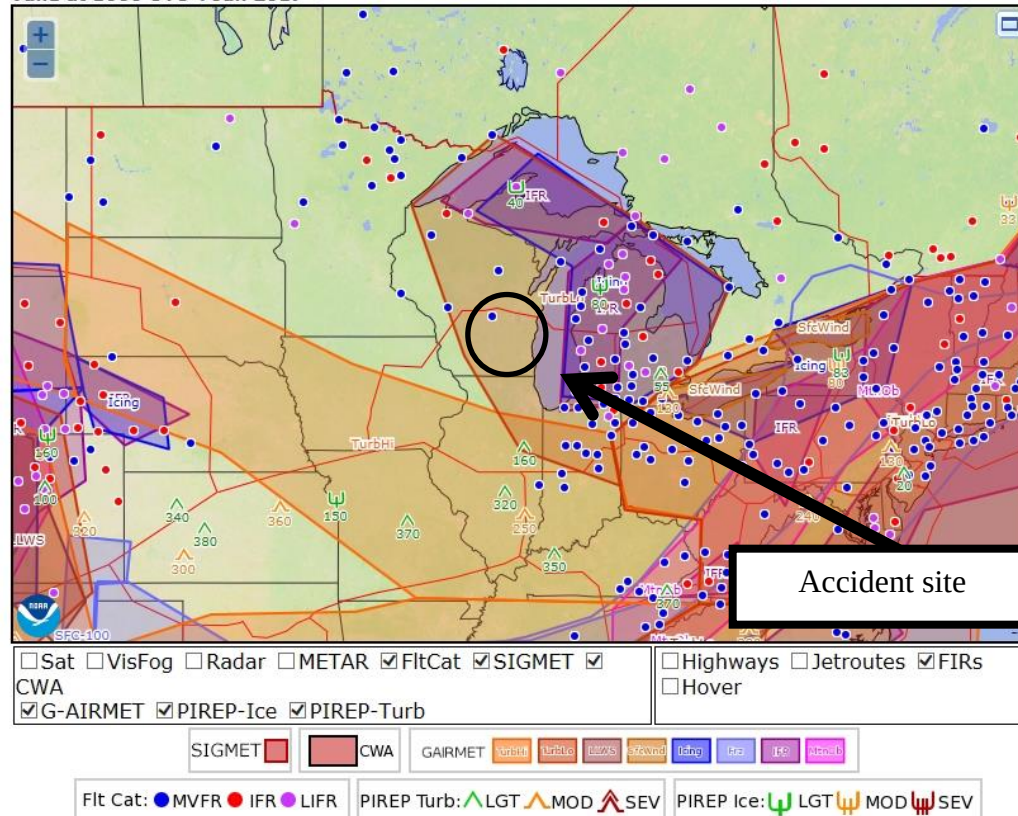
TAFs

AIR/PIREPs

SIGMETs

G-AIRMETs

Valid at 1600 UTC 4 Jan 2017



Disclaimer: International SIGMET locations approximated. Please refer to SIGMET text for full details

Figure 12 – SIGMETs, AIRMETs, CWAs, and PIREPs valid for the accident area at 1000 CST

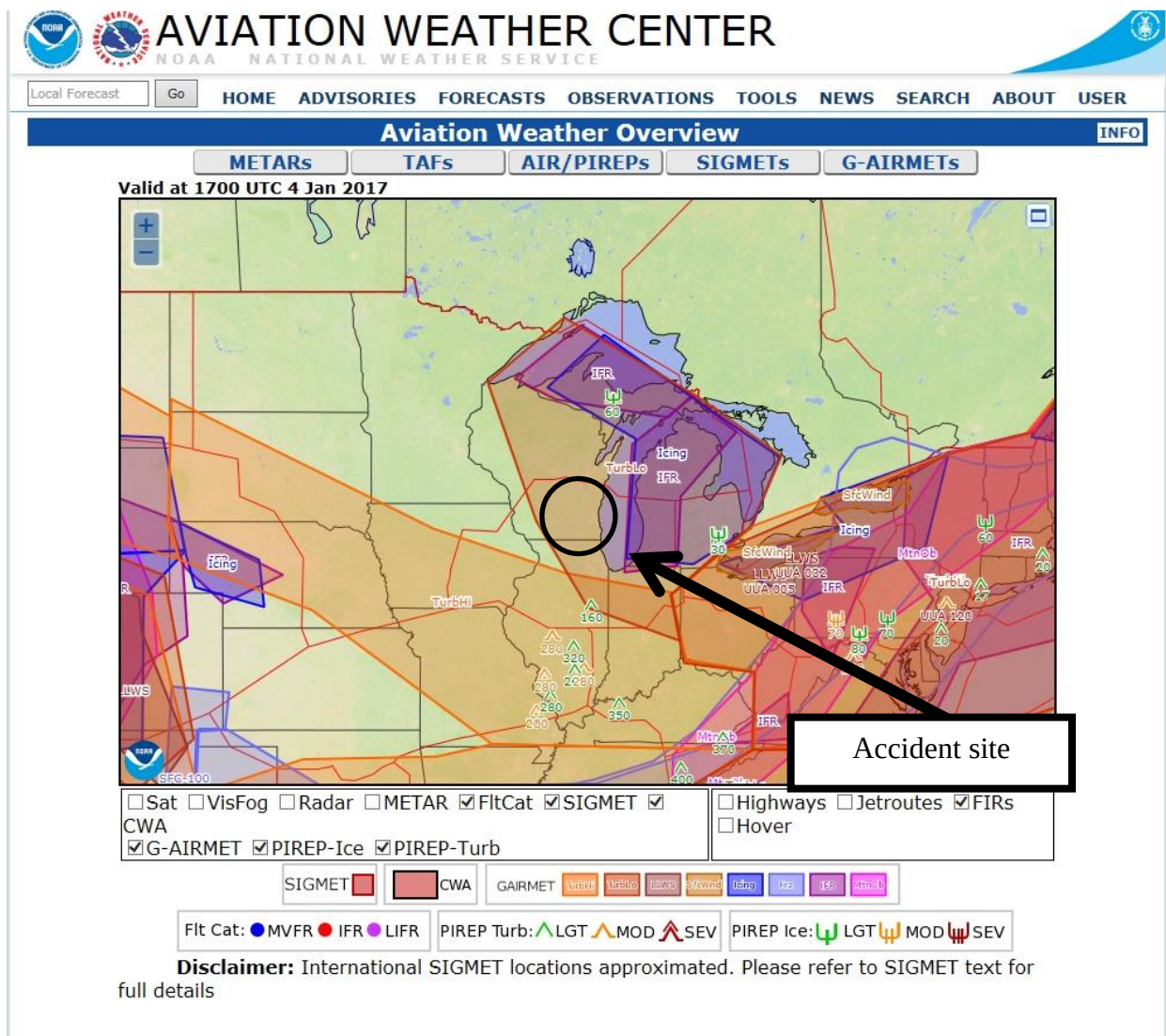


Figure 13 – SIGMETs, AIRMETs, CWAs, and PIREPs valid for the accident area at 1100 CST



AVIATION WEATHER CENTER

NOAA NATIONAL WEATHER SERVICE

Local Forecast

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Aviation Weather Overview

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METARs

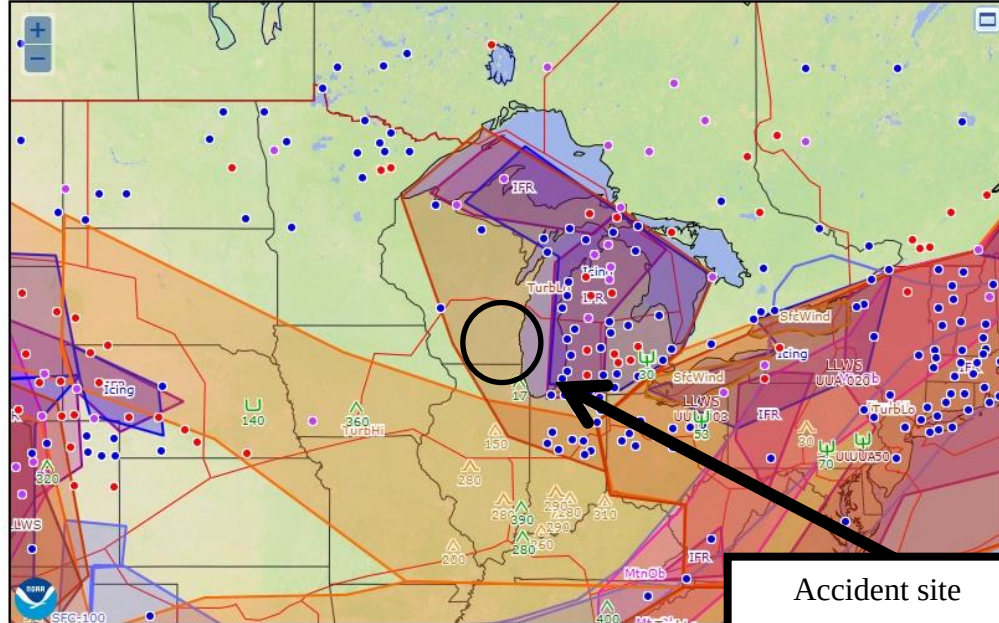
TAFs

AIR/PIREPs

SIGMETs

G-AIRMETs

Valid at 1800 UTC 4 Jan 2017



Accident site

☐ Sat	☐ VisFog	☐ Radar	☐ METAR	☒ FltCat	☒ SIGMET	☒
CWA						
☒ G-AIRMET	☒ PIREP-Ice	☒ PIREP-Turb				
SIGMET ☐ CWA ☐ G-AIRMET ☐ Turb ☐ Icing ☐ SttWind ☐ IFR ☐ LWS ☐ MtnGlb						
Flt Cat: ☒ MVFR ☒ IFR ☒ LIFR						
PIREP Turb: ☒ LGT ☒ MOD ☒ SEV						
PIREP Ice: ☒ LGT ☒ MOD ☒ SEV						

Disclaimer: International SIGMET locations approximated. Please refer to SIGMET text for full details

Figure 14 – SIGMETs, AIRMETs, CWAs, and PIREPs valid for the accident area at 1200 CST



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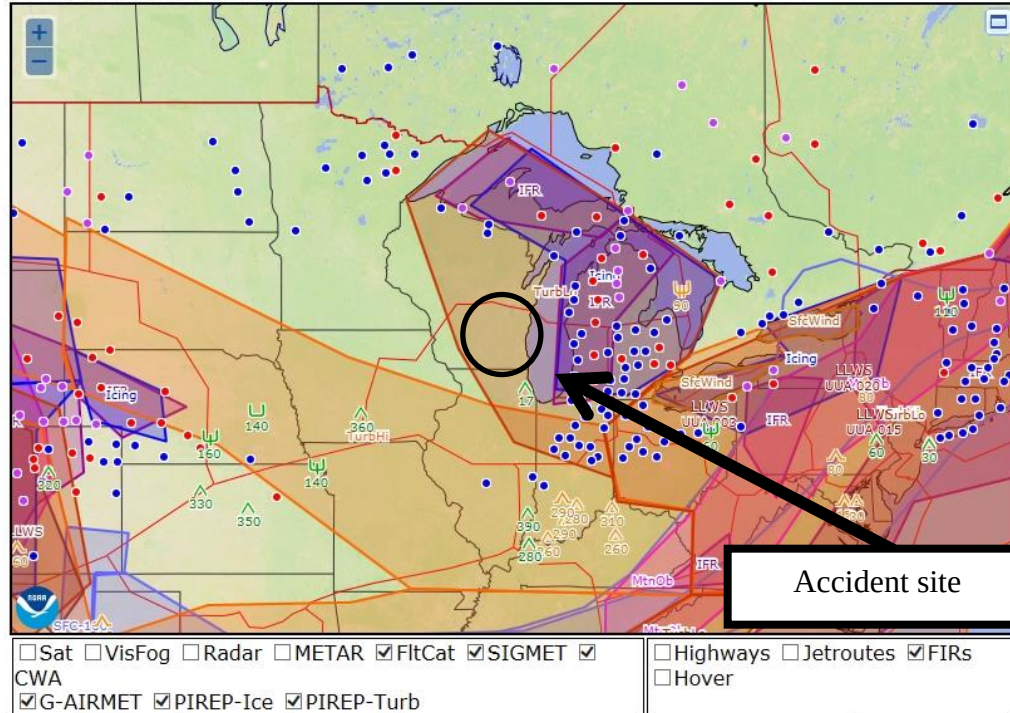
TAFs

AIR/PIREPs

SIGMETs

G-AIRMETs

Valid at 1900 UTC 4 Jan 2017



Disclaimer: International SIGMET locations approximated. Please refer to SIGMET text for full details

Figure 15 – SIGMETs, AIRMETs, CWAs, and PIREPs valid for the accident area at 1300 CST

10.0 Area Forecast

The Area Forecast issued at 0445 CST, valid at the accident time, forecasted scattered clouds at 14,000 feet with a northwest wind with gusts to 25 knots:

FAUS43 KPCI 041045

FA3W

_CHIC FA 041045

SYNOPSIS AND VFR CLDS/WX

SYNOPSIS VALID UNTIL 050500

CLDS/WX VALID UNTIL 042300...OTLK VALID 042300-050500

ND SD NE KS MN IA MO WI LM LS MI LH IL IN KY

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...11Z LOW OVR SWRN ONT WITH TROF EXTDG FM THE LOW ACRS
UPR MI TO NERN MN. RDG OF HIGH PRES OVR THE PLAINS. 05Z RDG OF
HIGH PRES FM THE NRN PLAINS THRU THE LWR OH VLY. TROF EXTDG E-W
ACRS LS INTO NERN MN.

.
ND

W THIRD...BKN060 TOPS 100. OTLK...MVFR CIG.
CNTRL THIRD...SCT050 SCT-BKN110 TOPS 120. 16Z BKN060. 22Z BKN040
TOPS 140. OTLK...MVFR CIG.
E THIRD...SCT120 SCT CI. BECMG 1417 SCT-BKN110 TOPS 120. 22Z
BKN045. OTLK...VFR.

.
SD

WRN...SCT-BKN080 TOPS 120. 17Z BKN070. OTLK...VFR.
CNTRL...SCT030 SCT CI. BECMG 1619 SCT-BKN060 BKN100 TOPS 120.
OTLK...VFR.
NERN...SCT110. BECMG 1821 BKN040 TOPS 120. OTLK...MVFR CIG.
SERN...SCT CI. BECMG 1821 SCT-BKN110 TOPS 130. OTLK...VFR.

.
NE

PNHDL...OVC050-060 LYRD FL250. VIS 4SM -SN. OTLK...IFR CIG SN BR.
RMNDR W HLF...
NRN PTNS...SCT120 OVC CI. BECMG 1820 OVC060 LYRD FL280. OCNL
VIS 4SM -SN. OTLK...VFR SN 02Z VFR.
SRN PTNS...OVC060 LYRD FL250. OCNL -SN. 18Z OVC060. VIS 3SM
-SN. OTLK...MVFR CIG SN.
NERN QTR...BKN150 TOPS FL200. 18Z OVC100. OTLK...VFR SN.
SE QTR...BKN110 TOPS 160. BECMG 1821 BKN060-070. OCNL VIS 5SM
-SN. OTLK...MVFR CIG SN.

.
KS

N HLF...SCT140 SCT CI. BECMG 1518 BKN-SCT100 TOPS 170. OTLK...VFR
THRUT 05Z SN ERN SXNS.
S HLF...SCT CI. OCNL SCT150. BECMG 1821 SCT-BKN140 TOPS 170 BKN
CI. OTLK...VFR.

.
MN

NW QTR...SCT-BKN CI. 14Z BKN060 BKN130 TOPS 150. OTLK...MVFR CIG.
NERN QTR...SCT025 SCT-BKN060 TOPS 100. OTLK...VFR.
S HLF...SKC. OCNL SCT020. TIL 22Z WND NW G25-30KT EXTRM SERN
SXNS. OTLK...VFR.

.
IA

W THIRD...SCT120 SCT-BKN150 TOPS FL200. OTLK...VFR.
CNTRL THIRD...SKC. OCNL SCT030. BECMG 2022 SCT060 BKN110 TOPS
150. OTLK...VFR THRUT 03Z MVFR CIG SHSN SRN SXNS.
E THIRD...SKC. OTLK...VFR.

.
MO

NW QTR...SKC. OCNL SCT060. 15Z SCT-BKN070 BKN110 TOPS 150.
OTLK...VFR 04Z MVFR CIG SN.
NERN QTR...SKC. OCNL SCT CI. BECMG 1720 BKN100 TOPS 160.
OTLK...VFR.
S HLF...SCT-BKN CI. TIL 15Z OCNL SCT025 SERN SXNS. OTLK...VFR.

.
WI
EXTRM NWRN...BKN025 TOPS 120. OCNL -SN. 16Z SCT035 SCT060.
OTLK...VFR.
RMNDR W HLF...SCT030. OTLK...VFR.
NERN QTR...SCT025 BKN035 TOPS 080. SCT -SHSN. WND NW G25-30KT.
BECMG 1821 SCT035. OTLK...VFR.
EXTRM SERN...BKN035 TOPS 060. WND NW G25-30KT. 15Z SCT090. WND NW
G30KT. OTLK...VFR WND 02Z VFR.
**RMNDR SE QTR...SCT030. 16Z SCT140. WND NW G25KT. OTLK...VFR WND
02Z VFR.**

.
LS UPR MI
OVC020 TOPS 130. VIS 3SM IN SCT -SHSN BLSN. WND NW G25-30KT.
OTLK...IFR CIG SHSN BLSN.

.
LM LWR MI LH
N HLF...OVC020-030 TOPS 100. VIS 3-5SM IN SCT -SHSN BLSN. WND W
G25KT. 15Z WND NW 20G35KT. OTLK...IFR CIG SHSN BLSN WND NRN
SXNS...MVFR CIG SHSN BLSN WND SRN SXNS.
SW QTR...OVC030 TOPS 060. VIS 3SM IN SCT -SHSN BLSN. WND NW
G25-30KT. OTLK...IFR SHSN BLSN WND.
SE QTR...OVC025 TOPS 050. WND W G25-30KT. 14Z BKN035 TOPS 060.
WND W 20G35KT. OTLK...VFR THRUT...WND NRN SXNS.

.
IL
NRN QTR...SCT030. WND NW G25-30KT. OTLK...VFR.
W CNTRL...SKC. OCNL SCT CI. 21Z SCT-BKN100 TOPS 150. OTLK...VFR.
RMNDR...SCT CI. OTLK...VFR.

.
IN
EXTRM NWRN...BKN025 TOPS 050. WND NW G25-30KT. 14Z WDLY SCT
-SHSN. OTLK...VFR.
RMNDR N HLF...SCT-BKN050 TOPS 060. WND W G25-30KT. 17Z SCT080.
WND NW G25-30KT. OTLK...VFR WND 03Z VFR.
S HLF...SCT020 SCT090 SCT CI. OTLK...VFR.

.
KY
W HLF...SCT025 SCT-BKN CI. 15Z SCT CI. OTLK...VFR.
E HLF...OVC020 TOPS 050. TIL 15Z OCNL -RA ERN SXNS. BECMG 1619
SCT120 SCT CI. OTLK...VFR.

....

11.0 Terminal Aerodrome Forecast

KUES was the closest site to the accident site with a NWS Terminal Aerodrome Forecast (TAF). The TAF valid at the time of the accident was issued at 1139 CST and was valid for a 24-hour period beginning at 1200 CST. The TAF for KUES was as follows:

TAF KUES 041739Z 0418/0518 29018G28KT P6SM FEW025
FM042200 28015G25KT P6SM SKC
FM050600 29011G21KT P6SM BKN110=

The forecast expected a wind from 290° at 18 knots with gusts to 28 knots, greater than 6 miles visibility, and few clouds at 2,500 feet agl.

The KUES TAF issued before the time the accident pilot received a Lockheed Martin Flight Service (LMFS) weather briefing (refer to section 14.0) was issued at 0905 CST. The 0905 TAF was valid for a 21-hour period beginning at 0900 CST. The 0905 TAF for KUES was as follows:

TAF AMD KUES 041505Z 0415/0512 **29019G29KT P6SM SCT020**
FM050100 29012G20KT P6SM BKN140=

The 0905 CST TAF expected a wind from 290° at 19 knots with gusts to 29 knots, greater than 6 miles visibility, and scattered clouds at 2,000 feet agl.

12.0 NWS Area Forecast Discussion

The NWS Office in Milwaukee/Sullivan, Wisconsin, issued the following Area Forecast Discussion (AFD) at 0318 CST (closest AFD to the accident time). The aviation section of the AFD discussed VFR conditions continuing through the TAF period with strong and gusty west to northwest wind conditions. The winds were forecast to diminish after sunset:

FXUS63 KMKX 040918

AFDMKX

Area Forecast Discussion

National Weather Service Milwaukee/Sullivan WI

318 AM CST Wed Jan 4 2017

.TODAY AND TONIGHT...Forecast confidence is high.

We remain in the zone between an arctic ridge stretched from the northern plains to Illinois and low pressure slowly pulling away to the northeast. The arctic air has arrived and the northwest winds will be steady and brisk today. Look for the winds to quiet down tonight. Wind chill values by Thursday morning will approach wind chill advisory criteria north Milwaukee and Madison, hitting -20 for a few hours centered around 5-6am. We should see a decent amount of sunshine today, followed by increasing clouds tonight associated with a system slipping by to the south on Thursday.

.THURSDAY THROUGH SUNDAY...Forecast confidence is high.

Arctic high pressure will dominate through the week and likely into the weekend. Low temperatures will be at or below zero. The surface pressure gradient will be weakening Thursday but a weak low level jet will allow for some 15 to 20 knot wind gusts during the day, especially in the east. Wind chill values of 10 to 20 below are expected Thursday and Friday mornings with the lowest values toward central WI. The pattern changes little through the weekend so these wind chill values will likely continue through Sunday morning.

Conditions look borderline for a Wind Chill Advisory for these days across the northern tier of counties so will hold off for now.

.MONDAY THROUGH WEDNESDAY...Forecast confidence is moderate.

Temperatures moderate on Monday as an upper ridge moves into the region with southwest flow at the surface. There is small chance for snow on Monday but that system may miss us to the north. Then a much stronger system moves through Tuesday and Wednesday. Models are in fairly good agreement on the track right now, but this far out that

can change. If precip starts early Tuesday there could be freezing rain or sleet, but the consensus is that precip won't start until the afternoon when temps warm above freezing. Some light snow is possible on the back edge early Wednesday morning.

&&

.AVIATION/12Z TAFS/...

VFR conditions are expected through the TAF period. The strong and gusty west to northwest winds will continue today, diminishing with sunset this evening.

&&

.MARINE...

The gale warning, for strong west to northwest winds, runs through 18z/noon today. Once that expires, a small craft advisory for continued elevated westerly winds will likely run through Thursday morning. Freezing spray will be a concern out toward open water. A heavy freezing spray warning is in effect for the open waters through this evening.

&&

.MKX WATCHES/WARNINGS/ADVISORIES...

WI...None.

LM...GALE WARNING until noon CST today for LMZ643>646.

&&

\$\$

13.0 Winds and Temperature Aloft Forecast

The NWS 0757 CST Winds and Temperature Aloft forecast valid for the accident flight is included below:

FBUS31 KWN0 041357

FD1US1

_DATA BASED ON 041200Z

_VALID 041800Z FOR USE 1400-2100Z. TEMPS NEG ABV 24000

FT 3000 6000 9000 12000 18000 24000 30000 34000 39000

_GRB 3035 3141-18 3138-23 3142-28 3048-39 3057-48 306345 296145 295747

The accident site was closest to the Green Bay, Wisconsin, forecast point. The 0757 CST GRB forecast indicated a wind at 3,000 feet from 300° at 35 knots and a wind at 6,000 feet from 310° at 41 knots with a temperature of -18° C.

14.0 Pilot Weather Briefing and Witness Information

A search of official weather briefing sources, such as LMFS and Direct User Access Terminal Service (DUATS), was done, and revealed that the accident pilot called and received a LMFS weather briefing at 0915 CST (attachments 1 and 2). During the 0915 CST weather briefing, the accident pilot and the weather briefer discussed the AIRMETs valid at 0915 CST (section 9.0) including all the AIRMETs along the intended route of flight and that current surface observations near the departure airport were VFR. The weather briefer asked if the accident pilot would like any TAFs, and the accident pilot replied that he had the TAFs and that the Area Forecast had the tops at 8,000 to 10,000 feet. The accident pilot did not request any additional weather information and only requested an abbreviated briefing. In addition to the audio weather briefing, the accident pilot received the LMFS text weather information (attachment 1) which contained all the valid AIRMETs (section 9.0), Area Forecast information (section 10.0), the TAFs (section 11.0) and surface observations (section 3.0) valid before 0915 CST, and Winds and Temperature Aloft forecast information (section 13.0). It is unknown if the accident pilot checked additional weather information before the accident flight.

15.0 Astronomical Data

The astronomical data obtained from the United States Naval Observatory for the accident site on January 4, 2017, indicated the following:

SUN

Begin civil twilight	0652 CST
Sunrise	0724 CST
Sun transit	1158 CST
Sunset	1632 CST
End civil twilight	1704 CST

F. LIST OF ATTACHMENTS

Attachment 1 – LMFS weather briefing text from 0915 CST weather briefing

Attachment 2 – LMFS weather briefing audio from 0915 CST weather briefing received by the accident pilot

Submitted by:

Paul Suffern
Senior Meteorologist

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