



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

July 14, 2021

Specialist's Factual Report

METEOROLOGY

CEN21FA297

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A. ACCIDENT

Location: Curtiss, Wisconsin
Date: June 30, 2021
Time: 0445 central daylight time (0945 UTC)¹
Aircraft: Type – Earthstar Aircraft Gull 2000; Registration – N1712L

B. METEOROLOGIST

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

C. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board’s meteorological specialist did not travel in support of this accident investigation and gathered all weather data remotely. Unless otherwise noted, all times are in central daylight time (CDT) for June 30, 2021 (based upon the 24-hour clock), directions are referenced to true north, distances are in nautical miles and heights are above mean sea level (msl). The accident site was located at about: 44.984025° north latitude; 90.461475° west longitude at an elevation of about 1,315 feet.

This report provides information on the weather conditions and forecasts applicable to the accident time and location.

D. WEATHER INFORMATION

1.0 Surface Observations

An Automated Weather Observing System (AWOS) was located at Taylor County Airport (MDZ²), in Medford, Wisconsin, which was about 10 miles northeast of the accident location at an elevation of about 1,480 feet and had a magnetic variation of about 2° west. Automated longline³ reports from the MDZ AWOS during the times surrounding the accident time are presented here.

¹ UTC – abbreviation for Coordinated Universal Time

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

³ “Longline” refers to the dissemination of weather observations with the intent that they are available in near-real

[0335 CDT] METAR KMDZ 300835Z AUTO 00000KT M1/4SM FG OVC002 14/14 A3010 RMK AO2 T01360136=
 [0355 CDT] METAR KMDZ 300855Z AUTO 00000KT 1/4SM FG BKN002 14/14 A3010 RMK AO2 T01410141=
 [0415 CDT] METAR KMDZ 300915Z AUTO 00000KT 1/4SM FG VV002 14/14 A3010 RMK AO2 T01400140=
[0435 CDT] METAR KMDZ 300935Z AUTO 00000KT 1/2SM FG VV005 14/14 A3010 RMK AO2 T01380138=
 [0455 CDT] METAR KMDZ 300955Z AUTO 00000KT 5SM BR CLR 14/14 A3010 RMK AO2 T01380138=
 [0515 CDT] METAR KMDZ 301015Z AUTO 00000KT M1/4SM FG VV000 14/14 A3010 RMK AO2 T01370137=

At 0435 CDT, the MDZ AWOS reported a calm wind, visibility 1/2 of a statute mile, fog, vertical visibility of 500 feet above ground level (agl), temperature of 14° Celsius (C) and dew point temperature of 14°C, altimeter setting of 30.10 inches of mercury; Remarks: automated station with a precipitation discriminator, temperature of 13.8°C and a dew point temperature of 13.8°C.

2.0 Pilot Reports

There were no publicly longline-disseminated pilot reports⁴ (PIREPs) within 100 miles of the accident location between 0200 and 0700 CDT.

3.0 Weather Radar

WSR-88D⁵ Level-II base reflectivity weather radar imagery from the La Crosse, Wisconsin, site (KARX) is presented in figure 1. KARX was located approximately 77 miles south-southwest of the accident location at an elevation of about 1,355 feet. Assuming standard refraction and considering the 0.95° beam width⁶ for the WSR-88D radar beam, the KARX 0.483° tilt would have “seen” altitudes above the accident location of between about 5,350 and 13,100 feet above msl. The imagery revealed small areas of light reflectivity about 10 to 25 miles south of the accident location.

time to national databases (effectively, the whole world) and accessible to the general global public from a large number of vendors. This does not include public accessibility to observations from a reporting station’s Very High Frequency (VHF; line-of-site) or telephone broadcast, where applicable. Longline-dissemination of weather observations is the primary vehicle through which the general global public has access to surface weather observations, particularly outside of the aviation community.

⁴ These do not include pilot reports only broadcast via radio.

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

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

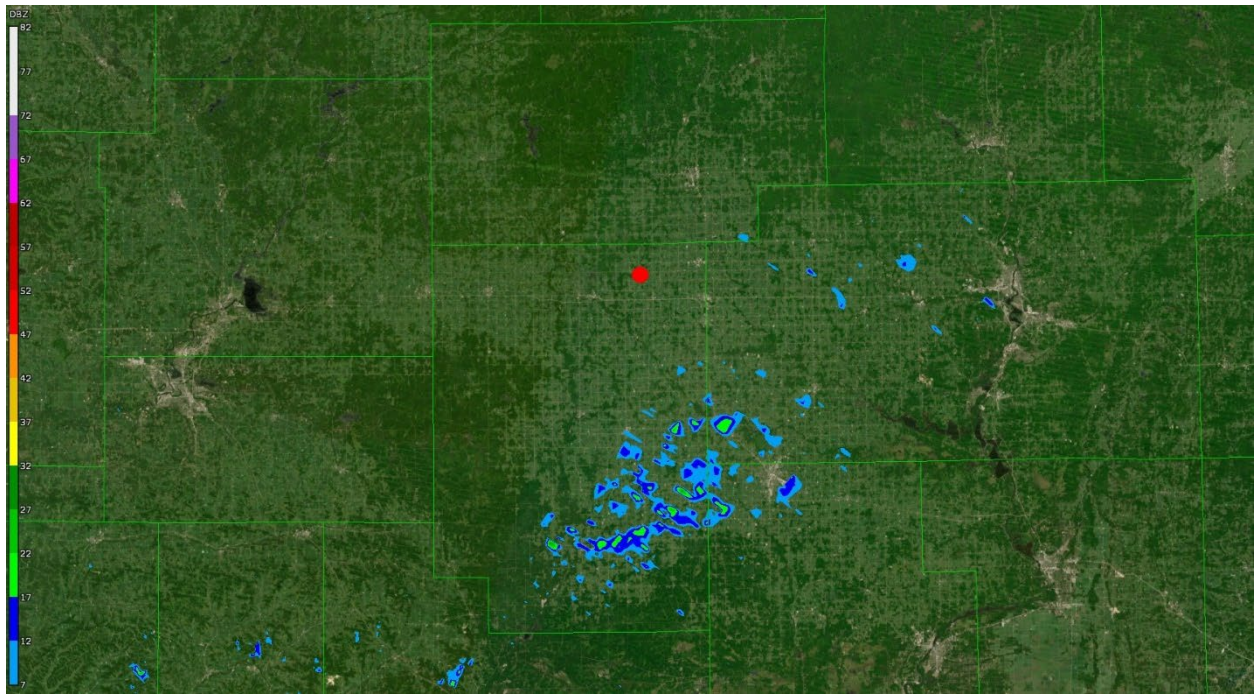


Figure 1 – KARX 0.483° Level-II base reflectivity product from a sweep initiated at 0439:24 CDT. Accident location marked by the red circle. Reflectivity has been “smoothed” and values less than 7.5 dBZ have been masked out.

4.0 HRRR Model Sounding

A High-Resolution Rapid Refresh (HRRR) model⁷ sounding (figure 2) for the accident site at 0500 CDT using an elevation of about 1,315 feet was retrieved from the National Oceanic and Atmospheric Administration’s Air Resources Laboratory. Near the surface below about 75 feet agl the relative humidity was 97 percent or greater; however, the RAwinsonde OBservation Program (RAOB) did not identify any clouds in the lower atmosphere. A temperature inversion was noted below about 1,850 feet. The wind below 2,000 feet was light and variable.

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.

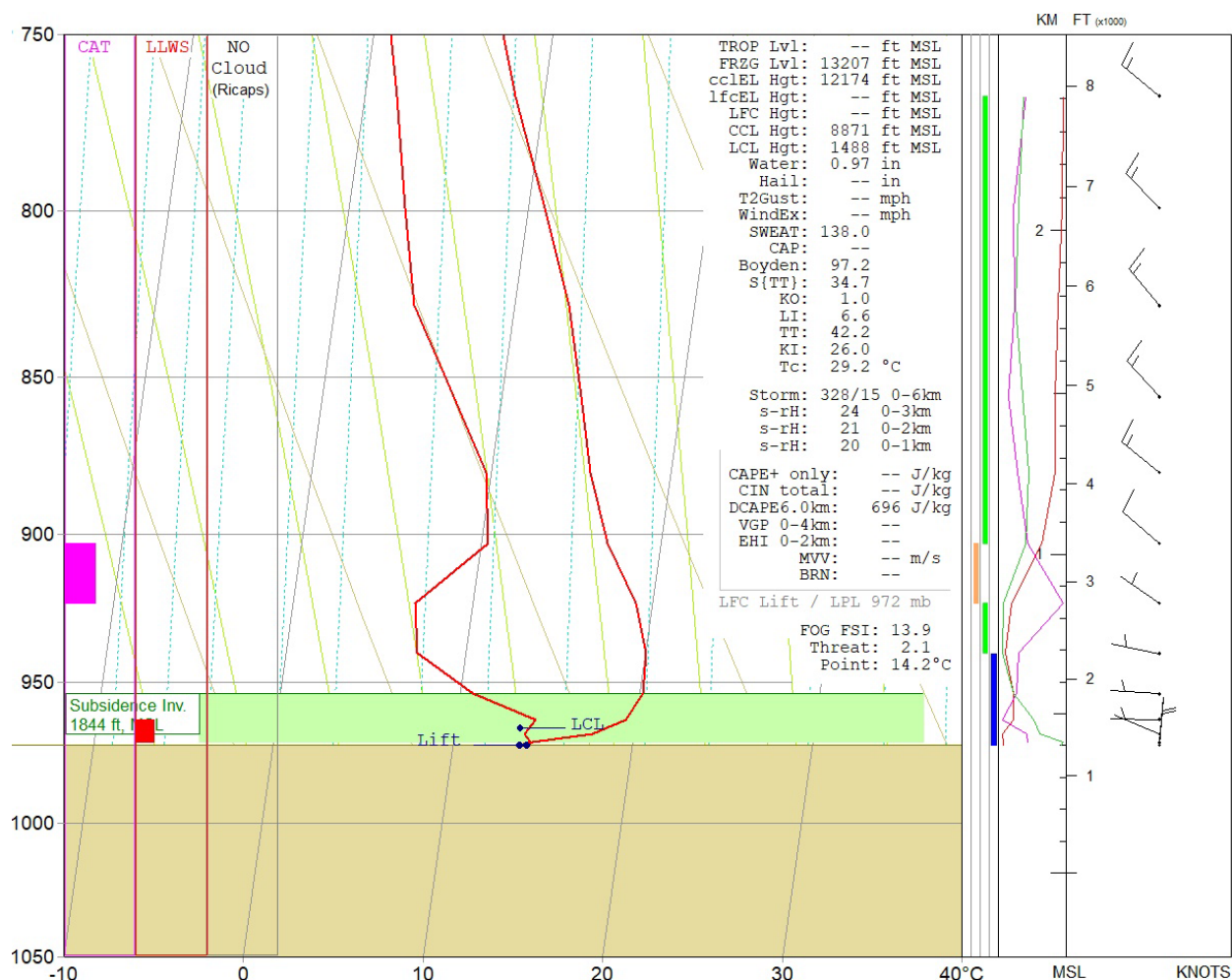


Figure 2 – HRRR model sounding data in SkewT/LogP format for 0500 CDT at the accident site, surface to 750 hectopascals (hPa).

5.0 Satellite Imagery

Geostationary Operational Environmental Satellite (GOES)-16 satellite data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison. Figure 3 presents a red-green-blue (12.3 μ m-10.3 μ m – 10.3 μ m-3.9 μ m – 10.3 μ m; RGB) nighttime microphysics GOES-16 band combination product for 0445 CDT. This product assists in visually identifying cloud level and type at night. Figure 4 presents a guide on interpreting these types of images.

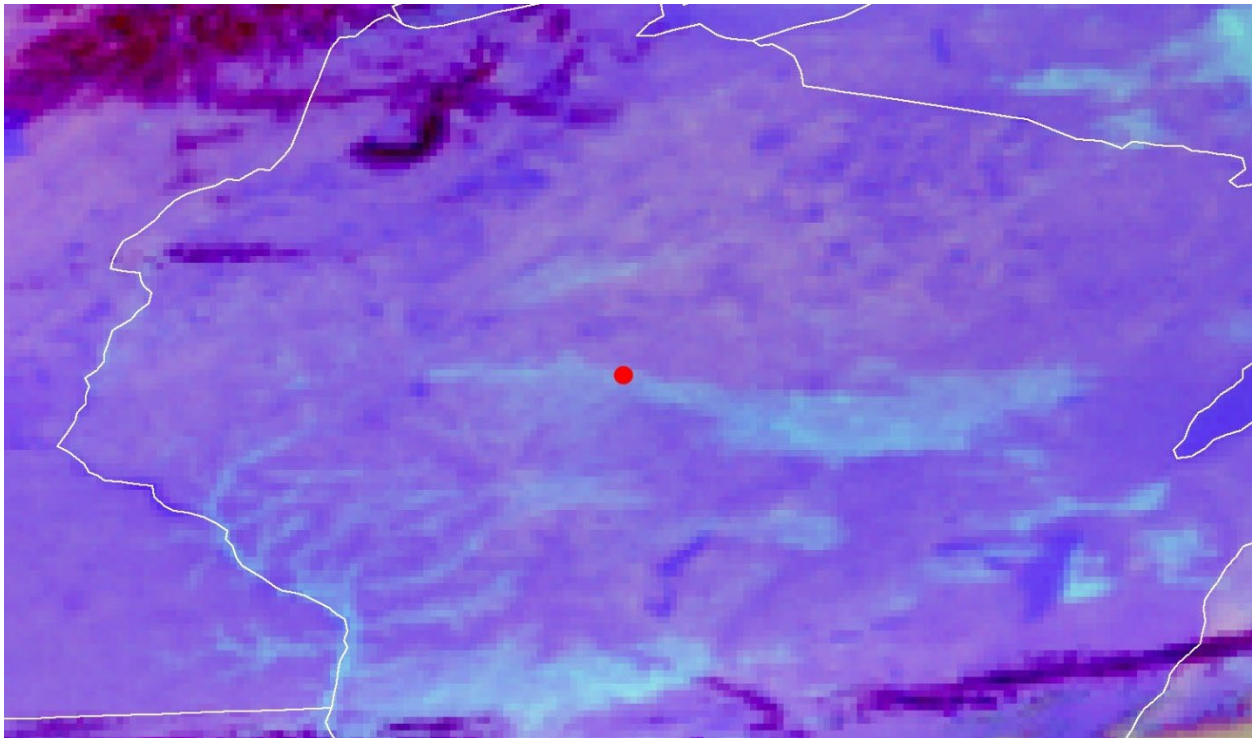


Figure 3 – GOES-16 RGB nighttime microphysics image from 0445 CDT. Accident location denoted by the red circle. This image has not been corrected for any parallax error.

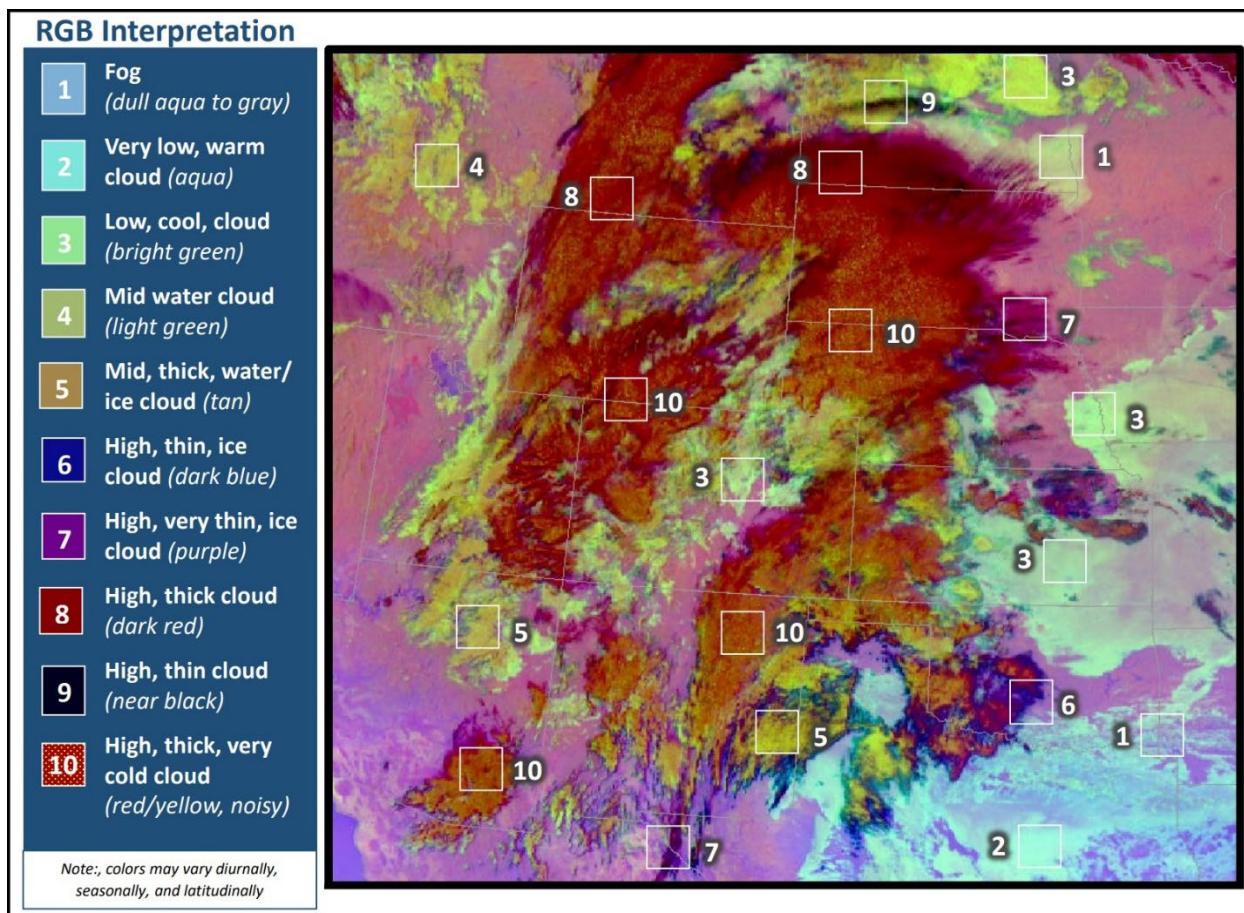


Figure 4 – Interpretation aid for the GOES-16 RGB nighttime microphysics image found in Figure 3. Taken from https://www.star.nesdis.noaa.gov/GOES/documents/QuickGuide_GOESR_NtMicroRGB_final.pdf

6.0 Area Forecast Discussion

The National Weather Service (NWS) Weather Forecast Office (WFO) in La Crosse, Wisconsin, issued the following “Short Term” and “Aviation” sections of an Area Forecast Discussion issued at 0250 CDT. The Short Term section stated, “... Weak boundary layer flow and residual low-level moisture will result in areas of early morning fog, especially in low-lying areas/valleys, but should quickly erode after sunrise. The fog may be locally dense...” The Aviation section identified “VFR conditions settling over the region...” for the Terminal Aerodrome Forecast sites.

FXUS63 KARX 300750

AFDARX

Area Forecast Discussion

National Weather Service La Crosse WI

250 AM CDT Wed Jun 30 2021

.SHORT TERM...(Today through Thursday)

Issued at 250 AM CDT Wed Jun 30 2021

*Dissipating showers have cleared the region early this morning as a diffuse surface boundary continues to drop south. **Weak boundary layer flow and residual low-level moisture will result in areas of early morning fog, especially in low-lying areas/valleys, but should quickly erode after sunrise. The fog may be locally dense,** and will continue to monitor over the next few hours. Otherwise, expect generally uneventful weather today into Thursday as weak high pressure builds across the area. GEFS IVT plots show the plume of deeper moisture extending into the area on the periphery of the subtropical ridge to the southeast will continue to get shunted east as an upper level trough deepens across the eastern Great Lakes through late week with a drier, more comfortable airmass gradually filtering across the region. A shortwave trough will slide south across WI this late today into Thursday. Surface forcing appears negligible and with only weak synoptic lift, expect a mostly dry period with only a very low chance for an isolated shower/storm. Seasonably warm temps in the 80s are likely today before slight cooling occurs for Thursday with the influence of the upper trough deepening to the east.*

*.AVIATION...(For the 00Z TAFS through 00Z Wednesday evening)
Issued at 616 PM CDT Tue Jun 29 2021*

VFR conditions settling over the region as the short wave and associated cold front clear the area. Light north to northwest wind will continue through the TAF period as the surface ridge settles over the upper midwest.

7.0 Special Weather Statement

At 0400 CDT, the NWS WFO in La Crosse, Wisconsin, issued the following Special Weather Statement, which advised of dense fog for a region that included the accident location.

*WWUS83 KARX 300900
SPSARX
Special Weather Statement
National Weather Service La Crosse WI
400 AM CDT Wed Jun 30 2021*

*IAZ010-011-029-030-MNZ088-096-WIZ017-029-032>034-041>044-053>055-061-
301300-
Winneshiek- Allamakee- Fayette- Clayton- Winona- Houston- Taylor- Clark- Buffalo-
Trempealeau- Jackson- La Crosse- Monroe- Juneau- Adams- Vernon- Crawford-
Richland-Grant-
Including the cities of Decorah, Waukon, Oelwein, Elkader, Winona, Caledonia,
Medford, Neillsville, Alma, Arcadia, Whitehall, Black River Falls, La Crosse, Sparta,
Tomah, Mauston, Friendship, Viroqua, Prairie Du Chien, Richland Center, and
Platteville
400 AM CDT Wed Jun 30 2021*

...Locally Dense Fog Early This Morning...

Light winds, mostly clear skies and wet grounds from the recent rains have resulted in areas of fog early this morning, mostly in low lying areas and near bodies of water. The fog will be locally dense, reducing visibilities to 1/2 mile or less.

Early morning travelers should be prepared for rapidly reduced visibilities at times. Visibilities could go from good to poor within a few hundred feet. Much of the fog will lift and dissipate by 8 to 9 am. Exercise caution.

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8.0 AIRMETs SIERRA

An Airmen's Meteorological Information (AIRMET) SIERRA advisory for instrument flight rule conditions, identifying ceilings below 1,000 feet, visibility below 3 statute miles, precipitation and fog, was issued at 0345 CDT and was valid for the accident site at the accident time.

WAUS43 KKCI 300845

WA3S

-CHIS WA 300845

AIRMET SIERRA UPDT 2 FOR IFR AND MTN OBSCN VALID UNTIL 301500

AIRMET IFR...SD NE MN IA MO WI LM LS MI LH IL

FROM 40E YQT TO 40NNW SSM TO 60NW YVV TO 60SW YVV TO 20SW GRR TO 30NW ORD TO 20N UIN TO 20E OBH TO 30N MCW TO 20S MSP TO 70ESE ABR TO 20S BJI TO 40E YQT

CIG BLW 010/VIS BLW 3SM BR/FG. CONDS CONTG BYD 15Z ENDG 15-18Z.

9.0 SIGMETs

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

10.0 CWSU Products

There were no Center Weather Advisories or Meteorological Impact Statements issued by the NWS Center Weather Service Units (CWSU) at the Minneapolis Air Route Traffic Control Center that were active for the accident location at the accident time.

11.0 Graphical Forecasts for Aviation

The Graphical Forecasts for Aviation (GFA) are intended to provide the necessary aviation weather information to give users a complete picture of the weather that might impact flight in the continental United States. Hourly model data and forecasts, including information on clouds, flight category, precipitation, icing, turbulence, wind, and other output from the NWS are available, however only certain imagery are archived by the NWS.

The following images (Figures 5 and 6) depict GFA forecast information on sky condition, icing, mountain obscuration, IFR condition and surface wind Graphical-AIRMET (G-AIRMET) advisories, surface visibility, surface wind, precipitation, and other obscurations and hazards, valid for a time near the accident time.

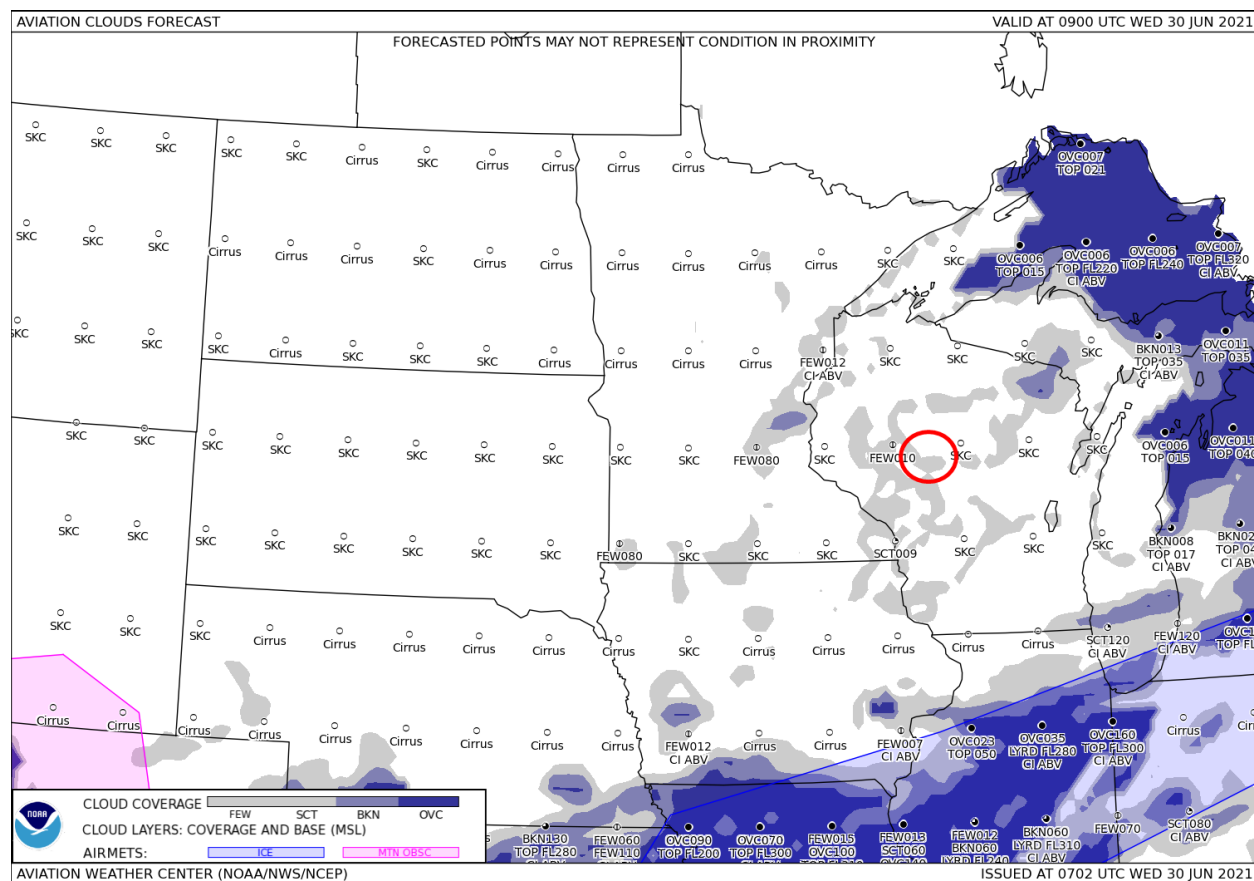


Figure 5 – GFA forecast imagery depicting sky condition and icing and mountain obscuration G-AIRMETs. Issued about 0200 CDT and valid for 0400 CDT. This GFA forecast imagery depicted few and scattered clouds at or near the accident location. The accident location is located within the red circle.

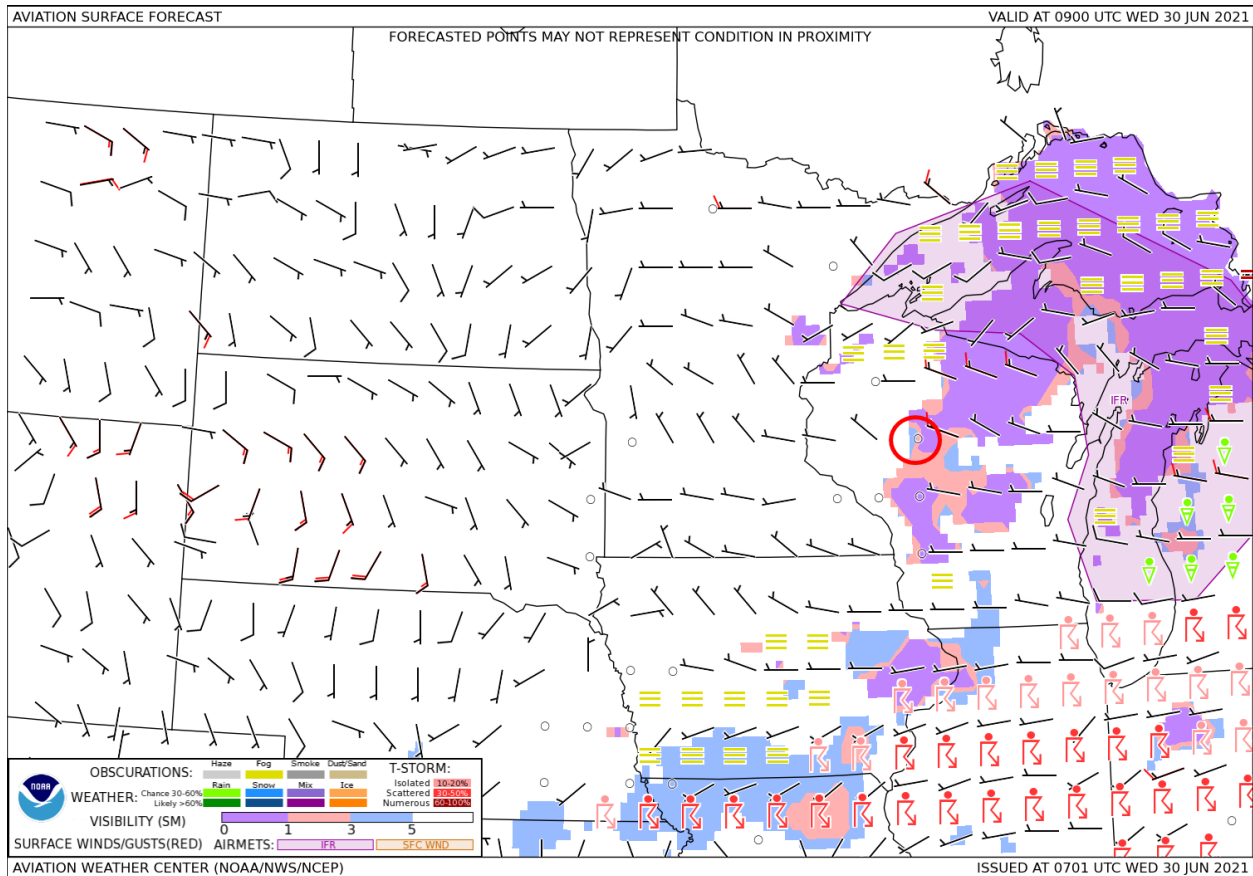


Figure 6 – GFA forecast imagery depicting IFR conditions and surface wind G-AIRMETs, surface visibility, surface wind, precipitation, and other obscurations and hazards. Issued about 0200 CDT and valid for 0400 CDT. This GFA forecast imagery depicted surface visibilities as being between 0 to 1 statute miles, 1 to 3 statute miles, 3 to 5 statute miles and greater than 5 statute miles at or near the accident location. A northwesterly to west-northwesterly wind of 5 -10 knots was depicted near the accident location. The accident location is located within the red circle.

12.0 Astronomical

On the day of the accident civil twilight began at 0442 CDT and sunrise occurred at 0519 CDT. At the time of the accident and relative to the accident location, the sun was at an azimuth of 47° and an elevation of -5° (center of the disk was below the horizon).⁸ According to mooncalc.org⁹, at the time of the accident and relative to the accident location, the moon was at an azimuth of 237° and an elevation of 19° with about 63 percent of its disk illuminated.

⁸ Solar position was retrieved from NOAA via: <https://www.esrl.noaa.gov/gmd/grad/solcalc/>

⁹ <https://www.mooncalc.org/>

Submitted by:

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