



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

March 1, 2021

Specialist's Factual Report

METEOROLOGY

CEN21FA125

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A. ACCIDENT

Location: Galt, Missouri
Date: February 8, 2021
Time: 1442 central standard time (CST)
2042 universal coordinated time (UTC)
Airplane: Cessna 177RG; Registration: N8080G

B. METEOROLOGIST

Don Eick
Senior Meteorologist
Operational Factors Division (AS-30)
National Transportation Safety Board

C. SUMMARY

On February 8, 2021, about 1442 central standard time, a Cessna 177RG airplane, N8080G, was destroyed when it was involved in an accident near Galt, Missouri. The pilot and passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 personal flight.

This report provides a meteorological review on the weather conditions and National Weather Service (NWS) aviation weather products applicable to the accident region around the accident time.

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 NWS sources including the Weather Prediction Center (WPC) and the National Center for Environmental Information (NCEI). All times are central standard time (CST) based upon the 24 hour clock, local time is +6 hours to UTC, and UTC=Z. Directions are referenced to true north and distances in nautical miles. Heights are in feet (ft) above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles.

The accident site was located at latitude 40.106588° N and longitude 93.373717° W at an elevation of approximately 790 ft.

E. WEATHER INFORMATION

1.0 Synoptic Conditions

The synoptic or large-scale migratory weather systems influencing the area were documented using standard NWS charts issued by the National Center for Environmental Prediction (NCEP) located in College Park, Maryland. These are the base products used in describing weather features and in the creation of forecasts and warnings. Reference to these charts and other weather products documented in this report can be found in the joint NWS and Federal Aviation Administration (FAA) Advisory Circular “Aviation Weather Services”, AC 00-45H change 2.

1.1 Surface Analysis Chart

The central section of the NWS Surface Analysis Chart for 1500 CST with the approximate accident site marked by the red star is included as Figure 1. The chart depicted a cold-core high pressure system¹ centered over northwest Iowa with a central pressure of 1029-hectopascals (hPa)². A low pressure system at 1010-hPa was located to the south-southwest over the Texas and Oklahoma border with a stationary front extending northeast from the low through Oklahoma into central Missouri to the south of the route of flight. Another developing warm front was depicted extending eastward from the low across Texas and Arkansas, into northern Mississippi and Alabama. An extensive area of clouds and mixed precipitation extended along and north of the stationary and warm front into northern Missouri and Iowa in the form of light continuous snow. The station models surrounding the accident site depicted wind from the north at 10 knots or less, overcast cloud cover, with visibility restricted in haze, with a temperature of 7° F and a dew point of 2° F. Numerous stations across Kansas, Iowa, northern Missouri, and Illinois surrounding the accident site reported light snow, with several station in Oklahoma, central and southern Missouri reporting light freezing rain and unknown freezing precipitation.

¹ The cold-core high pressure system was associated with an arctic airmass with very cold dense air.

² Hectopascal (hPa) is the standard international term for reporting sea level pressure and is interchangeable with the term millibar (mb) with the same units. Standard sea level pressure is 1013.25-hPa at 59° Fahrenheit (F) or 15° Celsius (C).

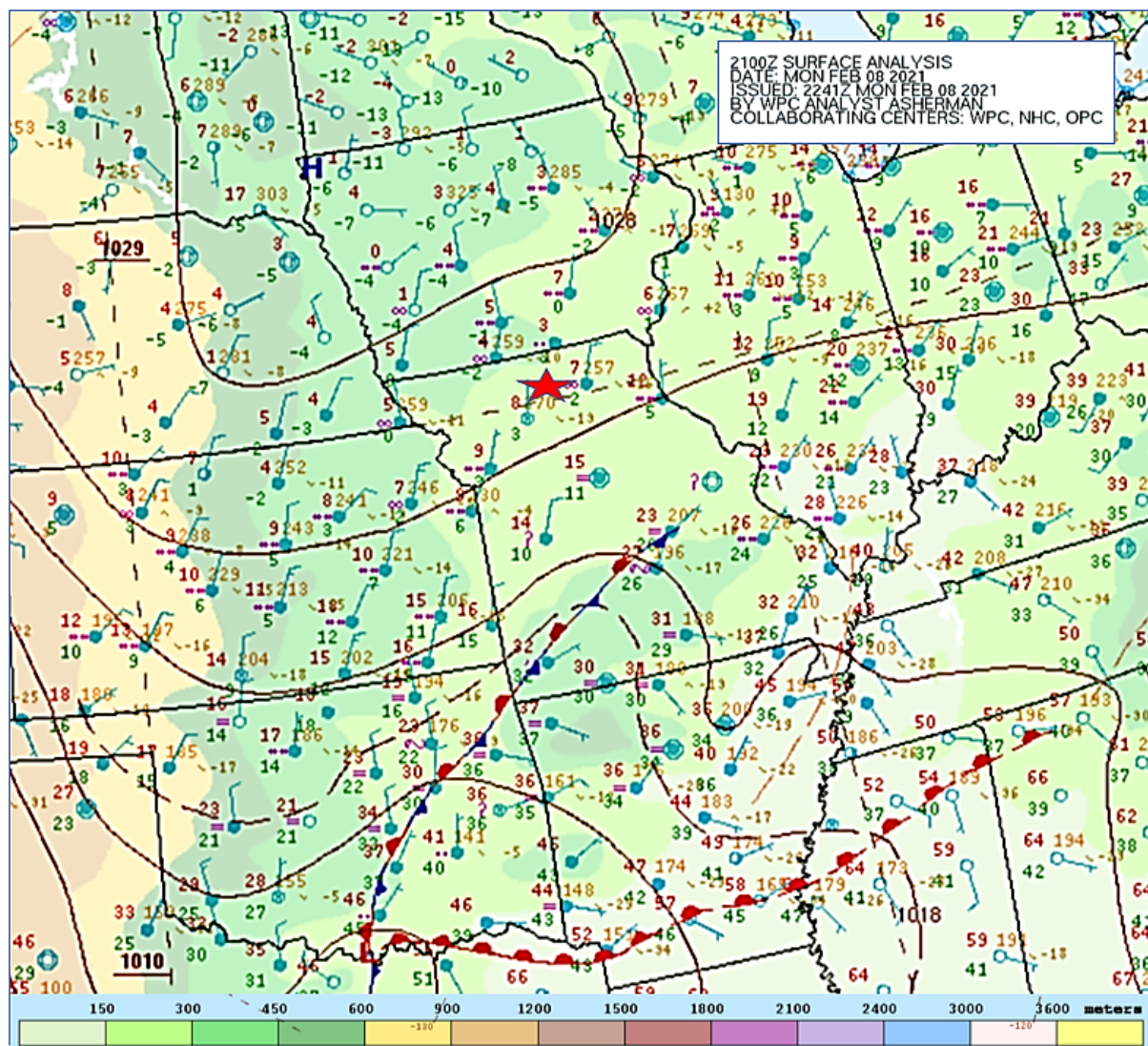


Figure 1 - Central section of the NWS Surface Analysis Chart for 1500 CST depicting the primary pressure systems and fronts over the area with the accident site marked by a red star.

1.2 National Composite Radar Mosaic

A regional view of the National Composite Radar Mosaic for 1440 CST over northern Missouri is included as Figure 2 with the approximate accident site marked by a red star. Several west-to-east bands of light intensity echoes associated with snow were depicted north of the accident site over Iowa and to the south between Kansas City and St. Louis. No significant echoes were depicted in the vicinity of the accident site; however, the accident site was in an area of a data gap in radar coverage as depicted in figure 3, where there was no coverage in the WSR-88D below 6,000 ft. A separate review of the closest NWS WSR-88D was from Kansas City/Pleasant Hill, Missouri (KEAX), which was located approximately 90 miles from the accident site. The lowest elevation scan of the 0.45° beam extended from approximately 6,670 ft to 15,770 ft over the accident site and could not identify any low level reflectivities over the area. The radar did detect an extensive area

of very light intensity echoes over the region with a band of 15 dBZ echoes extending eastward from the Kansas City area as depicted in Figure 2 below.



Figure 2 - Regional view of the National Composite Radar Mosaic for 1440 CST

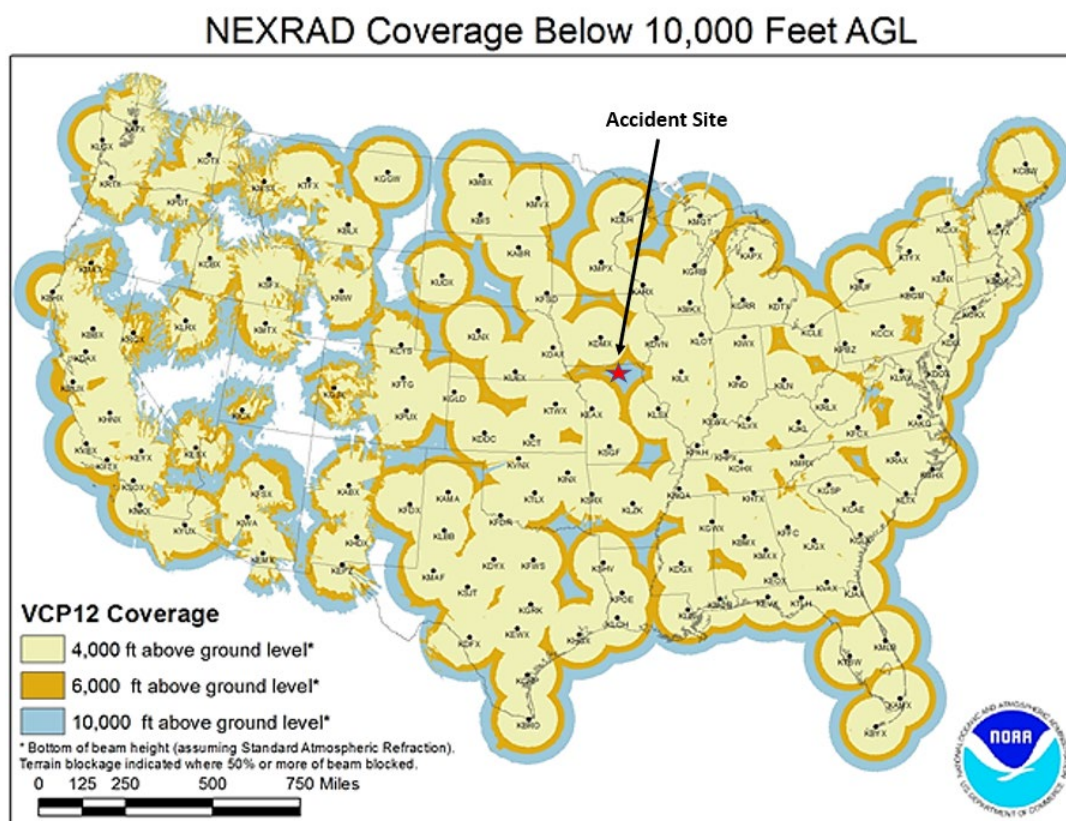


Figure 3 - Coverage of the WSR-88D showing a lack of coverage below 10,000 ft over the area

1.3 12-hour Surface Prognostic Chart

The 12-hour Surface Prognostic Chart valid for 1800 CST is included as figure 4 and depicted the primary pressure system, fronts, and precipitation expected during the period. The chart continued to depict the high pressure system moving over central Iowa and the low pressure system moving over Louisiana with the associated stationary front extending eastward across Mississippi, Alabama with an extensive area of rain north of the front. The precipitation was depicted as freezing precipitation from Oklahoma, into southern Missouri, and mixing with snow into southern Illinois and Indiana, and Kentucky, with rain over Arkansas, Mississippi, and Tennessee. Snow was also depicted across Colorado, Kansas, and Nebraska, with several small areas of snow in central Missouri and along the Iowa border.

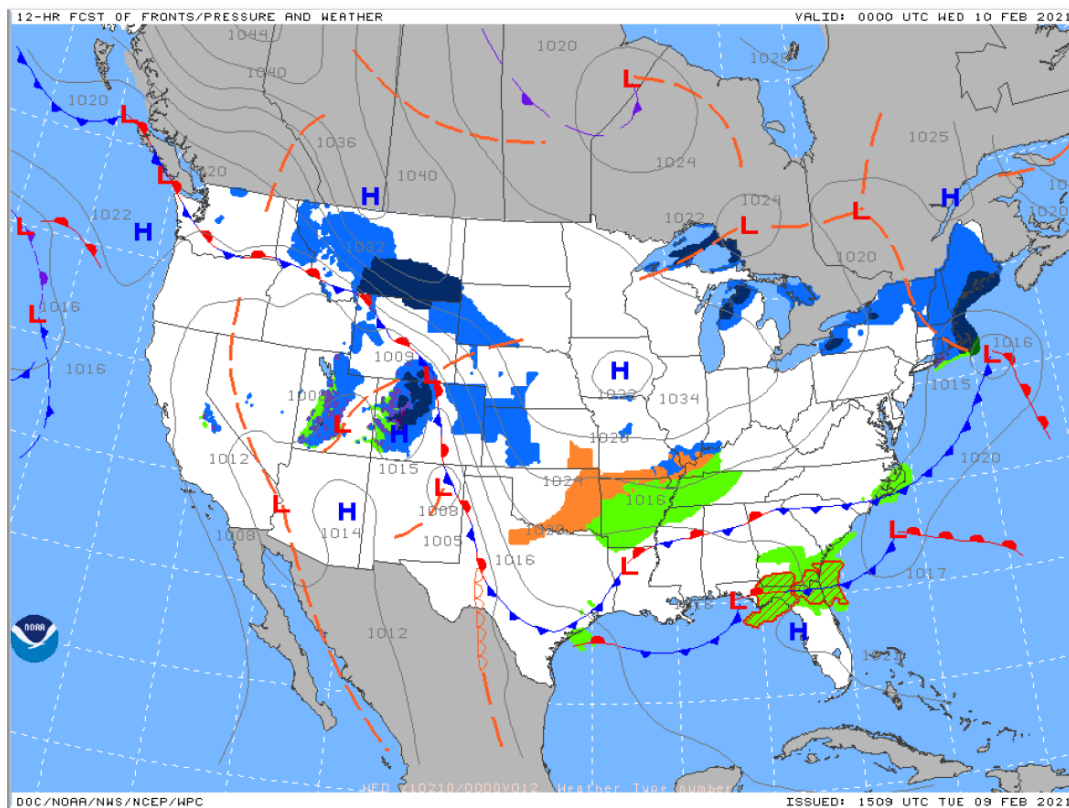


Figure 4 - 12-hour Surface Prognostic Chart valid for 1800 CST

1.4 12- and 24-hour Low Level Significant Weather Prognostic Chart

The 12- and 24-hour Low Level Significant Weather Prognostic Chart valid for the period of 1800 and 0600 CST on February 9, 2021 is included as Figure 5. The chart depicted the general flight categories³ of instrument flight rule (IFR) conditions (enclosed within the red line), marginal visual

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

- Low Instrument Flight Rules (LIFR*) – ceiling below 500 ft above ground level (agl) and/or visibility less than 1 statute mile.
- Instrument Flight Rules (IFR) – ceiling between 500 to below 1,000 feet agl and/or visibility 1 to less than 3 miles.

flight rule (MVFR) conditions (enclosed with the blue scalloped line), and visual flight rule (VFR) conditions (outside of the blue scalloped line), the freezing level (blue dashed line), and areas of expected moderate or greater turbulence below 24,000 ft. The 12-hour forecast valid for 1800 CST (left) depicted an extensive area of IFR conditions expected from northern Texas, Oklahoma, southeastern Kansas, Missouri, Illinois and into Michigan, with MVFR conditions across most of Iowa, Nebraska, and Kansas. The freezing level was depicted at the surface over southern Missouri, and implied potential icing in-clouds above that level. No turbulence was depicted over Missouri at the time.

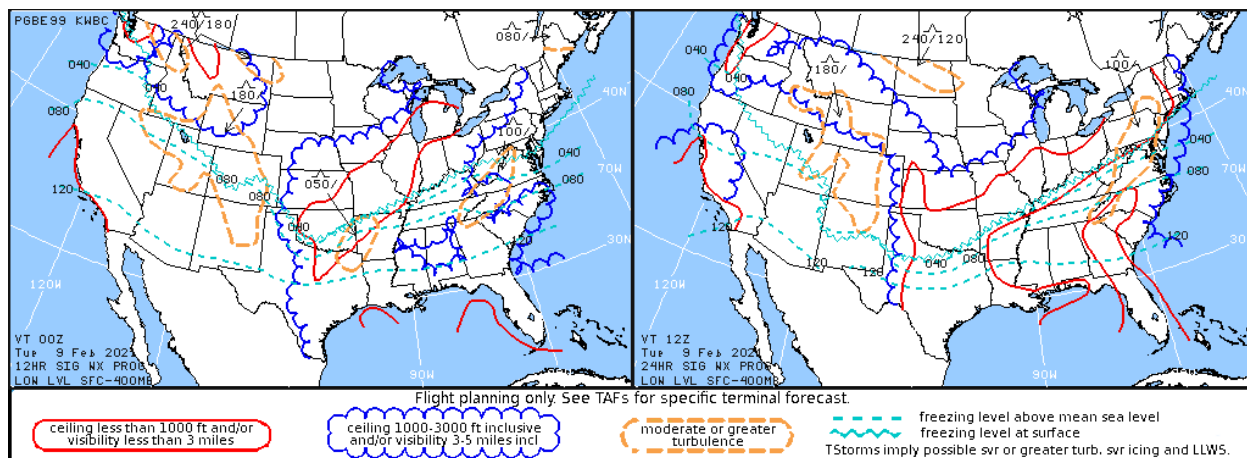


Figure 5 - 12-hr/24-hr Low Level Significant Weather Prognostic Chart valid for 1800 and 0600 CST

2.0 Observations

The official NWS Meteorological Aerodrome Reports (METARs) and Special Reports (SPECIs) surrounding the period were documented for the area. The cloud heights are reported above ground level (agl), and the magnetic variation over the region was estimated as 0° based on the sectional chart for the area.

2.1 Moberly, Missouri

The accident airplane departed from Omar N. Bradley Airport (KMBY), Moberly, Missouri, at approximately 1410 CST. The airport was at an elevation of 866 ft and had an Automated Weather Observation System (AWOS), which issued observations longline⁴ every 20-minutes. The accident site was located about 58 miles northwest from KMBY. The following conditions were reported at the time of departure.

- Marginal Visual Flight Rules (MVFR**) – ceiling from 1,000 to 3,000 ft agl and/or visibility 3 to 5 miles.
- Visual Flight Rules (VFR) – ceiling greater 3,000 ft agl and visibility greater than 5 miles.

* By definition, IFR is a ceiling less than 1,000 ft agl and/or visibility less than 3 miles while LIFR is a sub-category of IFR.

**By definition, VFR is a ceiling greater than or equal to 3,000 ft agl and visibility greater than 5 miles while MVFR is a sub-category of VFR.

⁴ Longline refers to the dissemination of weather observations on national databases for accessibility to the NWS, FAA, weather vendors, and the general public. The observations are available typically every minute to pilot's on the station's Very High Frequency (VHR) broadcast to the local area for landing and takeoff operations.

Weather observation for KMBY at 1355 CST, automated, wind from 030° at 9 knots, visibility 1 3/4 statute miles (weather conditions missing⁵), scattered clouds at 600 ft agl, ceiling⁶ broken at 1,500 ft, overcast at 2,700 ft, temperature -12° C, dew point -16° C, altimeter 30.20 inches of mercury ("Hg). Remarks: automated station with a precipitation discriminator.

The general flight categories and raw METARs reported between 1135 through 1535 CST surrounding the period of the accident were as follows:

*MVFR METAR KMBY 081735Z AUTO 04008KT 7SM OVC012 M13/M16 A3025 RMK AO2=
MVFR METAR KMBY 081755Z AUTO 04008KT 7SM OVC012 M13/M16 A3025 RMK AO2=
Arrived 1757Z
MVFR METAR KMBY 081815Z AUTO 04007KT 4SM OVC014 M13/M16 A3024 RMK AO2=
IFR METAR KMBY 081835Z AUTO 03008KT 1 3/4SM OVC014 M13/M16 A3023 RMK AO2=
IFR METAR KMBY 081855Z AUTO 04008KT 1 1/2SM BKN008 OVC014 M12/M16 A3022 RMK AO2=
IFR METAR KMBY 081915Z AUTO 03006KT 1 1/4SM BKN008 OVC013 M12/M16 A3022 RMK AO2=
IFR METAR KMBY 081935Z AUTO 02009KT 1 1/4SM BKN006 OVC015 M12/M16 A3021 RMK AO2=
IFR METAR KMBY 081955Z AUTO 03009KT 1 3/4SM SCT006 BKN015 OVC027 M12/M16 A3020 RMK AO2=
Departure 2010Z
IFR METAR KMBY 082015Z AUTO 03009KT 2 1/2SM SCT009 OVC025 M12/M15 A3020 RMK AO2=
IFR METAR KMBY 082035Z AUTO 03008KT 2SM SCT005 BKN016 OVC025 M12/M15 A3020 RMK AO2=
IFR METAR KMBY 082055Z AUTO 03009KT 3SM BKN009 BKN014 OVC025 M12/M15 A3020 RMK AO2=
IFR METAR KMBY 082115Z AUTO 03008KT 3SM OVC009 M12/M15 A3020 RMK AO2=
IFR METAR KMBY 082135Z AUTO 03010KT 3SM BKN009 OVC013 M12/M15 A3021 RMK AO2=*

2.2 Kirksville, Missouri

Kirksville Regional Airport (KIRK), Kirksville, Missouri, was located approximately 38 miles east of the accident site at an elevation of 966 ft. The airport had a federally installed and maintained Automated Surface Observation System (ASOS), which was not augmented by any human observer. The following conditions were reported at the approximate time of the accident.

Special weather observation for KIRK at 1446 CST, automated, wind from 030° at 8 knots, visibility 3/4 statute mile in haze, vertical visibility 1,800 ft agl, temperature -14° C, dew point temperature -17° C, altimeter 30.21 "Hg. Remarks: automated station with a precipitation discriminator, 6-hour maximum temperature -0.1° C, temperature -13.9° C, dew point temperature -16.7° C.

The general flight categories and raw METAR observations surrounding the period from 1230 through 1600 CST were as follows:

*IFR METAR KIRK 081855Z AUTO 03008KT 2SM HZ OVC021 M14/M17 A3023 RMK AO2 SLP262 I1000
T11441172=*

⁵ While the AWOS system had a precipitation discriminator, no current weather type was reported during the period which would be expected anytime visibility was reported less than 7 miles.

⁶ A ceiling is defined as the lowest layer of clouds as reported as broken or overcast, or the vertical visibility into a surface based obscuration.

MVFR SPECI KIRK 081911Z AUTO 02010KT 3SM HZ SCT021 OVC033 M14/M18 A3022 RMK AO2 T11441178=
IFR SPECI KIRK 081920Z AUTO 01009KT 2 1/2SM HZ SCT022 OVC033 M15/M18 A3022 RMK AO2
T11501178=
IFR SPECI KIRK 081932Z AUTO 02010KT 1 3/4SM HZ SCT022 OVC033 M14/M17 A3022 RMK AO2 I1000
T11441172=
IFR SPECI KIRK 081940Z AUTO 01010KT 1 1/2SM HZ SCT016 BKN022 OVC029 M14/M17 A3022 RMK
AO2 I1000 T11441172=
IFR METAR KIRK 081955Z AUTO 03008KT 2SM HZ OVC020 M14/M17 A3022 RMK AO2 SLP260 I1000
T11441172=
IFR SPECI KIRK 082007Z AUTO 03009KT 1 1/2SM HZ OVC020 M14/M17 A3021 RMK AO2 I1000 T11441172=
Accident 2040Z
LIFR SPECI KIRK 082046Z AUTO 03008KT 3/4SM HZ VV018 M14/M17 A3021 RMK AO2 I1001 T11391167=
IFR METAR KIRK 082055Z AUTO 02011KT 1 1/4SM HZ FEW015 BKN020 OVC028 M14/M17 A3021 RMK
AO2 SLP257 I1001 I3001 T11391167 56016=
LIFR SPECI KIRK 082120Z AUTO 01011KT 3/4SM -SN FEW010 BKN023 OVC030 M14/M17 A3021 RMK
AO2 SNB12 P0000 I1001 T11391167=
IFR SPECI KIRK 082126Z AUTO 01011KT 1SM UP BR FEW008 BKN026 OVC031 M14/M17 A3021 RMK
AO2 UPB26SNB12E22 P0000 I1001 T11441167=
IFR SPECI KIRK 082142Z AUTO 02011KT 1SM -FZRA BR FEW007 OVC030 M14/M17 A3022 RMK AO2
UPB26E42FZRA B42SNB12E22 P0000 I1001 T11441167=
IFR METAR KIRK 082155Z AUTO 04011KT 1SM -FZRA BR SCT009 BKN023 OVC032 M14/M17 A3022
RMK AO2 UPB26E42FZRA B42SNB12E22 SLP262 P0000 I1001 T11441167=

2.3 Chillicothe, Missouri

The closest weather reporting location to the accident site was from Chillicothe Municipal Airport (KCDJ), Chillicothe, Missouri, approximately 20 miles south at an elevation of 783 ft. The station had an AWOS-3 system which did not issue longline observations or have a visibility sensor or ceilometer to report cloud cover.

At 1453 CST KCDJ reported a wind from 010° at 6 knots, with a temperature of -13° C, dew point temperature of -16° C, altimeter 30.23 "Hg. Remarks: automated station without a precipitation discriminator, sea level pressure 1027.0-hPa, hourly precipitation 0.01", 6-hour precipitation 0.01", temperature -13.3° C, dew point temperature -16.1° C, 3-hour pressure tendency fallen 1.3-hPa.

The raw observations surrounding the period were as follows.

METAR KCDJ 081752Z AUTO 03007KT M15/M18 A3028 RMK AO1 SLP284 T11501183 11144 21161 50001
METAR KCDJ 081852Z AUTO 01005KT M14/M18 A3025 RMK AO1 SLP276 T11441178
METAR KCDJ 081952Z AUTO 01006KT M14/M17 A3024 RMK AO1 SLP272 T11391172
Accident 2040Z
METAR KCDJ 082052Z AUTO 01006KT M13/M16 A3023 RMK AO1 SLP270 P0001 60001 T11331161 56013
METAR KCDJ 082152Z AUTO 02006KT M13/M16 A3025 RMK AO1 SLP274 T11331161

2.4 Cameron, Missouri

Cameron Memorial Airport (KEZZ), Cameron, Missouri was located approximately 48 miles southwest of the accident site at an elevation of 1,040 ft. The airport had an AWOS and issued observations every 20-minutes. The station reported the following conditions at the approximate time of the accident.

Weather observation for KEZZ at 1435 CST, automated, wind from 010° at 111 knots, visibility 1 ½ statute miles in light snow and mist, ceiling overcast at 800 ft agl, temperature -15° C, dew point temperature -17° C. altimeter 30.20 "Hg. Remarks: automated station with a precipitation discriminator, temperature -15.2° C, dew point temperature -17.2° C.

The general flight categories and raw observations from 1215 through 1600 CST were as follows.

MVFR METAR KEZZ 081815Z AUTO 02009KT 4SM BR BKN010 OVC018 M16/M18 A3023 RMK AO2 T11611183=
MVFR METAR KEZZ 081835Z AUTO 03008KT 3 1/2SM -SN BR OVC010 M16/M18 A3023 RMK AO2 T11601183=
MVFR METAR KEZZ 081855Z AUTO 01009KT 3SM BR OVC010 M16/M18 A3022 RMK AO2 T11601182=
MVFR METAR KEZZ 081915Z AUTO 02009KT 3SM BR BKN010 OVC017 M16/M18 A3021 RMK AO2 T11581180=
MVFR METAR KEZZ 081935Z AUTO 03009KT 3 1/2SM BR BKN010 OVC017 M16/M18 A3021 RMK AO2 T11561177=
IFR METAR KEZZ 081955Z AUTO 02010KT 2 1/2SM BR OVC010 M15/M17 A3020 RMK AO2 T11541175=
IFR METAR KEZZ 082015Z AUTO 03010KT 2 1/2SM BR OVC008 M15/M17 A3020 RMK AO2 T11521172=
IFR METAR KEZZ 082035Z AUTO 01011KT 1 1/2SM -SN BR OVC008 M15/M17 A3020 RMK AO2 T11521172=
Accident 2040Z
IFR METAR KEZZ 082055Z AUTO 01009KT 1 1/2SM -SN BR OVC008 M15/M17 A3020 RMK AO2 T11511172=
IFR METAR KEZZ 082115Z AUTO 01009KT 1 3/4SM -SN BR OVC010 M15/M17 A3021 RMK AO2 T11511171=
IFR METAR KEZZ 082135Z AUTO 01009KT 1 1/2SM -SN BR OVC010 M15/M17 A3021 RMK AO2 T11511171=
IFR METAR KEZZ 082155Z AUTO 01012KT 2SM -SN BR OVC010 M15/M17 A3021 RMK AO2 T11501170=

2.5 Cahokia/St. Louis, Illinois

The accident flight originated from (KCPS) and departed there at approximately 1050 CST on the day of the accident. The airport listed an elevation of 413 ft and had an ASOS system which was augmented by tower personnel during normal operating hours. At the time the airplane departed the following conditions were being reported.

Routine weather observation for KCPS at 1053 CST, wind from 060° at 4 knots, visibility 10 statute miles or more, ceiling overcast at 2,000 ft, temperature -6° C, dew point temperature -11° C, altimeter 30.26 "Hg. Remarks: automated station with a precipitation discriminator, sea level pressure 1025.3-hPa, temperature -5.6° C, dew point temperature -10.6° C.

The conditions reported surrounding the period were as follows.

MVFR METAR KCPS 081453Z 09008KT 10SM OVC018 M07/M11 A3024 RMK AO2 SLP245 T10671106 58001=
MVFR METAR KCPS 081553Z 05003KT 10SM OVC020 M06/M11 A3027 RMK AO2 SLP255 T10611106=
Departed 1650Z
MVFR METAR KCPS 081653Z 06004KT 10SM OVC020 M06/M11 A3026 RMK AO2 SLP253 T10561106=
MVFR METAR KCPS 081753Z 05006KT 10SM OVC019 M05/M10 A3022 RMK AO2 SLP241 T10501100 11050 21072 58003=
MVFR METAR KCPS 081853Z 03006KT 10SM OVC020 M04/M10 A3021 RMK AO2 SLP236 T10441100=
MVFR METAR KCPS 081953Z 04005KT 5SM -SN SCT019 OVC042 M04/M09 A3020 RMK AO2 SNB38 SLP232

P0000 T10441089=

VFR METAR KCPS 082053Z 04005KT 10SM BKN049 OVC055 M04/M08 A3019 RMK AO2 SNE05 SLP229
P0000 60000 T10441083 56012=

MVFR METAR KCPS 082153Z 05006KT 5SM HZ OVC055 M04/M08 A3020 RMK AO2 SNB11E46 SLP231 P0000
T10441078=

2.6 Aviation Weather Center's METAR Display

A display of the conditions from the NWS Aviation Weather Center's METAR display is included as Figure 6, with the approximate accident site marked by a red star. The chart depicts the METARs current at the time of the chart at 1445 CST with temperature and dew point temperatures displayed in ° F.

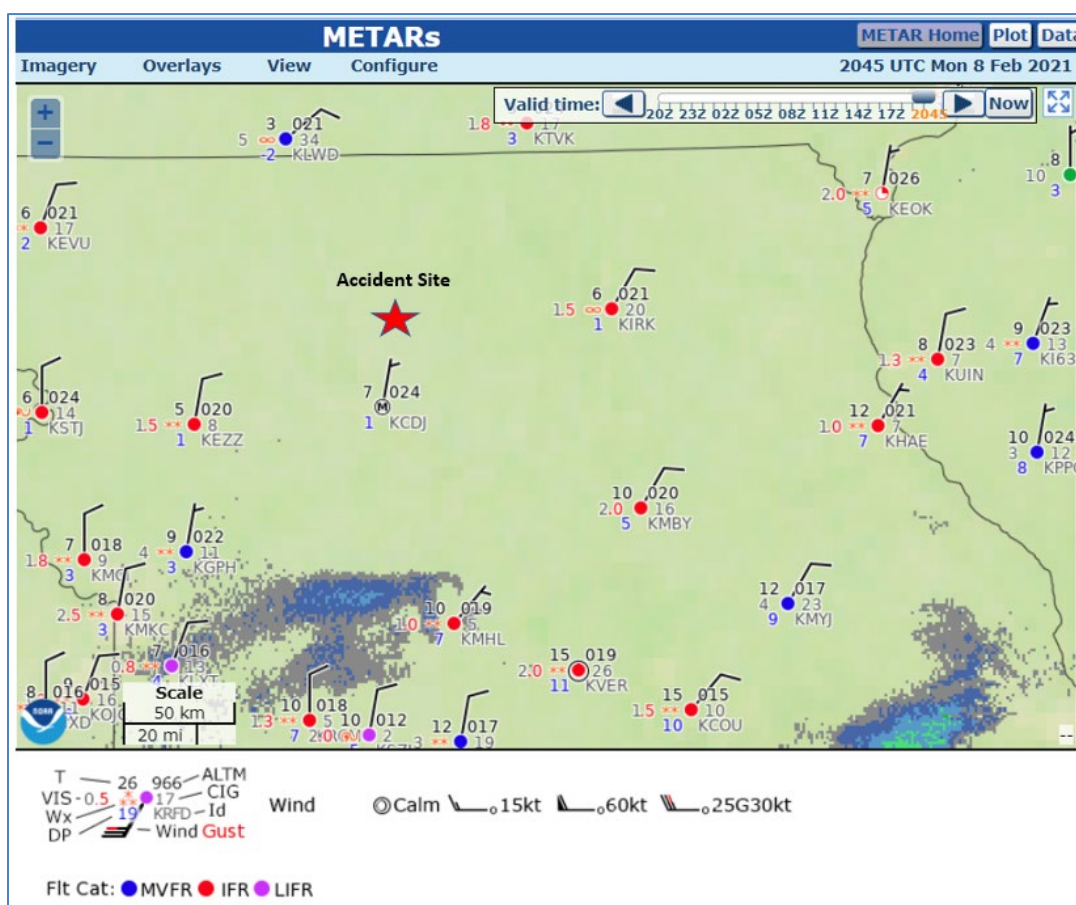


Figure 6 - METAR display from the NWS Aviation Weather Center for 1445 CST

The METAR display for 1445 CST depicted general IFR conditions prevailing across the area with visibility restricted in snow, mist, and haze, with overcast clouds. The winds were from the north-northeast at 5 to 10 knots across the area with no wind gusts reported at the time of the image.

3.0 Sounding Information

To determine the vertical structure and state of the atmosphere a High-Resolution Rapid Refresh (HRRR)⁷ numerical model data were retrieved from the NOAA Air Resources Laboratory archive for the accident site coordinates. The HRRR numerical model was then plotted on a standard Skew T log P diagram⁸ using the Universal RAwinsonde OBservation (RAOB) program software⁹.

Figure 7 is the HRRR numerical model run from 1200 for 1400 CST over the accident site coordinates from the surface through 500-hPa or approximately 18,000 ft.

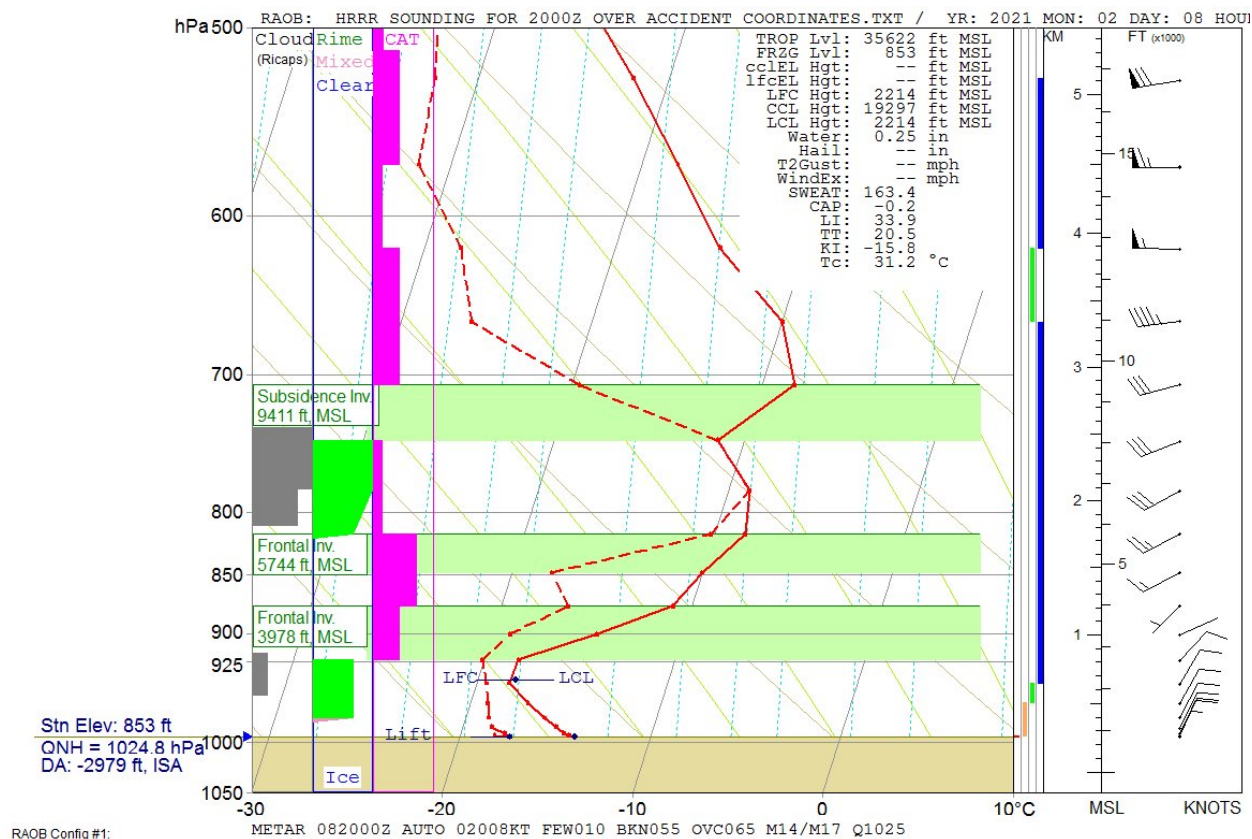


Figure 7 - HRRR numerical model sounding for 1400 CST over the accident site

The HRRR sounding depicted an elevation of 853 ft with a near surface temperature of -14° C, a dew point temperature of -17° C, a relative humidity of 78% and a density altitude of -2,979 ft. The lifted condensations level (LCL)¹⁰ and level of free convection (LFC) were identified at 1,361

⁷ The HRRR is a National Oceanic and Atmospheric Administration (NOAA) real-time three-kilometer resolution, hourly-updated, cloud-resolving, convection-allowing atmospheric model, initialized by three-kilometer grids with three-kilometer radar assimilation. Radar data is assimilated in the HRRR every 15 minutes over a one-hour period.

⁸ 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.

⁹ RAOB – (The Universal RAwinsonde OBservation program) is an interactive sounding analysis program developed by Eosonde Research Services (ERS) previously known as Environmental Research Services, The Villages, Florida.

¹⁰ Lifting Condensation Level (LCL) - the level at which a lifted parcel becomes saturated. The LCL height corresponds

ft agl (2,214 ft msl). The RAOB analysis program supported multiple layers of clouds with a layer of low clouds at 1,300 ft agl, a broken layer at 5,500 with tops near 8,000 ft (depicted as gray on left side of diagram), and a high layer of clouds between 24,000 ft with tops near 31,500 ft. The sounding depicted several inversions with temperatures remaining below freezing through the depth of the sounding. The atmosphere below 2,200 ft was conditional unstable with the overall sounding characterized as stable with a Lifted Index of 33.9 and supported nimbostratus type clouds with the potential for snow. The RAOB analysis program supported moderate rime icing (depicted in green on left side of diagram) between the surface and 8,000 ft.

The HRRR wind profile indicated a near surface wind from 020° at 8 knots with winds from the north-northeast through 3,000 ft, before shearing to the southwest above the first frontal inversion with wind veering¹¹ from the southwest to the west with height. The level of maximum wind was at 30,000 ft with winds from 260° at 105 knots and was located below the tropopause which was identified at approximately 35,600 ft. The RAOB program supported light to moderate turbulence between 2,800 through 6,000 ft. No significant turbulence was depicted below 2,500 ft msl.

4.0 Satellite Imagery

The Geostationary Operational Environmental Satellite number 16 (GOES-16) data were obtained from an archive at the Space Science Engineering Center (SSEC) at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System (McIDAS) software. The infrared and visible imagery were reviewed surrounding the period, and the closest images to the accident time documented. The infrared long wave imagery (band 15) at a wavelength of 12.3 microns (μm) provided radiative cloud top temperatures with a nominal spatial resolution of 2 km. The visible (band 2) at a wavelength of 0.64 μm provided images at a resolution of 0.5 km.

Figure 8 is the GOES-16 infrared image for 1441 CST at 2X magnification with a standard MB temperature enhancement curve applied to highlight the colder cloud tops. The surface pressure systems and fronts for 1500 CST have also been overlaid to depict the surface features. The infrared image depicted an extensive area of low stratiform to nimbostratus clouds over the area (gray) with high cirrus clouds (red and green shades) over the area. The radiative cloud top temperature over the accident site was 228 Kelvin or -45° C, which corresponded to cloud tops near 26,000 ft based on the HRRR sounding.

Figure 9 is the GOES-16 visible image for the same period of 1441 CST at normal magnification. The visible satellite image depicted the extensive area of overcast nimbostratus type clouds with higher cirriform clouds over the accident site.

to cloud base height for forced ascent.

¹¹ Veering of wind means a clockwise shift in the wind with height and implied warm air advection.

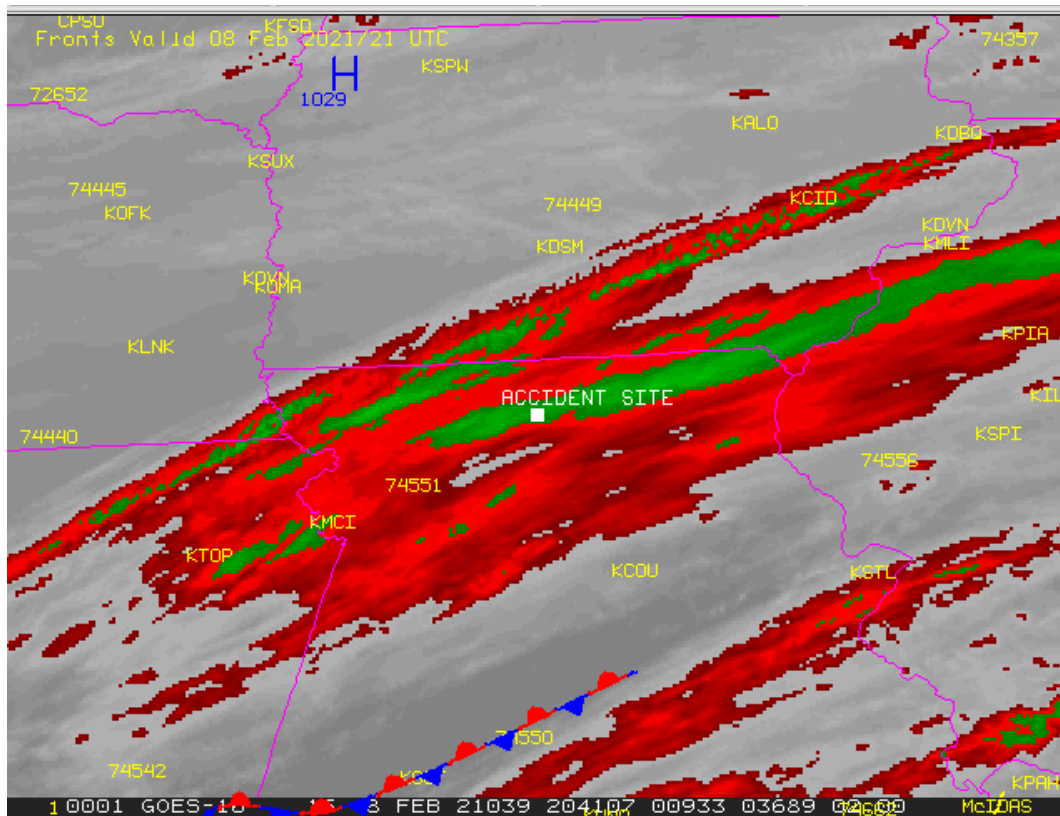


Figure 8 - GOES-16 infrared satellite image for 1441 CST at 2X magnification with MB temperature enhancement curve and fronts overlaid

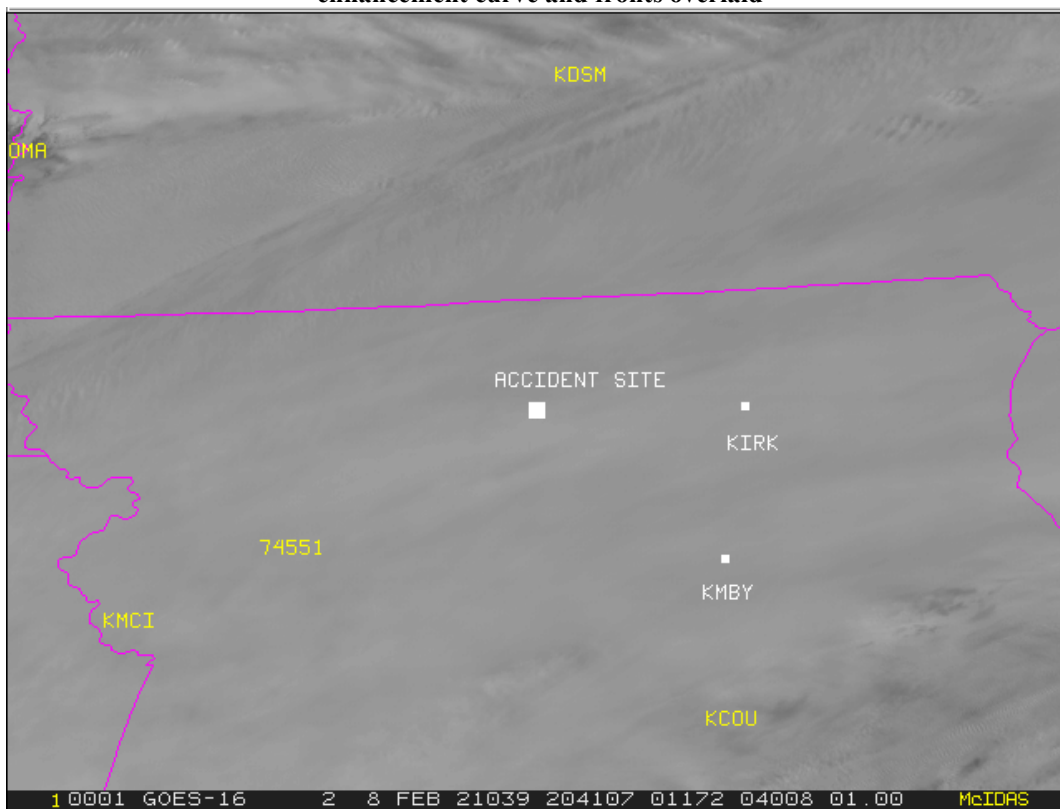


Figure 9 - GOES-16 visible image for 1441 CST at 2X magnification

5.0 Pilot Reports

A search of pilot reports (PIREPs) in the NWS database over the region surrounding the period from 1000 through 1800 CST below 18,000 ft and within approximately 125 miles provided the following reports. The raw reports are provided in standard code and abbreviations as issued.

DSM UA /OV DSM360013/TM 1605/FL030/TP SR22/TA M05/IC LGT RIME
DSM UA /OV DSM090020/TM 1630/FL110/TP E75L/TA M12/IC LGT MX 110-090 DURD
IRK UA /OV IRK100025/TM 1841/FL060/TP BE35/TA M03/IC MOD RIME 060-030/RM ZKC FDC
MKC UA /OV MKC/TM 1907/FLUNK/TP H25B/SK OVC010/TA UNK/IC MOD RIME/RM DURD RY19
MCI UA /OV MCI350002/TM 1908/FL020/TP B737/SK OVC020-TOP080/IC LGT RIME 020-080/RM DURD
MKC UA /OV MKC/TM1931/FLUNK/TP H25B/SK OVC015/TA M15/IC LGT RIME/RM DURD RY03
MKC UA /OV KMC010002/TM 1935/FL020/TP GLF4/SK OVC020
MCI UA /OV IXD280012/TM 1942/FL082/TP LJ45/SK OVC-TOP082/TA M08/IC LGT MX BLO 082/RM DURD
MCI UA /OV MCI10002/TM 2003/FL025/TP E75S/SK OVC025-TOP095/RM DURD
MCI UA /OV MCI190010/TM 2006/FL050/TP B737/TA M19/IC MOD CLR 030-050/RM DURD
MCI UA /OV MCI205020/TM 2008/FL165/TP E170/TB CONS LGT OCNL MOD CHOP/IC MDT RIME/RM
ZKC/FD1/CJ
MKC UA /OV KMKC/TM 2010/FLUNK/TP CL30/SK OVC012/TA M17/IC MOD MIXED/RM DURG RY03
VIH UA /OV VIH190080/TM 2020/FL030/TP S22T/SK IMC/TA M5/IC LGT-MOD CLR/RM ZKC/FD1/CJ
CGI UA /OV CGI020020/TM 2028/FL080/TP S22T/TA M3/IC LGT RIME/RM ZKC/FD1/CJ
MCI UA /OV MKC030003/TM 2034/FL080/TP LJ45/TA M08/IC LGT MX BLO 080/RM DURC
CGI UA /OV CGI360020/TM 2041/FL120/TP S22T/TA M5/IC MDT RIME/RM ZKC/FD1/CJ
Accident 2042Z
MKC UA /OV MKC210002/TM 2122/FL020/TP BE20/SK OVC022-TOP040/TA M14/IC LGT-MOD RIME 040-
022/RM DURD
MCI UA /OV MKC230005/TM 2126/FL022/TP BE20/SK OVC022-TOP UNKN/TA M14/IC LGT RIME ABV
022/RMK DURD
CPS UA /OV CPS/TM 2130/FLDURD/TP C56X/SK OVC014/WX 1 1/2SM -SN/IC NEG ICING/RM RNAV 12R
TBN UA /OV TBN/TM 2155/FL030/TP C560/TA M2/IC LGT RIME/RMK ZKC/FD1/CJ
MKC UA /OV MKC210002/TM 2157/FL015/TP C560/SK OVC019/IC LGT MX/RM DURD
COU UA /OV HAE/TM 2219/FL017/TP C414/SK 017OVC090/TA M2/IC LGT RIME 080-090/RM ZKC/FD1/CJ
MCI UA /OV IXD180003/TM 2224/FL021/TP C25C/SK OVC021-TOP UNKN/RM DURD
MKC UA /OV MKC/TM 2235/FL024/TP CL60/SK BKN024/IC LT RIME NEG TEMP
COU UA /OV KCOU/TM 2245/FL011/TP CRJ2/SK OVC011-TOP040/TA M02/IC LGT MXD
MCI UA /OV MCI180020/TM 2242/FL080/TP C680/SK OVC-TOP080/TA M07/IC LGT RIME BLO 050
MCI UA /OV MCI180015/TM 2255/FL070/TP E75L/TA M08/IC LGT-MDT MIXED BLO 070
JLN UA /OV JLN/TM 2300/FLUNKN/TP S22T/SK OVC015-TOP090/TA M07/IC LGT RIME
MKC UA /OV MKC210002/TM 2308/FL020/TP C525/SK OVC022/RM DURD
COU UA /OV KCOU/TM 2332/FL015/TP LJ35/SK OVC015-TOP070/TA M02/IC LGT MIX

A review of the 30 PIREPs issued surrounding the period, indicated that 25 reported encountering icing conditions with all but 6 coming from air carrier or business jets or turbine aircraft. All the aircraft that did not report encountering icing conditions were jet aircraft, with one reporting visibility as 1 ½ miles in light snow on approach. The majority of the 16 icing reports reported the severity as light icing, with 3 reporting light-to-moderate, and 6 reporting moderate intensity icing conditions. The type of icing varied from 15 reports of rime, 8 as mixed icing, and 2 reports of clear icing. Most of the icing PIREPs were reported below 8,000 ft.

For reference the following icing intensity is taken from the Aeronautical Information Manual (AIM), Safety of Flight, section 7-1-21 PIREPs Relating to Airframe Icing.

1. Trace. *Ice becomes noticeable. The rate of accumulation is slightly greater than the rate of sublimation. A representative accretion rate for reference purposes is less than 1/4 inch (6 mm) per hour on the outer wing. The pilot should consider exiting the icing conditions before they become worse.*

2. Light. *The rate of ice accumulation requires occasional cycling of manual deicing systems to minimize ice accretions on the airframe. A representative accretion rate for reference purposes is 1/4 inch to 1 inch (0.6 to 2.5 cm) per hour on the unprotected part of the outer wing. The pilot should consider exiting the icing condition.*

3. Moderate. *The rate of ice accumulation requires frequent cycling of manual deicing systems to minimize ice accretions on the airframe. A representative accretion rate for reference purposes is 1 to 3 inches (2.5 to 7.5 cm) per hour on the unprotected part of the outer wing. The pilot should consider exiting the icing condition as soon as possible.*

4. Severe. *The rate of ice accumulation is such that ice protection systems fail to remove the accumulation of ice and ice accumulates in locations not normally prone to icing, such as areas aft of protected surfaces and any other areas identified by the manufacturer. A representative accretion rate for reference purposes is more than 3 inches (7.5 cm) per hour on the unprotected part of the outer wing. By regulation, immediate exit is required.*

NOTE- *Severe icing is aircraft dependent, as are the other categories of icing intensity. Severe icing may occur at any ice accumulation rate when the icing rate or ice accumulations exceed the tolerance of the aircraft.*

6.0 Current Icing Products

The NWS AWC Current Icing Products (CIP) probability of icing and icing severity for 1,000 ft agl and 2,000 ft agl for 1400 and 1500 CST from the NWS AWC were documented. The CIP graphics are computer-generated three-dimensional analyses of information related to the likelihood of encountering icing conditions. Information on the graphics is determined from observational data including WSR-88D radar, satellite, pilot weather reports, surface weather reports, lightning, and computer model output. This information is available for the 48 contiguous United States, much of Canada and Mexico, and their respective coastal waters. The icing severity estimations are based on the accretion rate of ice on an aircraft, and the levels are determined by the time it would take for an airfoil to accrete 1/4 inch of ice: trace, 1 hour; light, 15 min-1 hour; moderate, 5-15 min; and severe < 5 min¹². The rates are tuned by nearby pilot reports of encountered severity. CIP is designed as a flight planning aid and to provide situational awareness of the icing threat in graphic format. Figure 10 is the CIP Icing Probability and Icing Severity scales used in the images. The accident airplane's cruising altitude after departing KMBY ranged from a high of 1,900 ft to a low of 1,200 ft msl (or from 1,000 ft to less than 400 ft agl) prior to the accident.

¹² <https://aviationweather.gov/icing/help>

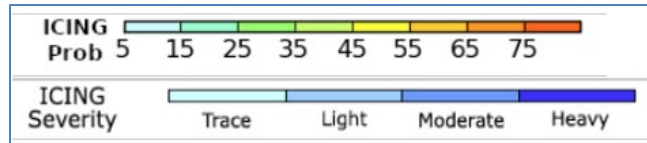


Figure 10 - CIP Probability and Icing Severity Scale

Figures 11-18 are the CIP Icing Probability and Icing Severity for 1,000 ft agl and 2,000 ft agl for 1400 and 1500 CST plotted from the Helicopter Emergency Medical Service (HEMS) Weather Tool over Missouri with the METARs displayed for the respective period. The Icing Probability indicated a probability ranging from 45 to 65% at 1400 CST and increasing to over 65% at 1500 CST, with the icing severity from light-to-moderate intensity.

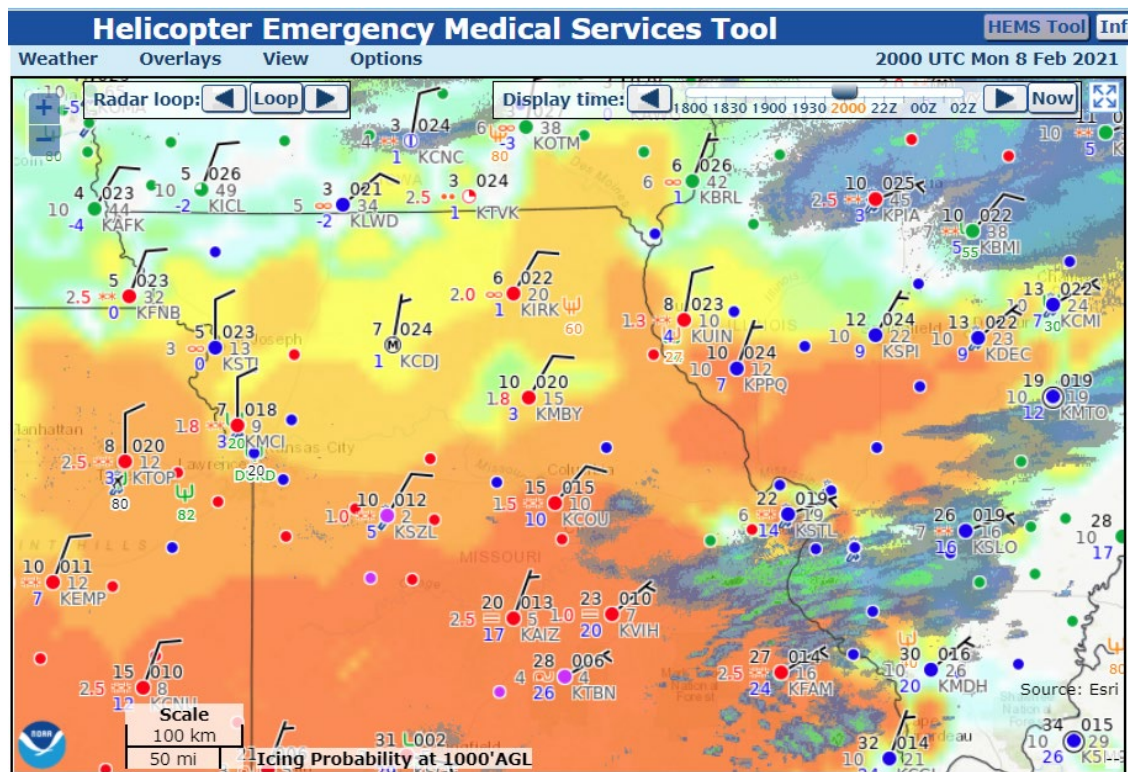


Figure 11 – CIP Icing Probability for 1,000 ft agl for 1400 CST

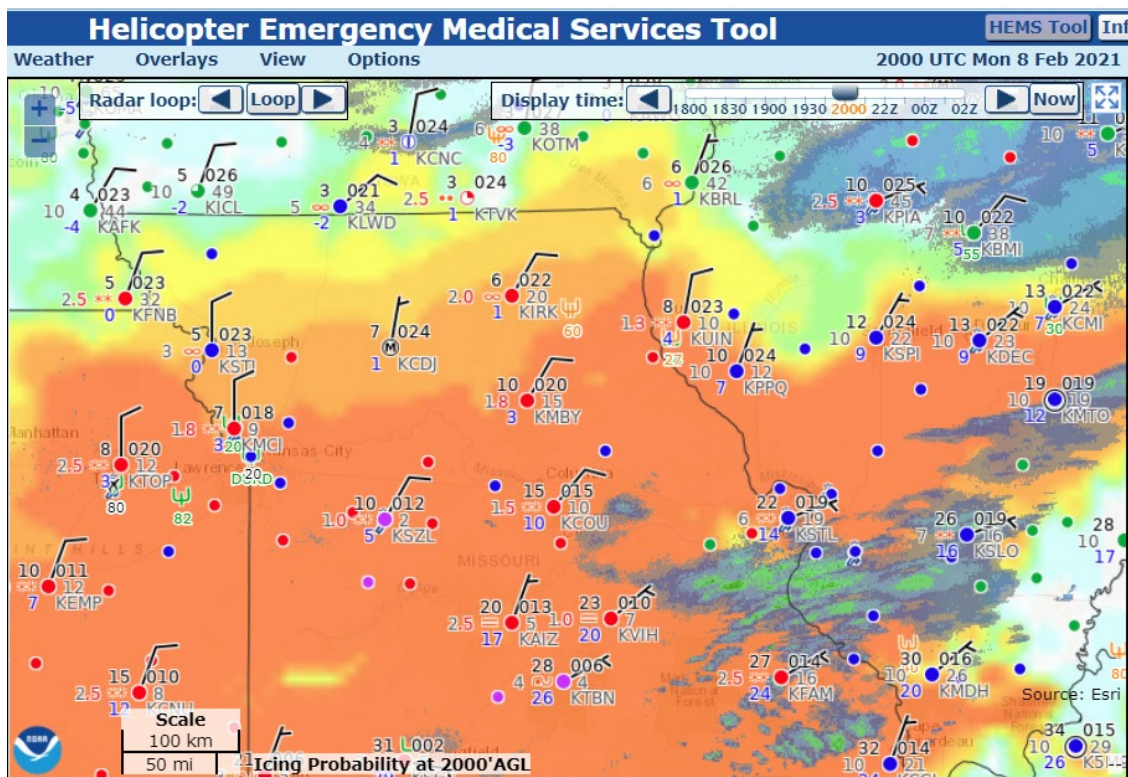


Figure 12 – CIP Icing Probability for 2,000 ft agl for 1400 CST

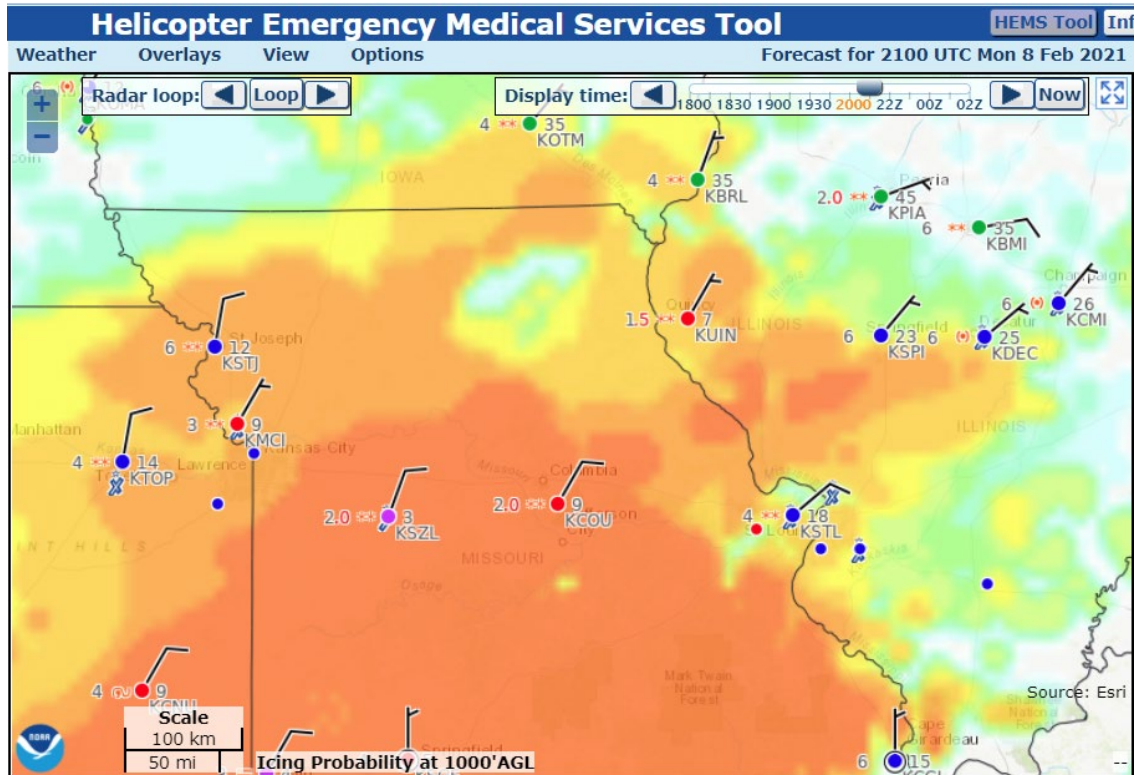


Figure 13 - CIP Icing Probability for 1,000 ft agl for 1500 CST

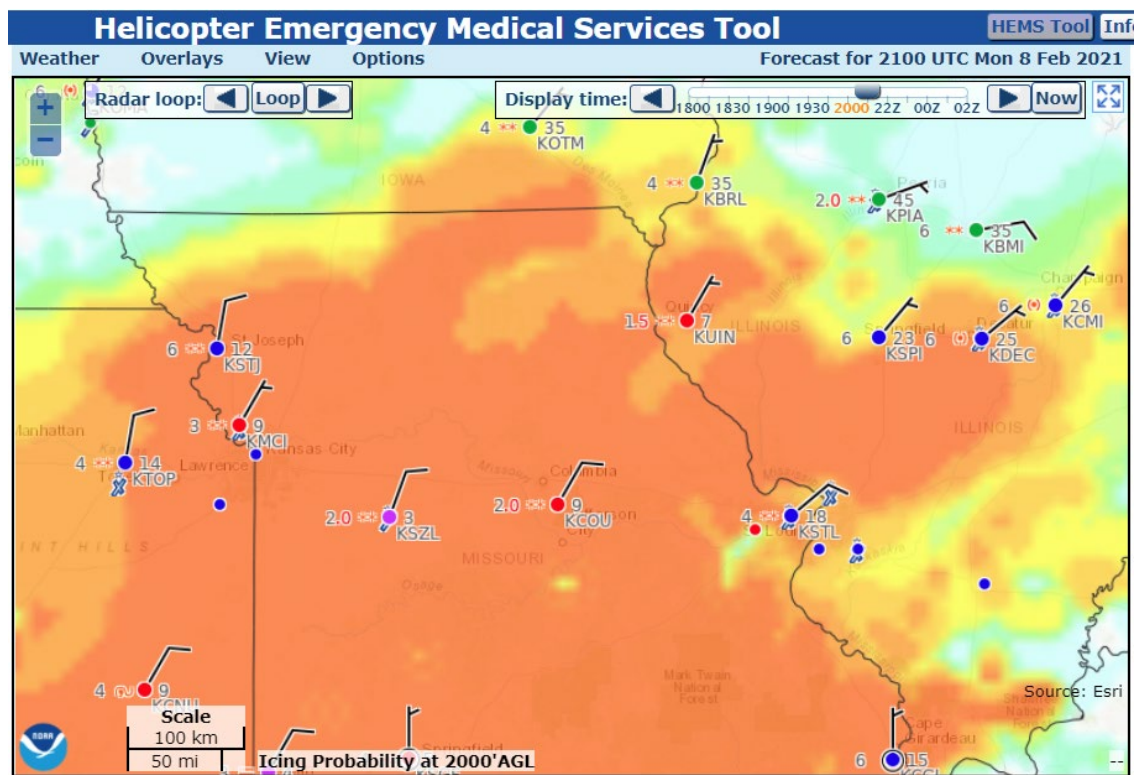
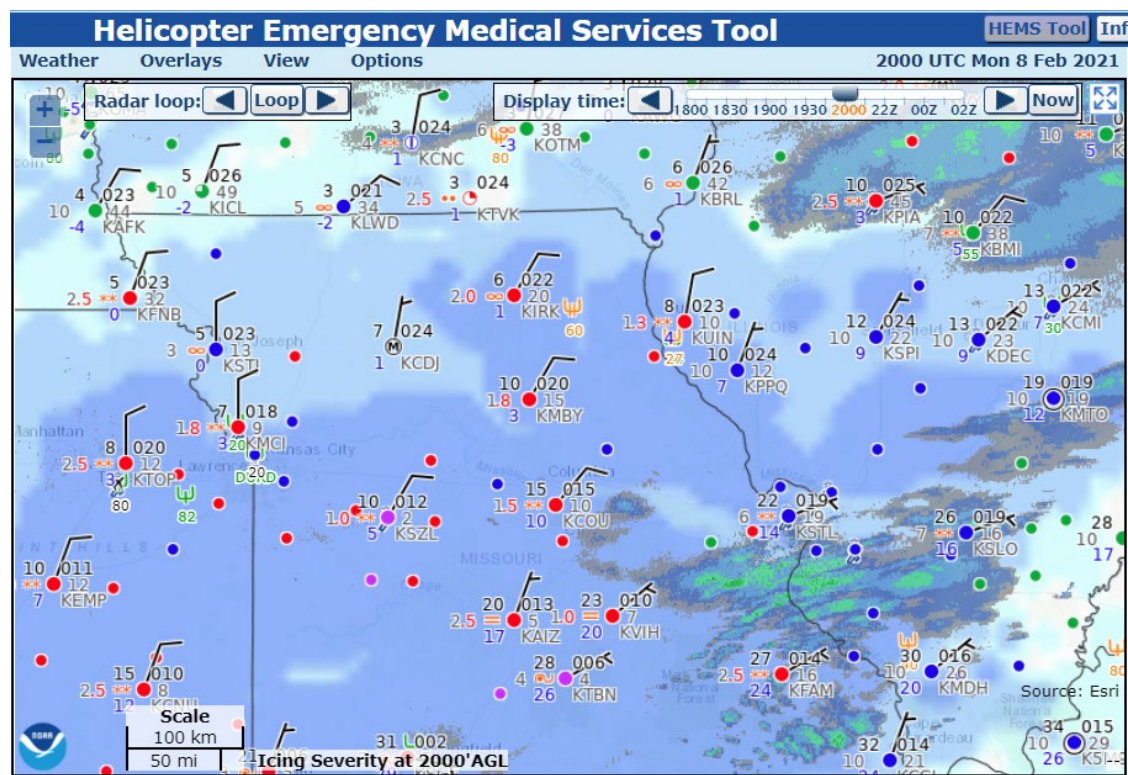
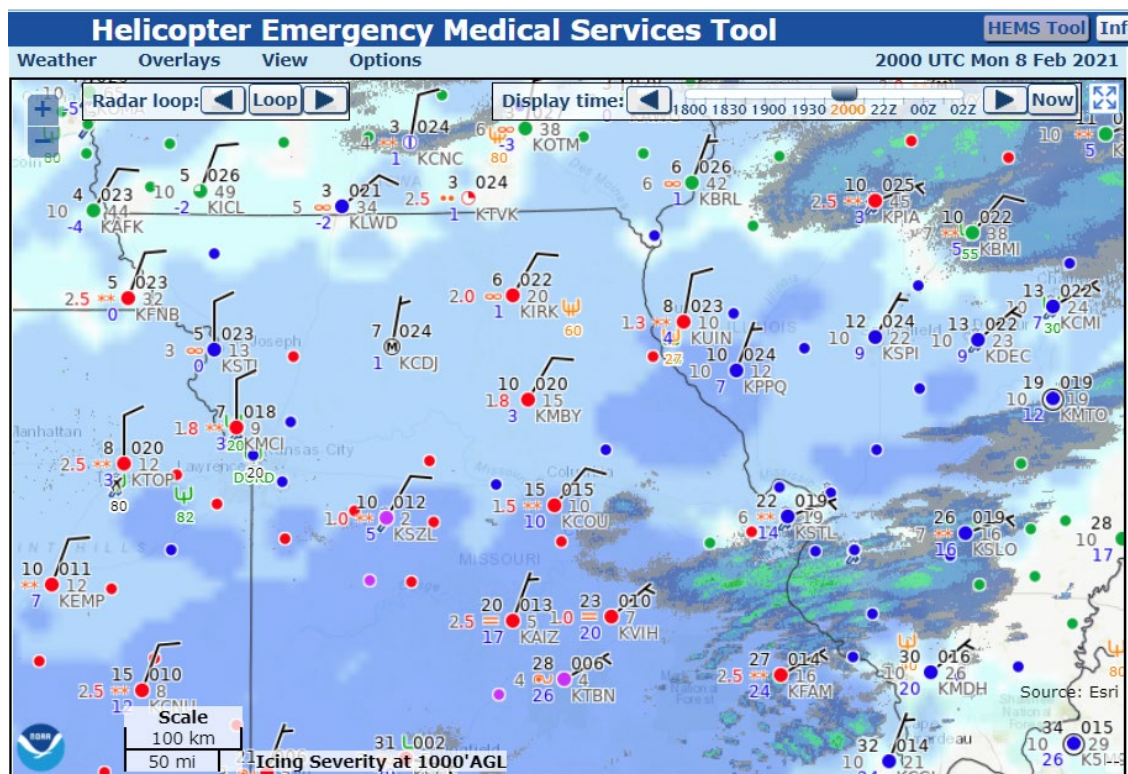


Figure 14 - CIP Icing Probability for 2,000 ft agl for 1500 CST



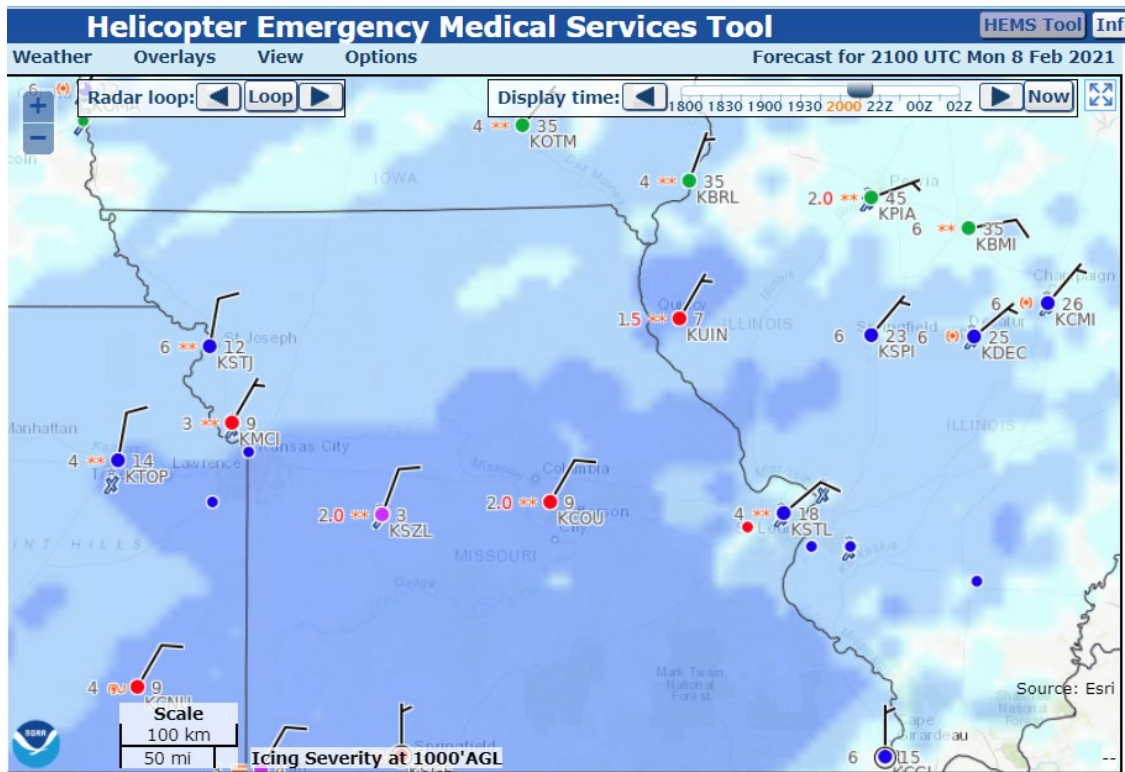


Figure 17 - CIP Icing Severity for 1,000 ft agl for 1500 CST

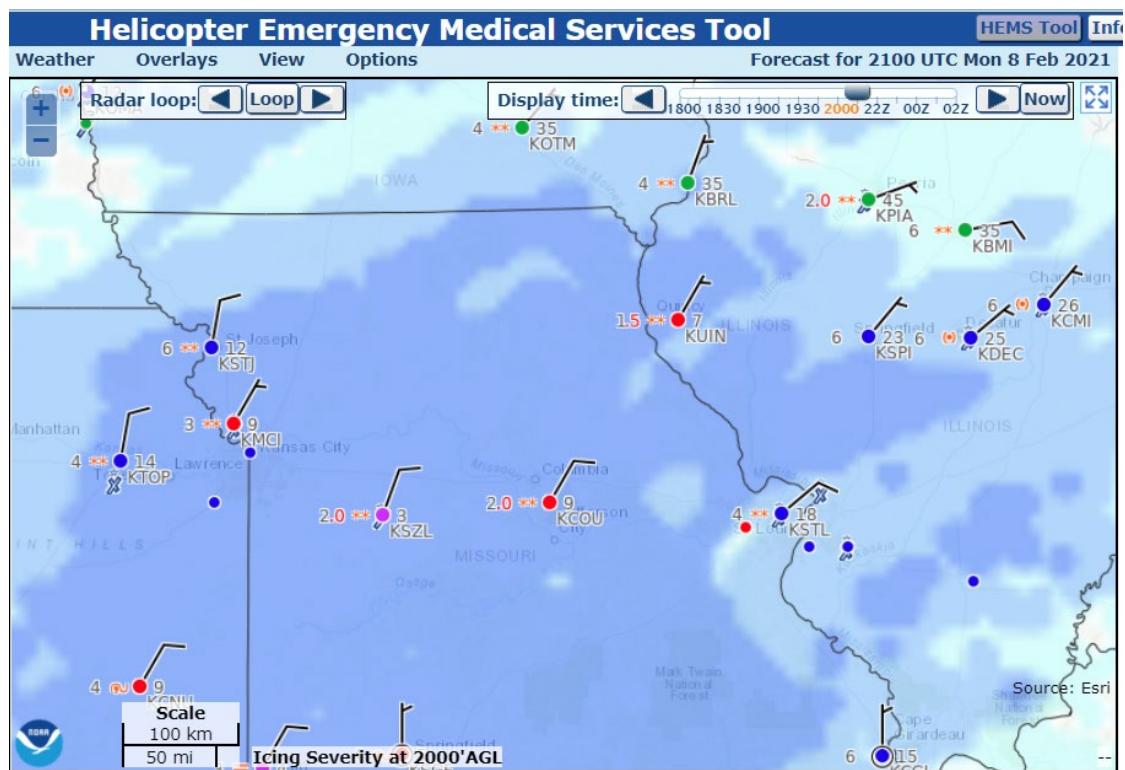


Figure 18 - CIP Icing Severity for 2,000 ft agl for 1500 CST

7.0 NWS Forecasts

7.1 Terminal Aerodrome Forecasts

The NWS did not issue any Terminal Aerodrome Forecasts (TAFs) for the airports within 40 miles of the accident site. A TAF is only valid within a 5 mile radius of the airport. The forecast issued for the origin airport of KCPS issued at 0538 CST was as follow.

*TAF KCPS 081138Z 0812/0912 08006KT P6SM OVC025
FM081800 05004KT 3SM -SN BR OVC015
FM082100 06005KT 2SM -SN BR OVC009
FM090000 04006KT 2SM -FZDZ OVC009
FM090900 02007KT P6SM OVC007=*

The forecast valid at the time the accident airplane departed expected MVFR conditions to prevail with a ceiling overcast at 2,500 ft agl, with visibility restricted in light snow after 1200 CST with lowering ceilings. At 1500 CST the forecast was expecting IFR conditions with visibility 2 miles in light snow and mist, with ceiling overcast at 900 ft.

8.0 Area Forecast Discussion

The NWS Area Forecast Discussions (AFD) are issued by each Weather Forecast Office (WFO) to describe the short term weather conditions within their region with an aviation section that includes the general conditions as they relate to the creation of the TAF. These are useful for additional aviation-related issues that cannot be encoded into the TAF. The discussion also gives some reasoning behind the forecast. These are generated roughly every 6 hours and corresponds to the release of the latest TAFs for that office. The NWS Kansas City/Pleasant Hill KEAX), Missouri WFO was responsible for the counties where the accident occurred and the Kirksville and Mosby areas. The AFD issued at 1205 CST was as follows:

*FXUS63 KEAX 081805
AFDEAX*

*AREA FORECAST DISCUSSION
National Weather Service Kansas City/Pleasant Hill MO
1205 PM CST Mon Feb 8 2021*

*.Discussion...
Issued at 430 AM CST MON FEB 8 2021*

Key Messages

- Freezing drizzle and light snow continue to fall across the area. This is expected to continue through the morning significantly impacting the morning commute. Roads are expected to be slick, especially bridges and overpasses. A light glaze is expected to form on vehicles and other hard surfaces such as sidewalks.*
- Rounds of light snow and freezing drizzle continue over the next few days. Off and on precipitation is expected as several small waves move through the area. Impacts similar to what we have been experiencing the past few days are anticipated to continue.*

- Frigid temperatures and dangerous wind chills hang around for the next several days. Wind chills during the day are expected to around or just below zero while nocturnal wind chills could surpass -20F.

Detailed discussion...

Freezing drizzle and light snow continue through the morning. A substantial moisture boundary is currently located just north of US36. Light snow has been falling here for most of the night netting around an additional 0.5" of snow. This boundary is expected to sag south during the day bringing along bands of light to moderate snow as it travels eventually settling on the southern end of our CWA. This translates the axis of highest snow accumulations to areas along US50 east of Lee's Summit.

Meanwhile turbulent waves have destabilized the air south of the MO River causing widespread freezing drizzle. We have been able to observe these waves on radar for most of the night. Enhanced by a subtle moisture boundary, freezing drizzle and very light snow has been occurring across the southern half of the CWA for most of the night. A light glaze has been observed on roadways (especially bridges and overpasses), sidewalks, and vehicles. Freezing drizzle is expected to continue for much of the morning with significant impacts on roads (especially bridges and overpasses) and sidewalks. Please be cautious when traveling as freezing drizzle accumulations will decrease visibility and make roads and sidewalk slick. Freezing drizzle is expected to move southward as the previously mentioned boundary moves south. Freezing drizzle is expected to gradually transition to snow as the lower levels of the atmosphere dry out.

Light precipitation is expected to continue through the day today. Most impacts are expected during the morning and early afternoon; however, latest short range guidance shows a setup fairly similar to yesterday which means that light wintry precipitation could continue into Tuesday morning. It is possible that winter headlines will need to be continued if wintry conditions persist and significant impacts are expected.

Long range models show no end in sight to both the waves of wintry precipitation and the invasion of frigid temperatures (at least for the next week). Cold air continues to press into our area from the north driving temperatures downward. Meanwhile, subtle clipper systems enhanced by upper level waves trigger precipitation off and on for the next several days. Overnight lows fall into the low single digits with areas north of US36 falling well below zero. Dangerous wind chills below zero are expected creating hazardous conditions for anyone needing to go outside. Daytime wind chills hover around or below zero with nighttime values exceeding -20F. Adequate apparel and preparation are required for anyone venturing outside the next several days.

.Aviation...(For the 18Z TAFS through 18Z Tuesday Afternoon)
Issued at 1202 PM CST MON FEB 8 2021

Significant impacts due to light snow and pockets of freezing drizzle are expected to persist through the evening. Area terminals continue to hover between IFR and MVFR BKN to OVC ceilings; this will persist through the end of the period. Prevailing snow and MVFR visibilities are anticipated through at least 09/08Z at the latest. Winds will generally remain out of the north and northeast through Tuesday morning.

.EAX WATCHES/WARNINGS/ADVISORIES...

KS...Winter Weather Advisory until 3 PM CST this afternoon for KSZ057- 060-103>105.

MO...Winter Weather Advisory until 3 PM CST this afternoon for MOZ028-029-037>040-043>046-053-054.

Discussion...Pesel

Aviation...Kurtz

8.1 Graphic Forecasts for Aviation

The NWS Graphic Forecast for Aviation (GFA) product provides a graphical depiction of surface wind, visibility, weather, and cloud cover, with the graphic AIRMET Sierra for IFR conditions, mountain obscuration, and icing conditions overlaid. The GFA is available at the NWS AWC website and through other weather briefing services.

Figure 19 is the central section of the GFA Surface Weather issued at 1301 CST and valid for 1500 CST. The image depicted expected surface winds from the north-northeast at 5 to 10 knots over the accident site, with visibility restricted less than 3 miles in light freezing drizzle and snow over the route of flight. A Graphic (G)-AIRMET for IFR conditions (depicted in pink) extended over the region and enclosed the accident site, and KMBY and KIRK airports.

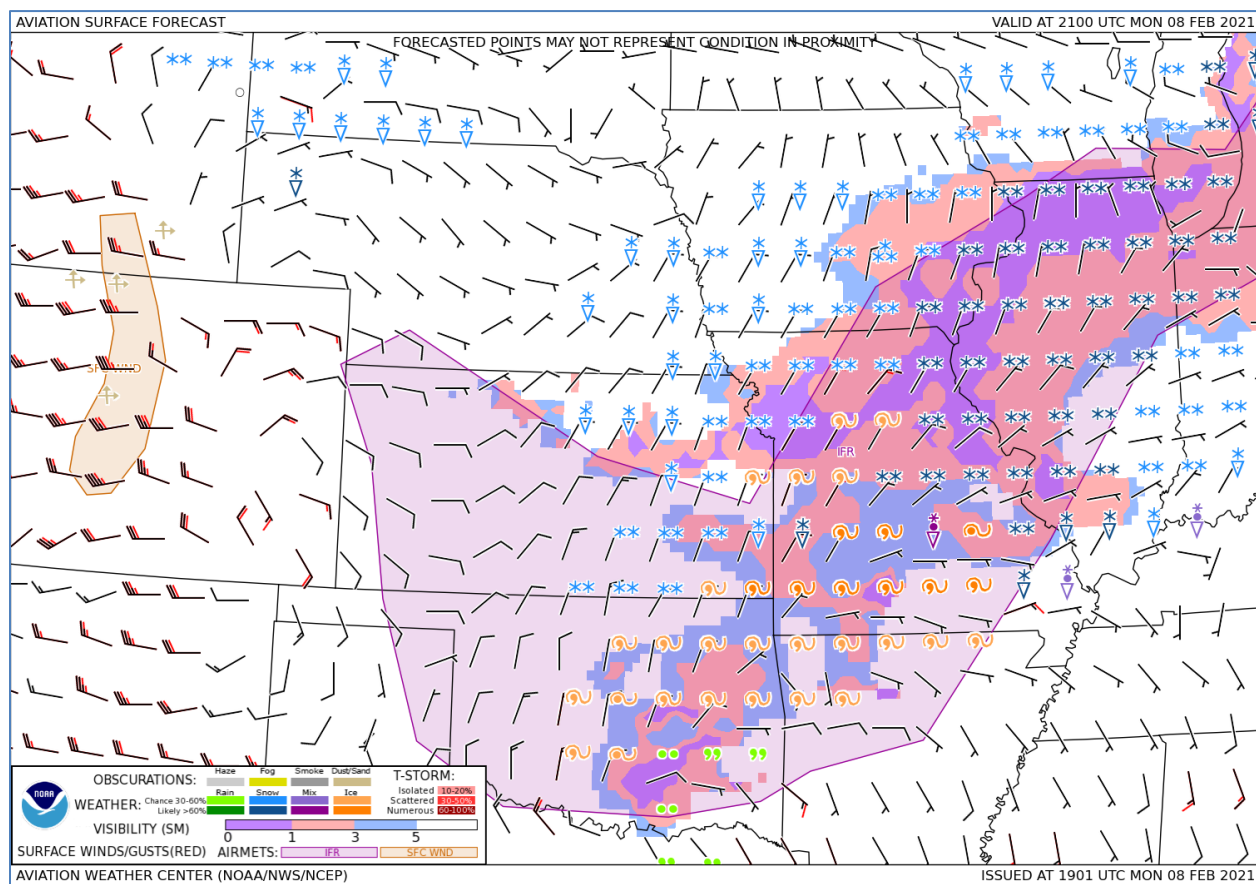


Figure 19 - GFA Surface Forecast for 1500 CST with G-AIRMET for IFR conditions

Figure 20 is the central section of the GFA Cloud Cover product issued at 1302 CST and valid for 1500 CST, with the cloud heights provided with reference to msl heights. The image depicted an extensive area of overcast clouds with bases at 1,700 ft msl and tops above 31,000 ft. A G-AIRMET for icing also extended over the accident site and the departure and destination airports (enclosed in blue polygon).

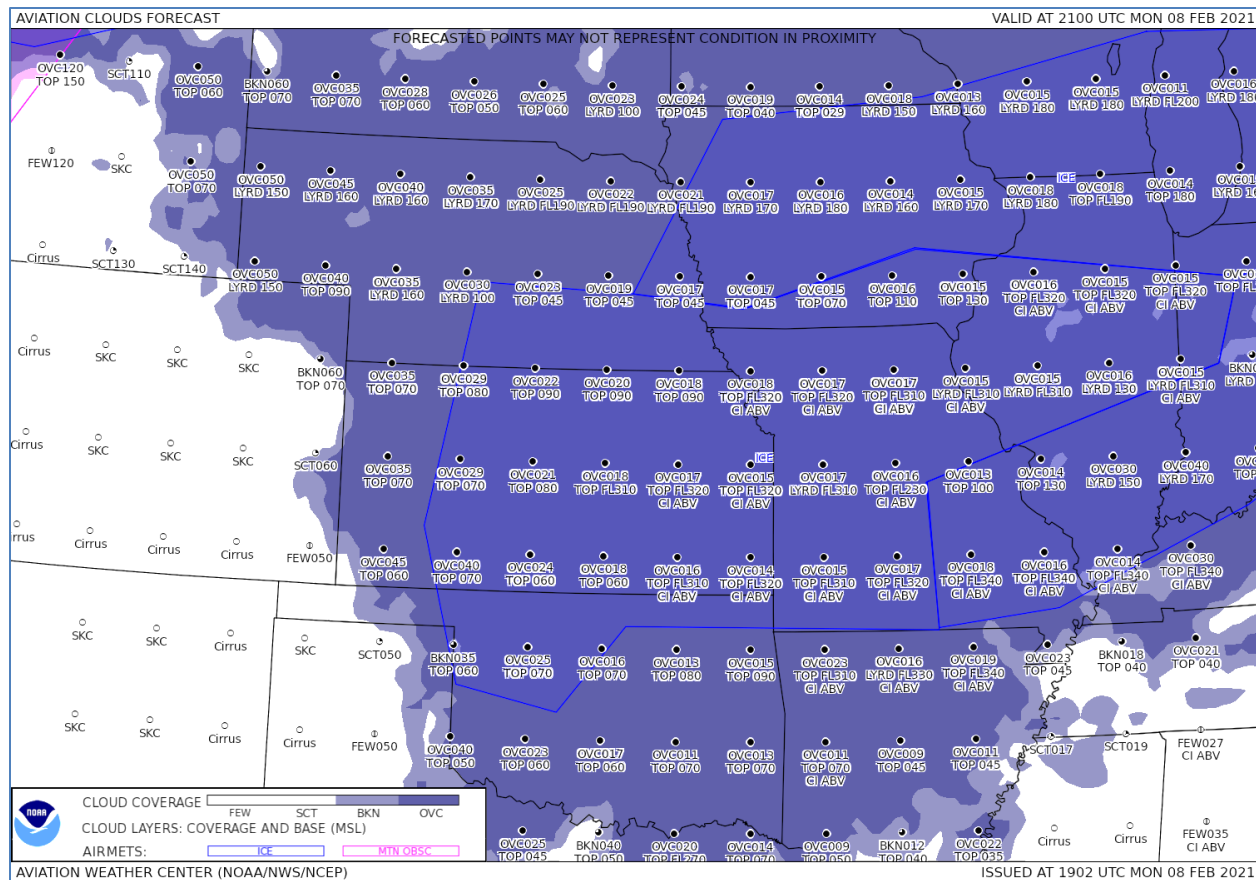


Figure 20 - GFA Cloud Forecast valid for 1500 CST with G-AIRMET for icing conditions

8.2 Winds Aloft Forecast

The NWS Winds and Temperature Aloft Forecast¹³ for the route of flight and valid for 1800 CST and for use between 1400 and 2100 CST were as follows.

WINDS ALOFT FORECASTS

DATA BASED ON 081800Z

VALID 090000Z FOR USE 2000-0300Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
COU	9900	2318-06	2619-04	2531-10	2559-24	2577-35	258449	258756	269257
BRL	9900	2531-09	2543-09	2756-15	2677-27	2592-37	750452	750757	269254
MKC	0709	2614-06	2718-06	2644-10	2662-25	2675-36	268851	268956	268555

The closest forecast point was for Burlington, Iowa (BRL) which expected light and variable winds less than 10 knots for 3,000 ft.

¹³ NWS bulletin FBUS KWNO

9.0 NWS Inflight Weather Advisories

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

During the period the NWS AWC issued a series of AIRMETs for IFR and icing conditions over most of Missouri. No SIGMETs, Convective SIGMETs, or CWAs were issued for the area during the period. The G-AIRMETs for IFR conditions due to ceilings below 1,000 ft agl and/or visibility below 3 miles in precipitation, mist, and fog and for moderate icing conditions below 18,000 ft are depicted in figures 21-22 respectively.

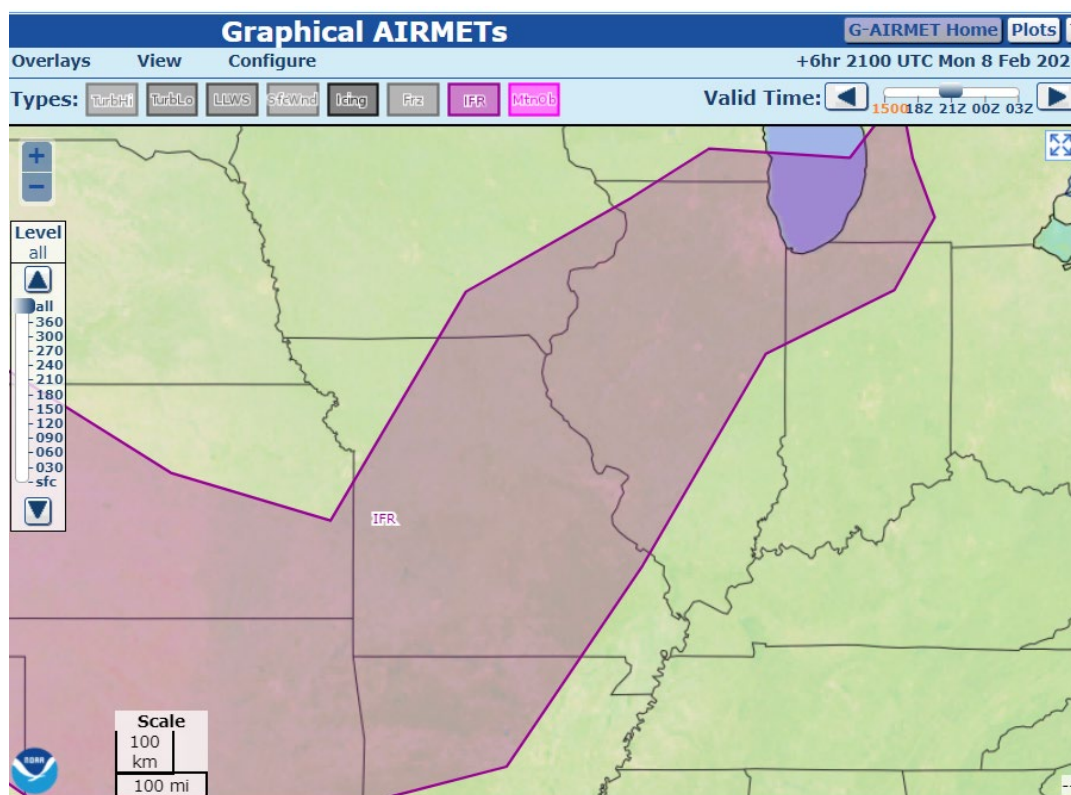


Figure 21 - G-AIRMET for IFR conditions valid at 1500 CST

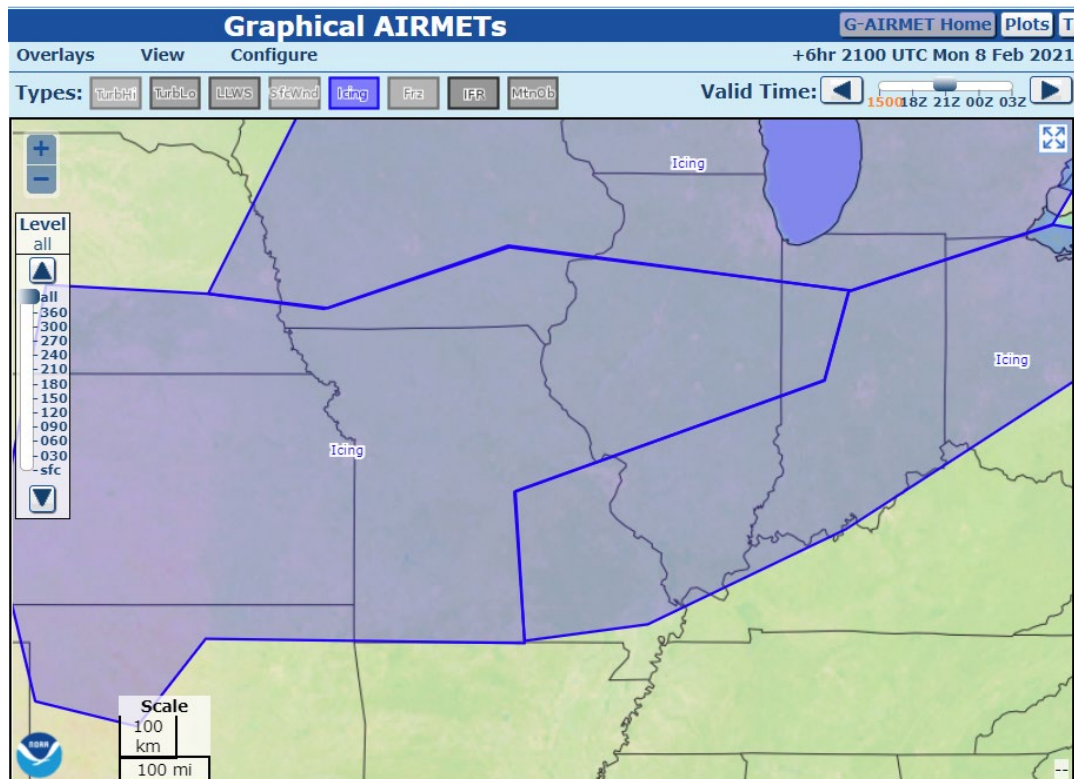


Figure 22 - G-AIRMET for icing conditions valid at 1500 CST

10.0 Weather Briefing Information

A search of the FAA contract Flight Service Station (FSS) provider Leidos indicated that they had no contact with the pilot of N8080G for any weather briefings, flight plans, or inflight contacts on February 8, 2021. A separate search of ForeFlight, indicated that the accident pilot had an account with the company but did not file any flight plans on the day of the accident. The pilot accessed weather imagery the day before the flight at 1542 CST on February 7, 2021, which included a review of the current ceiling and visibility analysis, the Current Icing Product (CIP) and 6-hour Forecast Icing Product (FIP) probability of icing and icing severity for 5000 ft, 7000 ft, 9000 ft, and 11000 ft, and a 12-hour through 60-hour precipitation forecast. There was no evidence that inflight weather advisories, pilot reports, or weather radar imagery were reviewed during the period. The pilot also had several route strings which provided METAR and TAF data for the requested airports. The pilot did not receive any formal weather briefings during the period.

Date/Time (UTC) Updated Route String

2/8/2021 20:38:13 40.167/-93.169 KTRX
 2/8/2021 20:23:17 39.894/-92.558 KLWD
 2/8/2021 20:11:19 39.494/-92.426 KIRK
 2/8/2021 20:11:17 39.312/-92.619 APCH@4.KMBY.R31 KMBY
 2/8/2021 17:55:34 39.312/-92.619 KMBY
 2/8/2021 17:10:13 KCPS 38.522/-90.901 KSLN KCOS
 2/8/2021 17:03:49 KCPS KSLN KCOS
 2/8/2021 17:03:17 KSLN KCOS

2/8/2021 17:03:07 38.497/-90.582 KSLN
 2/8/2021 17:00:33 KCPS KCOS
 2/8/2021 16:46:57 KCPS KSRC
 2/8/2021 16:11:42 KCPS 35.288/-92.780 ISPS KCOS
 2/8/2021 16:11:12 KCPS KUTA ISPS KCOS
 2/8/2021 15:41:39 KCPS KUTA 34.106/-98.606 KCOS
 2/8/2021 13:06:35 KCPS 34.775/-92.088 34.106/-98.606 KCOS
 2/8/2021 3:12:37 KOMA 41.245/-95.810 39.021/-91.076 38.573/-90.387 JUPIS/A022 RW12R KCPS N8080G
 6500FT
 2/7/2021 22:10:18 KCPS KJBR KORK F14 KCOS KLVs KGCN 33.566/-109.912 KSVC KWDG KCVS KCPS
 2/7/2021 22:06:25 KCPS KJBR KORK F14 KCOS KLVs KGCN KSVC KWDG KCVS KCPS
 2/7/2021 22:04:23 KCPS KJBR KORK F14 KSLN KCOS KLVs KGCN KSVC KWDG KCVS KCPS
 2/7/2021 22:03:15 KCPS KJBR KORK KSLN KCOS KLVs KGCN KSVC KWDG KCVS KCPS
 2/7/2021 22:01:39 KCPS KJBR KSLN KCOS KLVs KGCN KSVC KWDG KCVS KCPS
 2/7/2021 21:55:39 KCPS KSLN KCOS KGCN KSVC KWDG KCVS KCPS
 2/7/2021 21:47:25 KCPS 36.898/-90.676 34.775/-92.088 34.106/-98.606 KCOS
 2/7/2021 21:46:10 KCPS 36.898/-90.676 34.106/-98.606 KCOS
 2/7/2021 21:45:44 KCPS 36.898/-90.676 36.048/-95.519 KCOS
 2/7/2021 21:44:52 KCPS 36.898/-90.676 KCOS
 2/7/2021 21:14:03 KCPS KDMO
 2/7/2021 18:36:04 KCPS KSLN KCOS KLVs KGCN KSVC KWDG KCVS KCPS
 2/7/2021 18:30:11 KCPS KSLN KCOS 36.330/-104.621 KGCN KSVC KWDG KCVS KCPS
 2/7/2021 18:29:37 KCPS KSLN KCOS KSVC KGCN KWDG KCVS KCPS
 2/7/2021 18:18:39 KCPS KSLN KCOS KCVS KSVC KGCN KWDG KCPS
 2/7/2021 18:16:19 KCPS KSLN KCOS KWDG KCVS KSVC KGCN KCPS
 2/7/2021 18:14:34 KCPS KSLN KWDG KCVS KSVC KGCN KCOS KCPS
 2/7/2021 18:14:17 KCPS KCOS 36.670/-104.696 KGCN KSVC KCVS KWDG KCPS N7385W 6000FT

Last viewed (UTC) Airport ID - Procedure name

2/8/2021 18:07:56 KMBY - AIRPORT DIAGRAM
 2/8/2021 18:01:41 KMBY - RNAV (GPS) RWY 31
 2/8/2021 17:41:19 KCOS - AIRPORT DIAGRAM

11.0 Witness Statements

There were two witnesses who observed the accident airplane on the ground at KMBY and interacted with the accident pilot. Their statements are in the docket for reference. Both of them witnessed the accident aircraft arrive in KMBY at approximately 1130 CST and reported that it was entirely covered in about ¼” of ice that covered the leading edge, tail section, propeller blades, and windscreen. One of the witness stated that the pilot had to land utilizing only side window for visibility. After placing the aircraft in a heated hangar to deice the aircraft, one of the witnesses stated that the pilot “took off into the exact weather conditions that he had landed in”. That same witness described the accident pilot as being a very proficient instrument pilot as he has landed at KMBY in minimum instrument conditions on numerous occasions. One of the witnesses also engaged in conversation with the pilot and indicated the accident pilot was using an app on his phone to review the weather conditions.

12.0 Astronomical Conditions

The following astronomical conditions were calculated for Galt, Missouri, on February 8, 2021. The time of the accident has been added in italic print for reference.

<u>Sun</u>	
Begin civil twilight	0646 CST
Sunrise	0714 CST
Culmination	1227 CST
<i>Accident</i>	<i>1442 CST</i>
Sunset	1741 CST
End civil twilight	1809 CST

At the time of the accident the sun was at an altitude of 27° above the horizon at an azimuth of 216°.

Submitted by:

Don Eick
Senior Meteorologist