



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

March 4, 2019

Weather Study

METEOROLOGY

CEN19FA030

Table Of Contents

A.	ACCIDENT	3
B.	METEOROLOGIST	3
C.	SUMMARY	3
D.	DETAILS OF THE INVESTIGATION	3
E.	WEATHER INFORMATION	4
1.0	Synoptic Conditions.....	4
1.1	Surface Analysis Chart	4
1.2	National Radar Mosaic Image	5
1.3	Weather Depiction Chart	6
1.4	Constant Pressure Charts	7
1.5	12-hour Surface Prognostic Chart.....	10
1.6	Low Level Significant Weather Prognostic Chart	10
2.0	Observations	11
2.1	Bismarck Municipal Airport, Bismarck, North Dakota.....	11
2.2	Mercer County Regional Airport, Hazen, North Dakota	12
2.3	Glen Ullin Regional Airport, Glen Ullin, North Dakota	13
2.4	Dickinson – Theodore Roosevelt Regional Airport, Dickinson, North Dakota	14
2.5	Sloulin Field International Airport, Williston, North Dakota.....	15
3.0	Sounding Observation.....	16
4.0	Satellite Imagery	18
5.0	Weather Surveillance Radar Imagery	19
6.0	Pilot Reports.....	21
7.0	NWS Forecasts.....	21
7.1	Terminal Aerodrome Forecast	22
7.2	Area Forecast Discussion.....	22
8.0	Inflight Weather Advisories.....	24
8.1	Winds and Temperatures Aloft.....	26
9.0	Weather Briefing Data	27
10.0	Astronomical Data	27
11.0	Current Icing Potential.....	28
F.	LIST OF ATTACHMENTS	30

A. ACCIDENT

Location: Harmon, North Dakota
Date: November 18, 2018
Time: 2240 central standard time
0440 Universal Coordinated Time (UTC) on November 19, 2018
Airplane: Cessna 441; Registration: N441CX

B. METEOROLOGIST

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

C. SUMMARY

On November 18, 2018, at 2240 central standard time, a Cessna 441, N441CX, was destroyed when it broke up in-flight and impacted an open field near Harmon, North Dakota. The airline transport certificated pilot, flight nurse, and paramedic were fatally injured. The airplane was registered to and operated by Bismarck Air Medical under the provisions of Title 14 *Code of Federal Regulations* Part 135. Instrument meteorological conditions prevailed at the time of the accident, and an instrument flight rules (IFR) flight plan had been filed for the air medical cross-country flight. The flight originated from Bismarck Municipal Airport (BIS), Bismarck, North Dakota, at 2230, and was en route to Sloulin Field International Airport (ISN), Williston, North Dakota.

D. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's Senior Meteorologist was not on scene for this investigation and conducted the meteorology phase of the investigation from the Washington D.C. office, collecting data from official National Weather Service (NWS) sources including the Weather Prediction Center (WPC) and the National Center for Environmental Information (NCEI). All times are central standard time (CDT) based upon the 24-hour clock, local time is -6 hours from UTC, and UTC=Z. NWS airport and station identifiers use the standard International Civil Aviation Organization 4-letter station identifiers versus the International Air Transport Association 3-letter identifiers, which deletes the initial country code designator "K" for U.S. airports. 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 airplane was cruising at 14,000 ft when it was lost off radar. The accident site was estimated at latitude 46.960556° N and longitude 101.064722° W at an elevation of approximately 1,942 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 can be found in the joint NWS and Federal Aviation Administration (FAA) Advisory Circular “Aviation Weather Services”, AC 00-45H.

1.1 Surface Analysis Chart

The north central portion of the NWS Surface Analysis Chart for 2100 CST on November 18, 2018 is included as figure 1 with the accident site located within the red circle and the intended route of flight indicated by the dashed red line. The chart depicted a low-pressure system at 1017-hectopascals (hPa)¹ over Minnesota along a frontal wave, with a cold front extending west-southwest across Minnesota into South Dakota and then back to the northwest into North Dakota, Montana, and into Canada. A cold-core high-pressure system at 1031-hPa was located further to the north over Canada with a ridge extending southward into North Dakota. The accident site was located on the cold air side of the cold front.

¹ Hectopascals (hPa) is the new standard 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.

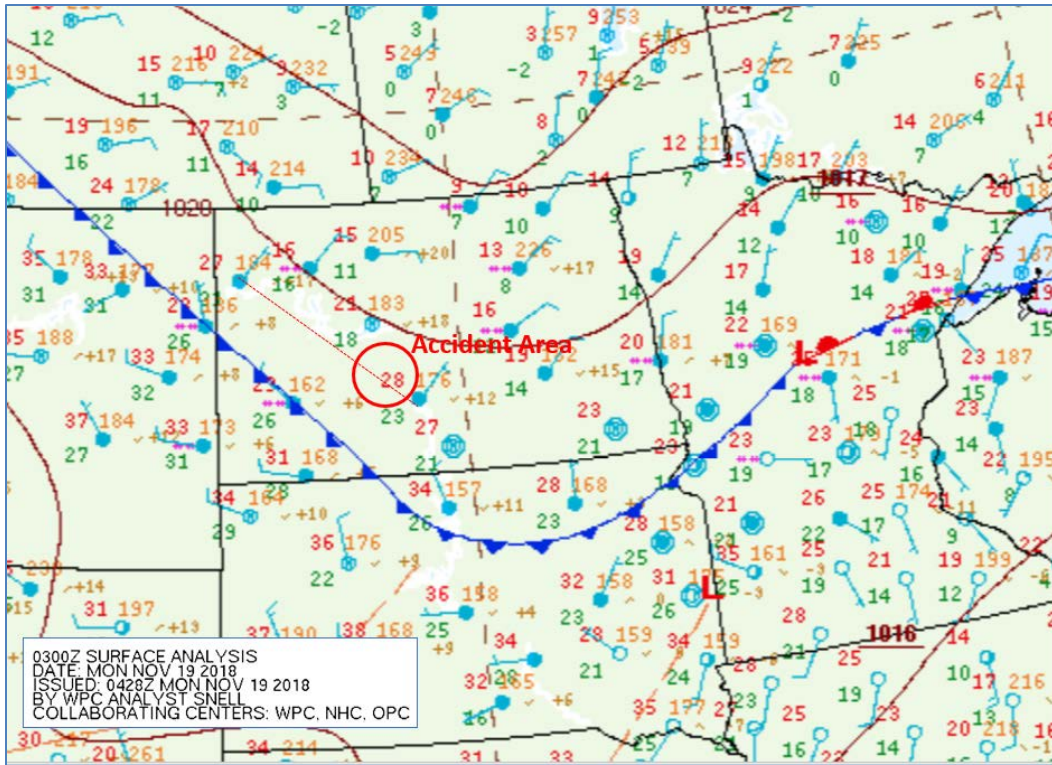


Figure 1 - northcentral NWS Surface Analysis Chart for 2100 CST

The station model for Bismarck indicated a wind from the northeast at approximately 5 knots, overcast clouds, with a temperature of 28° Fahrenheit (F), and a dew point of 23° F. Numerous stations over Minnesota, North Dakota, and Montana reported light snow showers.

1.2 National Radar Mosaic Image

The NWS National Composite Radar Mosaic image for 2240 CST over the region is included as figure 2 with the approximate accident site marked by a red star. The image depicted several areas of snow showers over North Dakota north and east of the Bismarck area, with one area immediately north of the accident site. Figure 3 is a closeup over the accident site for the same period. The echoes in the vicinity of KBIS and immediately west of the accident site were identified as false echoes associated with higher terrain and wind farms. The band of west to east light echoes in various shades of blue extending northwest to northeast of the accident site were precipitation echoes associated with snow. Another area of light echoes was located further west in the vicinity of Glen Ullin along Interstate highway 94.

The closest NWS weather radar to the accident site will be further documented in section 5.0 of this report.

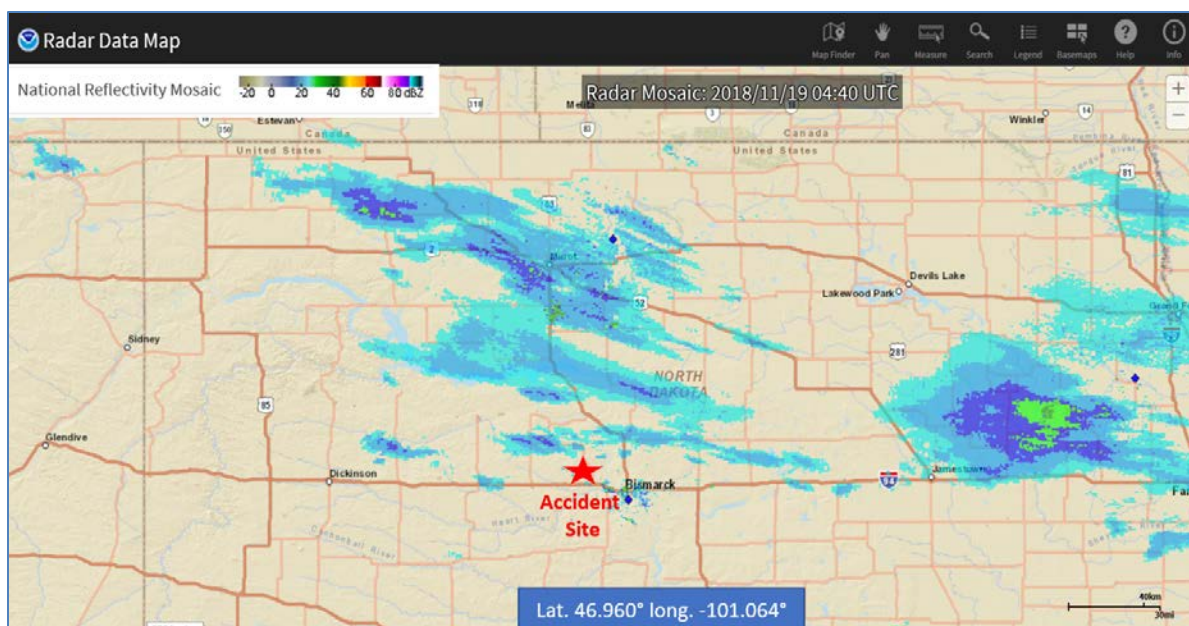


Figure 2 - NWS National Composite Radar Mosaic over North Dakota at 2240 CST

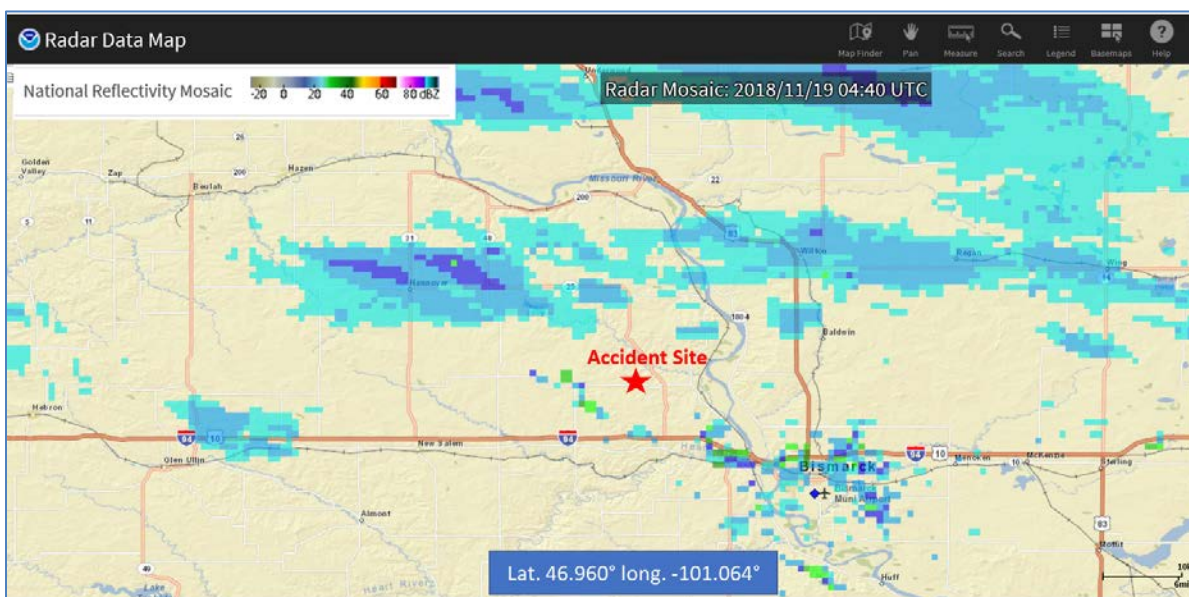


Figure 3 - NWS National Composite Radar Mosaic closeup for 2240 CST

1.3 Weather Depiction Chart

The northcentral section of the NWS Weather Depiction Chart for 2200 CST is included as figure 4 depicting the general flight categories² over the region. The chart depicted several areas

² As defined by the NWS and the FAA Aeronautical Information Manual (AIM) section 7-1-7 defines the following general flight categories:

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

of IFR conditions within the shaded contours over North Dakota and Montana due to low ceilings and visibility in snow, with MVFR conditions extending over most of North Dakota.

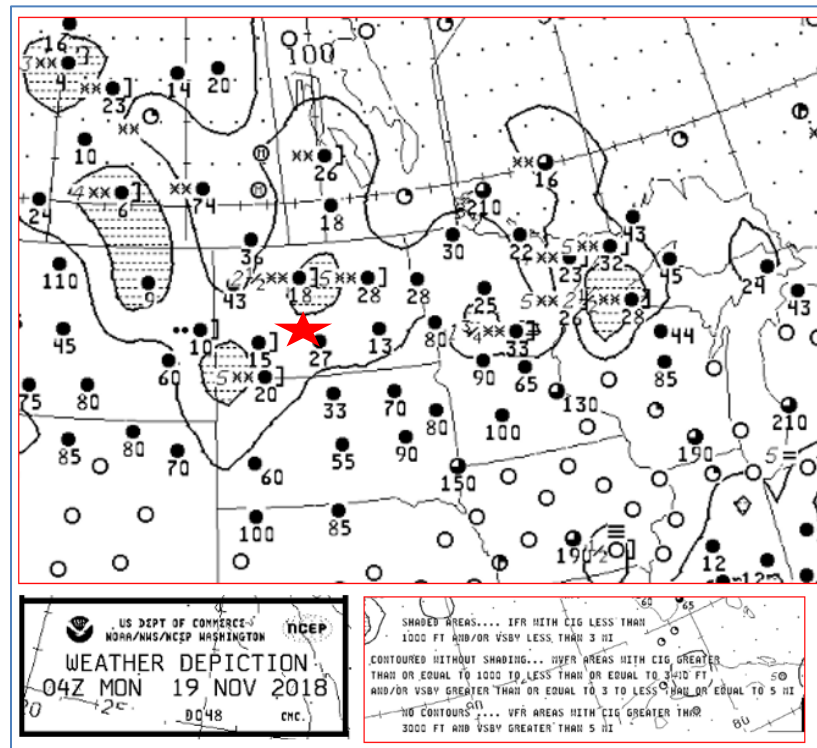


Figure 4 - Weather Depiction Chart for 2200 CST

1.4 Constant Pressure Charts

The NWS Storm Prediction Center (SPC) upper air charts for 850, 700, 500, and 300-hPa for 1800 CST are included as figures 5 through 8 with the accident site located within the red circle. The charts represent the conditions at approximately 5000 ft, 10000 ft, 18000 ft, and 30000 ft respectively, and indicated that northwesterly winds with little variation in direction with increasing wind speed with height were observed over the area.

- 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.

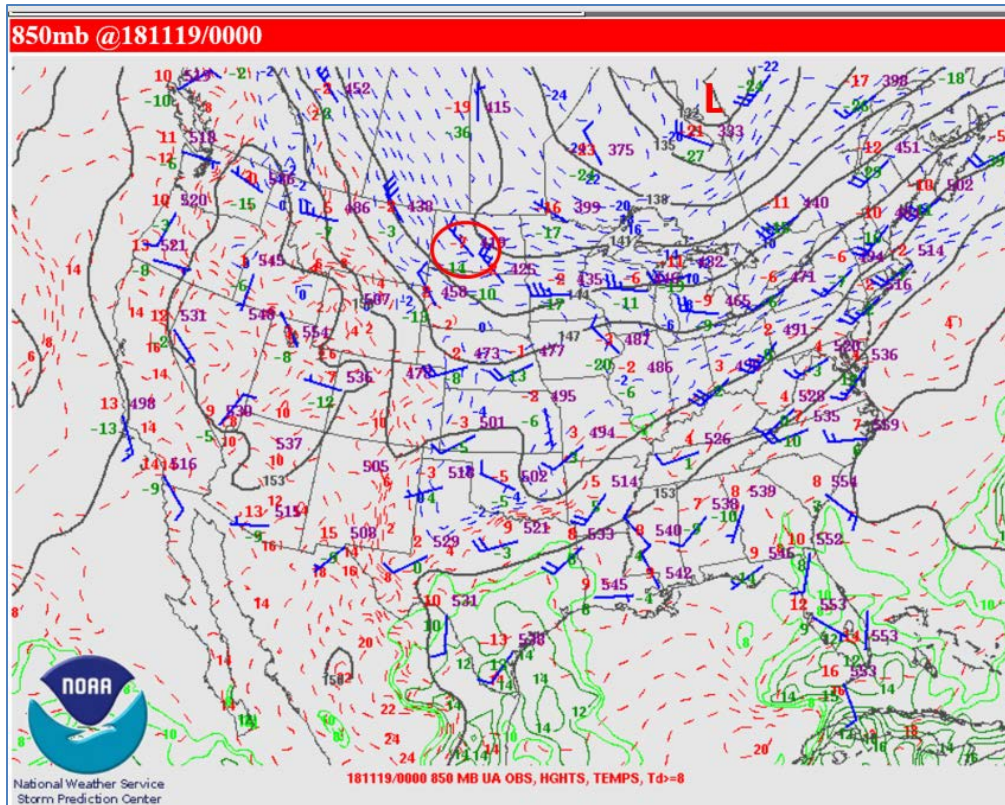


Figure 5 – NWS 850-hPa Constant Pressure Chart for 1800 CST

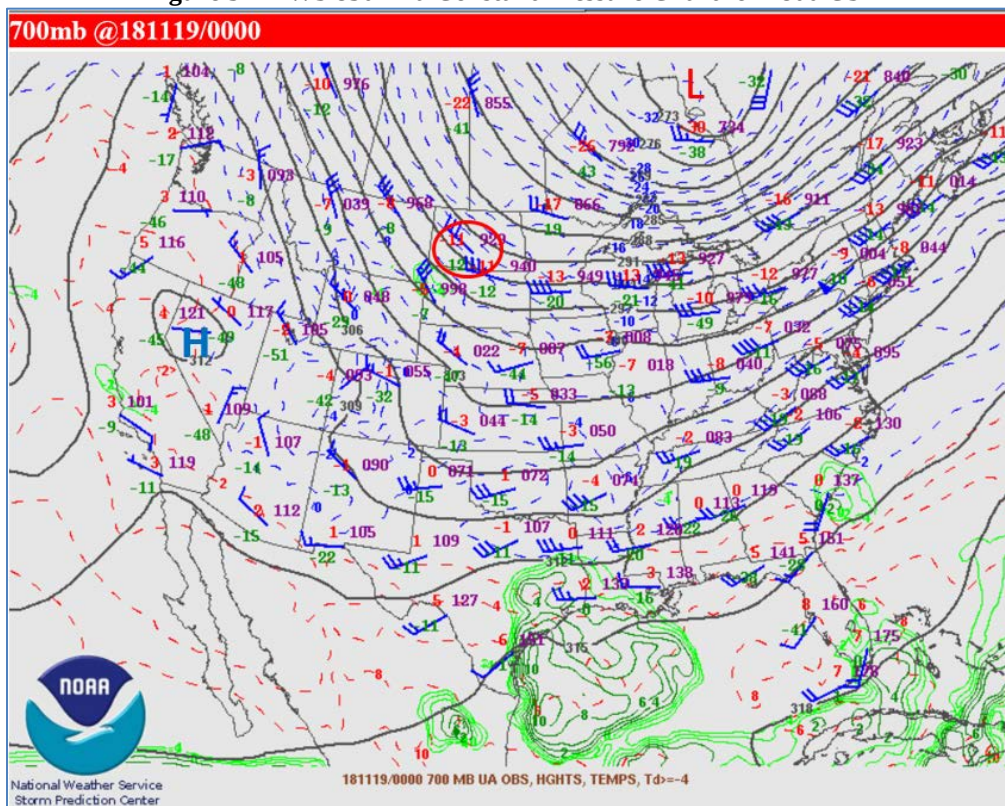


Figure 6 - NWS 700-hPa Constant Pressure Chart for 1800 CST

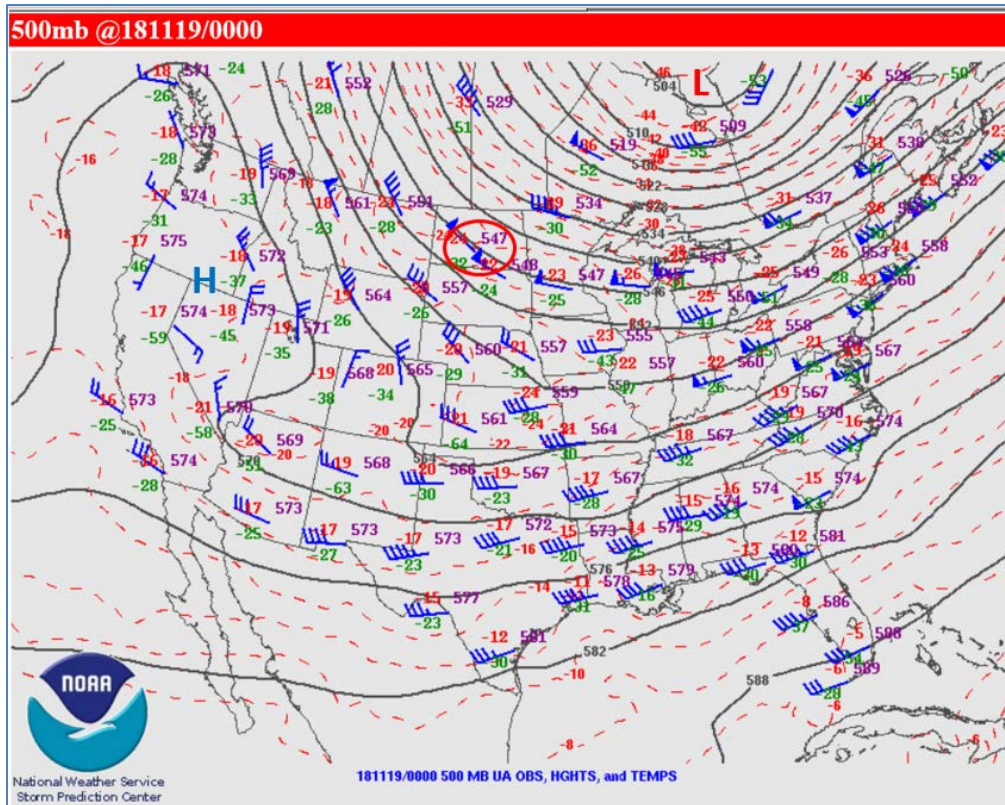


Figure 7 - NWS 500-hPa Constant Pressure Chart for 1800 CST

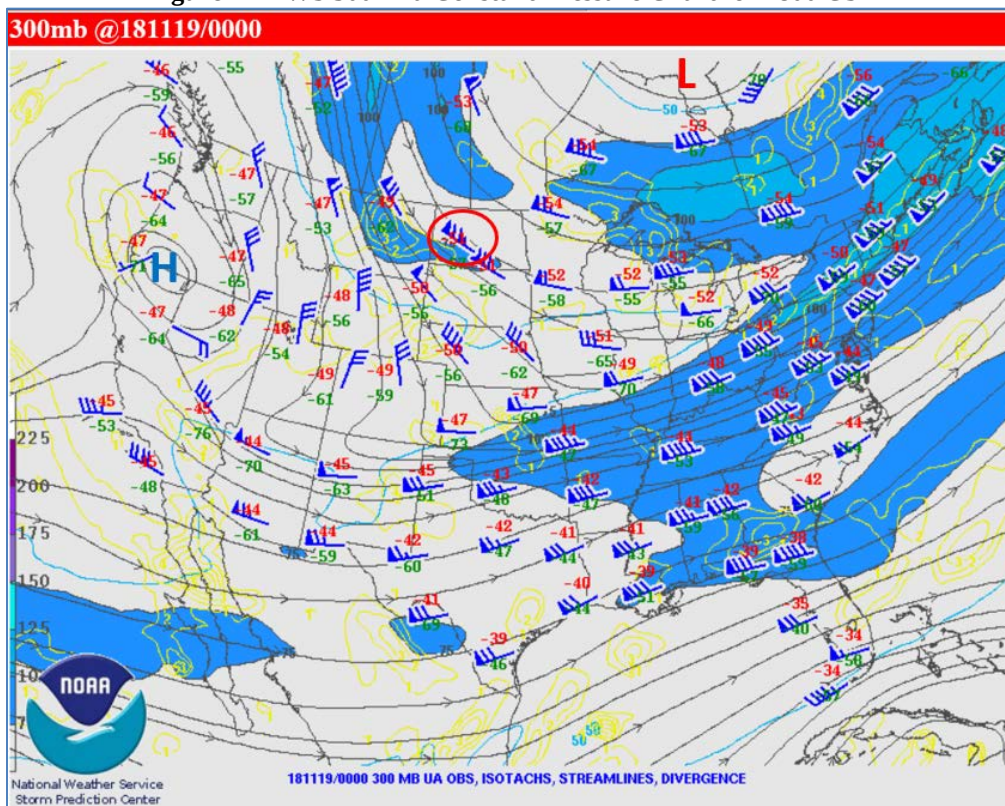


Figure 8 - NWS 300-hPa Constant Pressure Chart for 1800 CST

1.5 12-hour Surface Prognostic Chart

The NWS 12-hour Surface Prognostic Chart valid for 0600 CST on November 19, 2018 is included as figure 9 with the approximate accident site marked by a red star. The chart depicted the low-pressure system over Wisconsin and the trailing cold front over the region, which was expected to become stationary over western North Dakota and Montana during the period. A large area of scattered snow showers was expected over portions of the Dakota's and Montana during the period.

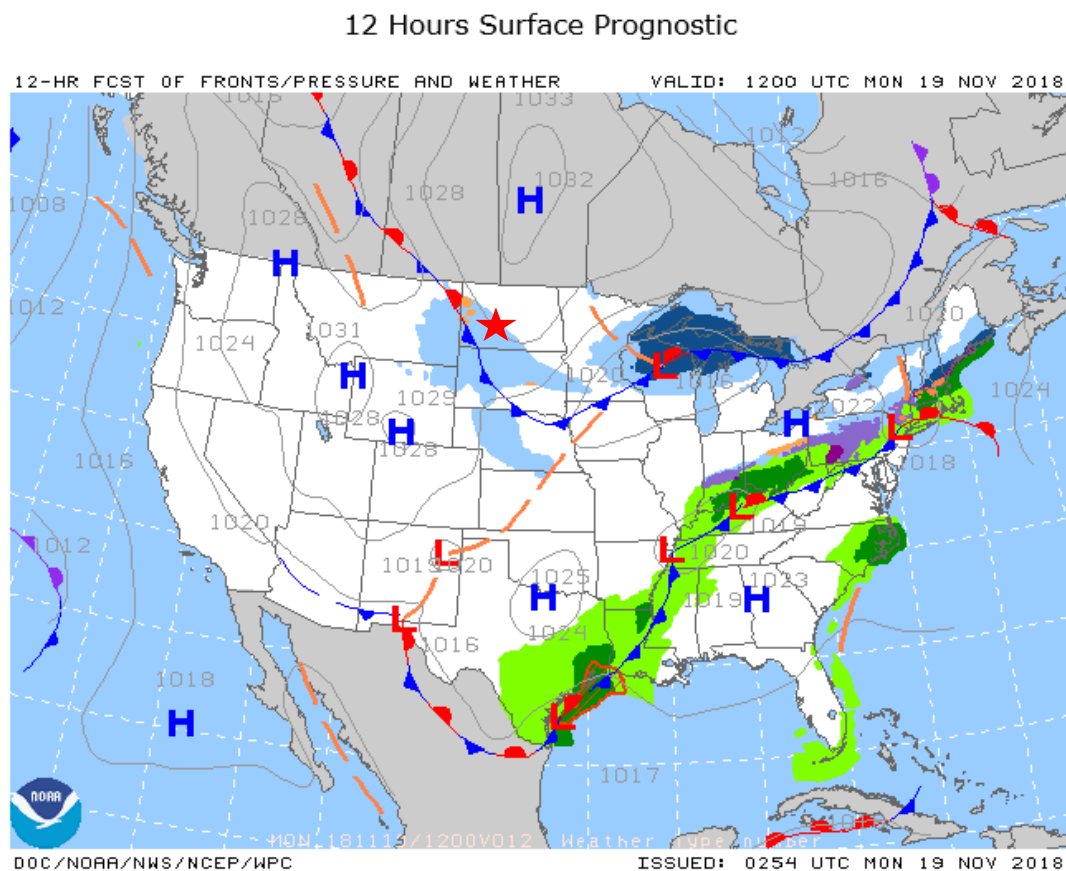


Figure 9 - NWS 12-hour Surface Prognostic Chart

1.6 Low Level Significant Weather Prognostic Chart

The 12- and 24-hour Low Level Significant Weather Prognostic Chart current at the time of the accident is included as figure 10, and depicted the general flight categories, turbulence, and freezing level. The 12-hour forecast (left chart) expected an area of instrument flight rule (IFR) conditions by the red contour over eastern Montana and western North Dakota, with a large area of marginal visual flight rule (MVFR) conditions over the region and included the accident site. No turbulence below 24,000 ft was forecasted, and the freezing level was at the surface over North Dakota.

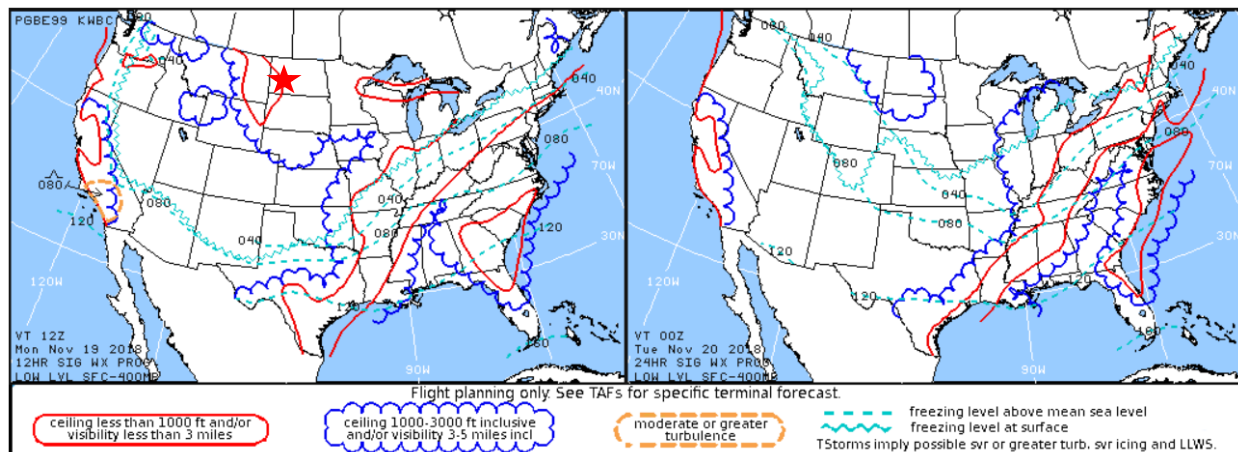


Figure 10 - Low Level Significant Weather Prognostic Chart

2.0 Observations

The surrounding area was documented using Meteorological Aerodrome Reports (METAR) and Specials observations (SPECI). The area had a magnetic variation of 6° East based on the sectional chart for the area. Cloud heights are reported in height above ground level (agl) in the following section.

2.1 Bismarck Municipal Airport, Bismarck, North Dakota

The closest official weather reporting location was from the departure site of Bismarck Municipal Airport (KBIS), Bismarck, North Dakota, located 17 miles southeast of the accident site at an elevation of 1,661 ft. The airport had a federally installed and maintained Automated Surface Observation System (ASOS) and was augmented by observers. The following conditions were reported surrounding the time of the accident:

KBIS weather observation at 2152 CST, wind from 040° at 7 knots, visibility 10 miles or more, ceiling³ overcast at 2,700 ft agl, temperature -3° Celsius (C), dew point temperature -5° C, altimeter 29.99 inches of mercury (Hg). Remarks: automated observation system with a precipitation discriminator, sea level pressure 1018.4-hPa, temperature -2.8° C, dew point -5.0° C.

KBIS weather observation at 2252 CST, wind from 050° at 9 knots, visibility 10 miles or more, a few clouds at 900 ft agl, ceiling overcast at 2,400 ft agl, temperature -4° C, dew point -6° C, altimeter 30.01 inches of Hg. Remarks: automated observation system with a precipitation discriminator, sea level pressure 1019.0-hPa, temperature -4.4° C, dew point -6.1° C.

KBIS weather observation at 2352 CST, automated, wind from 060° at 9 knots, visibility 5 miles in light snow and mist, scattered clouds at 2,000 ft agl, ceiling overcast at 2,700 ft agl, temperature -5° C, dew point -7° C, altimeter 30.04 inches of Hg. Remarks: automated observation system with a precipitation discriminator, snow began at 2321 CST, sea level pressure 1019.7-hPa, hourly

³ Ceiling – is defined as the lowest layer of clouds reported as broken or overcast, or the vertical visibility into a surface based obscuration.

precipitation less than 0.01 inches (trace), 3-hour precipitation trace, temperature -5.0° C, dew point -7.2° C, 6-hour maximum temperature -0.6° C, 6-hour minimum temperature -5.0° C, 24-hour maximum temperature 0.0° C, 24-hour minimum temperature -15.0° C, 3-hour pressure tendency risen 2.1-hPa.

The general flight categories and raw observations from 1952 through 0052 CST are included below. The reports show that snow continued to be reported from 2321 through 0147 CST with general MVFR to temporary IFR conditions being reported through that time.

VFR METAR KBIS 190152Z 05004KT 10SM FEW040 OVC065 M02/M04 A2995 RMK AO2 SLP169 T10171044

VFR METAR KBIS 190252Z 04007KT 10SM SCT030 OVC060 M02/M05 A2997 RMK AO2 SLP176 T10221050 53012

MVFR SPECI KBIS 190336Z 04008KT 10SM BKN027 OVC060 M03/M04 A2999 RMK AO2 T10281044

MVFR METAR KBIS 190352Z 04007KT 10SM OVC027 M03/M05 A2999 RMK AO2 SLP184 T10281050

Accident 0440Z

MVFR METAR KBIS 190452Z 05009KT 10SM FEW009 OVC024 M04/M06 A3001 RMK AO2 SLP190 T10441061=

MVFR METAR KBIS 190552Z AUTO 06009KT 5SM -SN BR SCT020 OVC027 M05/M07 A3004 RMK AO2 SNB21 SLP197 P0000 60000 T10501072 11006 21050 400001150 53021=

MVFR SPECI KBIS 190600Z AUTO 04011KT 6SM -SN BR SCT009 BKN020 OVC027 M05/M07 A3004 RMK AO2 P0000 T10501067

IFR SPECI KBIS 190610Z AUTO 04013KT 7SM -SN BKN009 OVC020 M06/M07 A3004 RMK AO2 P0000 T10561072

MVFR SPECI KBIS 190641Z AUTO 06012KT 7SM -SN SCT009 OVC022 M07/M09 A3006 RMK AO2 P0000 T10671089

MVFR METAR KBIS 190652Z AUTO 05012KT 6SM -SN OVC022 M07/M09 A3006 RMK AO2 SLP204 P0000 T10671094

2.2 Mercer County Regional Airport, Hazen, North Dakota

The next closest weather station to the accident site was from Mercer County Regional Airport (KHZ), Hazen, North Dakota, located 29 miles northwest of the accident site at an elevation of 1,814 ft. The airport had an Automated Weather Observation System (AWOS), which was not augmented by human observers and issued observations every 20-minutes. The following conditions were reported at the time of the accident:

KHZE weather observation at 2235 CST, automated, wind from 060° at 8 knots, visibility 3 miles in light snow, a few clouds at 400 ft agl, ceiling broken at 900 ft, overcast at 2,700 ft, temperature -5° C, dew point -6° C, altimeter 30.03 inches of Hg. Remarks: automated observation system with a precipitation discriminator, thunderstorm sensor inoperative.

The general flight categories and observations were reported during the period:

MVFR METAR KHZE 190155Z AUTO 05005KT 10SM OVC021 M03/M03 A2997 RMK AO2 TSNO=
MVFR METAR KHZE 190215Z AUTO 05006KT 10SM OVC021 M03/M04 A2998 RMK AO2 TSNO=
MVFR METAR KHZE 190235Z AUTO 05006KT 8SM -UP SCT008 SCT012 OVC022 M03/M04 A2998 RMK AO2
TSNO=
MVFR METAR KHZE 190255Z AUTO 05007KT 10SM SCT008 OVC013 M04/M04 A3000 RMK AO2 TSNO=
MVFR METAR KHZE 190315Z AUTO 06006KT 10SM OVC012 M04/M04 A3001 RMK AO2 TSNO=
MVFR METAR KHZE 190335Z AUTO 06008KT 10SM OVC011 M05/M05 A3001 RMK AO2 TSNO=
IFR METAR KHZE 190355Z AUTO 05006KT 10SM BKN009 OVC013 M05/M05 A3002 RMK AO2 TSNO=
IFR METAR KHZE 190415Z AUTO 05006KT 10SM OVC009 M05/M06 A3002 RMK AO2 TSNO=
IFR METAR KHZE 190435Z AUTO 06008KT 3SM -SN FEW004 BKN009 OVC027 M05/M06 A3003 RMK
AO2 TSNO=

Accident 0440Z

MVFR METAR KHZE 190455Z AUTO 05006KT 9SM -SN FEW004 OVC010 M05/M06 A3004 RMK AO2 TSNO=
IFR METAR KHZE 190515Z AUTO 05007KT 9SM OVC009 M06/M06 A3005 RMK AO2 TSNO=
IFR METAR KHZE 190535Z AUTO 05010KT 6SM -SN OVC009 M07/M08 A3006 RMK AO2 TSNO=
MVFR METAR KHZE 190555Z AUTO 06010KT 6SM -SN OVC010 M07/M08 A3006 RMK AO2 TSNO=
MVFR METAR KHZE 190615Z AUTO 05008G13KT 7SM -SN OVC013 M08/M08 A3007 RMK AO2 TSNO=
MVFR METAR KHZE 190635Z AUTO 06005G11KT 8SM BKN012 OVC016 M08/M09 A3008 RMK AO2 TSNO=

A review of the raw observations from KHZE indicated that unknown precipitation (UP) was reported at 2015 CST with below freezing temperatures with light snow being reported from 2235 through 0015 CST. At the time of the accident IFR conditions were being reported due to low overcast ceilings and visibility restricted in light snow.

2.3 Glen Ullin Regional Airport, Glen Ullin, North Dakota

The next closest weather reporting station located approximately 34 miles west of the accident site was from Glen Ullin Regional Airport (KD57), located in Glen Ullin, North Dakota, at an elevation of 2,091 ft. The airport had an AWOS system that was not augmented by any human observers and issued observations every 20-minutes. The AWOS present weather sensor was inoperative during the period as noted by the abbreviation “PWINO” in the remark section. The following conditions were reported at the approximate time of the accident:

KD57 weather observation at 2243 CST, automated, wind from 050° at 3 knots, visibility 10 miles or more, ceiling overcast at 4,100 ft. temperature -3° C, dew point -5° C, altimeter 29.97 inches of Hg.

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

VFR METAR KD57 190355Z AUTO 03005KT 10SM FEW011 OVC045 M02/M05 A2996 RMK AO2 PWINO

VFR METAR KD57 190415Z AUTO 05004KT 10SM FEW011 OVC043 M03/M06 A2996 RMK AO2 PWINO

VFR METAR KD57 190435Z AUTO 05003KT 10SM OVC041 M03/M05 A2997 RMK AO2 PWINO

Accident 0440Z

VFR METAR KD57 190455Z AUTO 04004KT 10SM OVC046 M03/M06 A2997 RMK AO2 PWINO=

VFR METAR KD57 190515Z AUTO 02005KT 10SM OVC046 M03/M06 A2998 RMK AO2 PWINO=

Although an area of weather echoes was identified on the National mosaic radar image in the vicinity of Glen Ullin, no snow was reported at the station. It is unknown, however, if this was due to the present weather indicator sensor outage.

2.4 Dickinson – Theodore Roosevelt Regional Airport, Dickinson, North Dakota

Dickinson - Theodore Roosevelt Regional Airport, Dickinson, was located approximately 71 miles west of the accident site at an elevation of 2,592 ft. The airport had an ASOS and reported the following conditions at the approximate time of the accident:

KDIK special weather observation at 2249 CST, automated, wind from 320° at 6 knots, visibility 9 miles, ceiling overcast at 900 ft, temperature -2° C, dew point -3° C, altimeter 29.94 inches of Hg. Remarks: automated observation system with a precipitation discriminator, ceiling 800 ft variable 1,100 ft.

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

IFR SPECI KDIK 190105Z AUTO 29005KT 2SM -SN BR SCT014 BKN027 OVC044 M02/M03 A2990 RMK AO2 P0000 T10221028

IFR SPECI KDIK 190115Z AUTO 29006KT 2 1/2SM -SN BR FEW013 SCT027 OVC048 M02/M03 A2990 RMK AO2 P0000 T10221033

MVFR SPECI KDIK 190123Z AUTO 29006KT 4SM -SN BR FEW013 SCT025 OVC048 M02/M03 A2989 RMK AO2 P0000 T10221033

MVFR METAR KDIK 190156Z AUTO 27004KT 8SM BKN029 BKN046 OVC060 M03/M04 A2990 RMK AO2 SNE48 SLP160 P0000 T10281044

MVFR METAR KDIK 190256Z AUTO 31009KT 3SM -SN BR BKN017 OVC026 M02/M03 A2991 RMK AO2 SNE45 SLP162 P0000 60000 T10171033 53006

MVFR SPECI KDIK 190311Z AUTO 31008KT 6SM BR OVC014 M02/M03 A2992 RMK AO2 SNE11 P0000
T10171033

MVFR SPECI KDIK 190349Z AUTO 32006KT 6SM BR OVC015 M02/M03 A2993 RMK AO2 SNE11 P0000
T10171028

MVFR METAR KDIK 190356Z AUTO 33005KT 9SM OVC015 M02/M03 A2993 RMK AO2 SNE11 SLP166
P0000 T10171028

MVFR SPECI KDIK 190433Z AUTO 32006KT 10SM BKN011 OVC016 M02/M03 A2994 RMK AO2

Accident 0440Z

IFR SPECI KDIK 190449Z AUTO 32006KT 9SM OVC009 M02/M03 A2994 RMK AO2 CIG 008V011

IFR METAR KDIK 190456Z AUTO 32007KT 9SM OVC009 M02/M03 A2995 RMK AO2 CIG 008V011
SLP171 T10171033

MVFR SPECI KDIK 190543Z AUTO 34007KT 10SM OVC011 M02/M04 A2996 RMK AO2 CIG 005V012
T10221044

MVFR METAR KDIK 190556Z AUTO 35006KT 10SM OVC011 M02/M04 A2996 RMK AO2 SLP176 60000
T10221044 11017 21028 53016

A review of the observations from KDIK indicated MVFR to IFR conditions prevailing during the period with light snow reported a few hours prior to the accident.

2.5 Sloulin Field International Airport, Williston, North Dakota

The planned destination was Sloulin Field International Airport (KISN), Williston, North Dakota, located 145 miles from KBIS and 128 miles from the accident site at an elevation of 1,982 ft. The airport had an ASOS that was not augmented during the period. At the time of the accident the following conditions were reported:

KISM special weather observation at 2222 CST, automated, wind from 030° at 6 knots, visibility 10 miles or more, ceiling broken at 1,700 ft agl, overcast at 4,300 ft, temperature -3° C, dew point -7° C, altimeter 30.02 inches of Hg. Remarks: automated observation system with a precipitation discriminator, temperature -3.3° C, dew point -6.7° C.

KISN special weather observation at 2235 CST, automated, wind from 030° at 6 knots, visibility 10 miles or more, scattered clouds at 1,700 ft, scattered at 2,900 ft, and overcast at 4,100 ft, temperature -3° C, dew point -7° C, altimeter 30.02 inches of Hg. Remarks: automated observation system with a precipitation discriminator, temperature -3.3° C, dew point -6.7° C.

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

VFR METAR KISN 190152Z AUTO 02006KT 10SM OVC048 M02/M06 A2997 RMK AO2 SLP179 T10221061

VFR METAR KISN 190252Z AUTO 04006KT 10SM OVC045 M03/M06 A2998 RMK AO2 SLP184 T10281061
51017

VFR METAR KISN 190352Z AUTO 01005KT 10SM OVC043 M03/M07 A3001 RMK AO2 SLP193 T10331067

MVFR SPECI KISN 190422Z AUTO 03006KT 10SM BKN017 OVC043 M03/M07 A3002 RMK AO2 T10331067

VFR SPECI KISN 190435Z AUTO 03006KT 10SM SCT017 SCT029 OVC041 M03/M07 A3002 RMK AO2
T10331067

Accident 0440Z

VFR METAR KISN 190452Z AUTO 07006KT 10SM FEW011 OVC043 M04/M07 A3002 RMK AO2 SLP195
T10391067=

MVFR SPECI KISN 190517Z AUTO 05006KT 10SM FEW011 BKN022 OVC037 M04/M07 A3003 RMK AO2
T10441072=

MVFR SPECI KISN 190543Z AUTO 07008KT 10SM BKN013 OVC022 M05/M08 A3005 RMK AO2 T10501083=

MVFR METAR KISN 190552Z AUTO 08006KT 10SM BKN014 OVC022 M05/M08 A3005 RMK AO2 SLP207
T10501083 11017 21050 400001100 53023=

MVFR SPECI KISN 190623Z AUTO 06006KT 10SM SCT014 OVC020 M06/M09 A3006 RMK AO2 T10561089=

MVFR SPECI KISN 190649Z AUTO 08007KT 10SM FEW009 OVC018 M06/M09 A3008 RMK AO2=

A review of the observations for KISN indicated that overcast conditions prevailed during the period and resulted in MVFR to VFR conditions surrounding the period due to variable ceiling heights. No snow or significant visibility restrictions were reported at the station during the period.

3.0 Sounding Observation

The NWS KBIS upper air sounding, site number 72764, for 1800 CST was plotted on a standard Skew T log P diagram⁴ using the complete Rawinsonde Observation RAOB program software⁵ and is included as figure 11 from the surface through 450-hPa (or approximately 21,000 ft). The surface temperature was -0.7° C, and the dew point temperature -4.4° C, with a relative humidity of 76%. The sounding indicated that the temperatures remained below freezing through the entire depth of the sounding. Several shallow temperature inversions were noted below 10,000 ft associated with subsidence and the frontal system where temperature increased with height. The lifted condensation level (LCL)⁶ was identified at approximately 1,500 ft agl (3,170 ft msl). The sounding was classified as stable based on the Lifted Index (LI)⁷ of +17.0 and the noted inversions,

⁴ 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.

⁵ RAOB software – The complete RAwinsonde OBservation program is an interactive sounding analysis program developed by Environmental Research Services, Matamoras, Pennsylvania, for plotting and analyzing upper air data.

⁶ Lifting Condensation Level (LCL) is defined as the height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

⁷ Lifted Index (LI) is a common measure of atmospheric instability. Its value is obtained by computing the temperature that air near the ground would have if it were lifted to 500-hPa or approximately 18,000 feet and comparing that

hPa450 RAOB: KBIS SOUNDING 19NOV 00Z.TXT / 72764 - KBIS - BISMARCK, ND US at 19/0000Z

Cloud (T/Td) Rime CAT Mixed Clear

1500

500

600

700

800

850

900

925

1000

1050

Stn Elev: 1660 ft
QNH = 1013.0 hPa
DA: 204 ft, ISA

Ice

Lift

LCL

CCL

Frontal Inv
7049 ft MSL

Subsidence Inv
5319 ft MSL

TROP Lvl: 32184 ft MSL
FR2G Lvl: 1660 ft MSL
CCL Lvl: 1660 ft MSL
LFC Hgt: -- ft MSL
CCL Hgt: 12750 ft MSL
LCL Hgt: 3170 ft MSL
Water: 0.36 in
Hail: -- in
T2Gust: -- mph
WindEx: -- mph
SWEAT: 77.0
CAP: --
LI: 17.0
TT: 26.2
KI: 1.5
Tc: 20.8 °C

Storm: 335/29 0-6km
s-rH: 173 0-3km
s-rH: 166 0-2km
s-rH: 47 0-1km

CAPE+ only: -- J/kg
CIN total: -- J/kg
DCAPE6.0km: 6 J/kg
VGP 0-4km: --
EHI 0-2km: --
MVV: -- m/s
BRN: --

LFC Lift / LPL 954 hPa

26 ft (x1000)

15

10

5

1

0

MSL

KNOTS

RAOB Config #1:

The KBIS sounding wind profile indicated a surface wind from the northwest or 320° at 2 knots with little change in direction with height. The wind at 14,000 ft was observed 340° at 45 knots with a temperature of -15° C. The mean 0 to 6 kilometer wind was from 305° at 38 knots, with winds above 50 knots above 16,000 ft with the level of maximum wind at 300° at 78 knots at 28,000 ft below the tropopause which was at approximately 32,200 ft.

temperature to the actual temperature at that level. Negative values indicate instability - the more negative, the more unstable the air is, and the stronger the updrafts are likely to be with any developing thunderstorms. Positive values indicate a stable atmosphere which restricts vertical motion.

Height (ft-MSL)	Pres (hPa)	T (C)	Td (C)	RH (%)	DD / FF (deg / kts)	CAT (FAA)	LLWS	Icing - Type (AFGWC method)	Wave/x---W---Turb nm fpm max
1660	954	-0.7	-4.4	76	320 / 2				
1743	951	-0.7	-5.7	69					
1881	946	-0.9	-6.9	64		MDT			
2467	925	-2.7	-7.5	69	310 / 10	LGT			
3000	906				310 / 14				
3553	887	-5.5	-9.1	76					
4000	872				310 / 15				
4228	864	-6.7	-11.6	68					
4646	850	-7.1	-14.1	57	315 / 13				
4676	849	-7.1	-14.1	57					
4919	841	-6.3	-17.3	41					
5319	828	-5.7	-17.7	38					
5789	813	-5.7	-16.7	42		SVR			2.70 1135 MD-SV
6000	806				295 / 29				
6655	786	-7.5	-18.5	41					
6884	779	-7.3	-17.3	45		LGT			
7049	774	-7.1	-10.3	78	290 / 31				2.99 1141 MD-SV
7115	772	-7.1	-9.8	81		MDT			4.72 742 LT-MD
7956	747	-8.5	-9.5	92	300 / 38	MDT		MDT Rime	
9000	717				310 / 37				
9604	700	-10.7	-11.7	92	310 / 36			MDT Rime	
9712	697	-10.9	-11.9	92				MDT Rime	
10336	680	-10.1	-11.4	90				LGT Rime	3.45 1122 MD-SV
10900	665	-10.5	-12.0	89				LGT Rime	4.94 604 LT-MD
12000	637				305 / 38				
12500	624	-13.1	-14.2	91		LGT		LGT Rime	
14000	587				305 / 45				
14319	580	-15.9	-18.5	80				LGT Mixed	8.74 523 LIGHT
15272	558	-18.1	-20.6	81				LGT Rime	
15625	550	-19.3	-22.8	74				LGT Rime	
16000	542				305 / 48				

Figure 12 - KBIS 1800 CST sounding parameters through 16,000 ft

4.0 Satellite Imagery

The Geostationary Operational Environmental Satellite number 16 (GOES-16) 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 (McIDAS) software. The infrared long wave and water vapor imagery were obtained surrounding the time of the accident. The infrared long wave imagery (band 13) at a wavelength of 10.3 microns (μm) provided radiative cloud top temperatures with a nominal spatial resolution of 2 km.

Figure 13 is the GOES-16 infrared image for 2242 CST at 4X magnification. The image depicted an extensive area layer of clouds extending from immediately south of KBIS through KISN and into eastern Montana. The radiative cloud top temperature over the accident site was 247° Kelvin or -26.10° C, which corresponded to cloud tops near 19,000 ft based on the KBIS sounding. Based on this image and the KBIS sounding indicate that clouds and instrument meteorological conditions (IMC) likely existed between 900 ft agl and 19,000 ft.

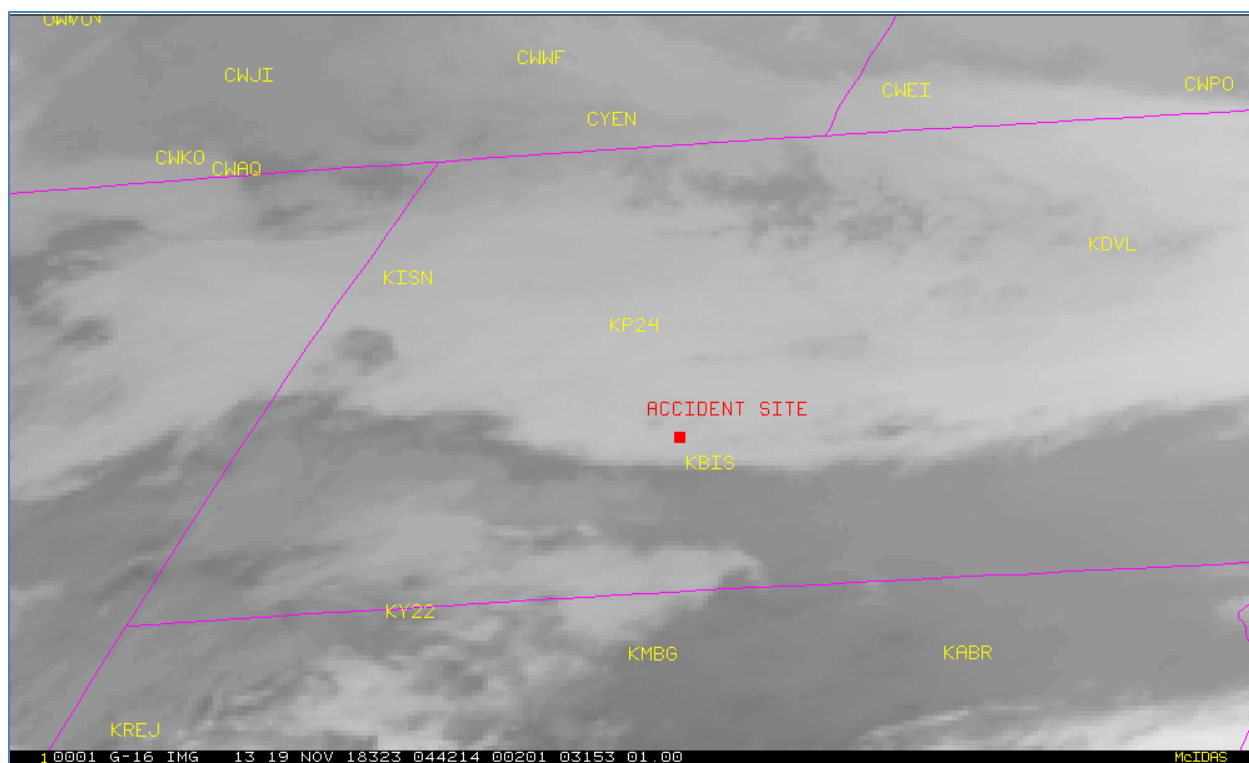


Figure 13 - GOES-16 infrared image at 4X magnification at 2242 CST

5.0 Weather Surveillance Radar Imagery

The closest NWS Weather Surveillance Radar-1988, Doppler (WSR-88D) was located at KBIS about 16.5 miles southwest of the accident site. The level II archive data was obtained from the NCEI using the Hierarchical Data Storage System and displayed using the NWS NEXRAD Interactive Viewer and Data Exporter software.

Reflectivity in dBZ provides basic intensity information and is referenced for pilots in Advisory Circular AC 00-24C - “Thunderstorm”. The following table provides the basic reflectivity (dBZ) and echo intensity values.

Reflectivity (dBZ) Ranges	Weather Radar Echo Intensity Terminology
< 30 dBZ	Light
30 – 40 dBZ	Moderate
>40 – 50 dBZ	Heavy
>50 dBZ	Extreme

During the period the KBIS WSR-88D was operating in the clear air mode, volume coverage pattern number 35 (VCP-35), where the radar makes 9 different elevation scans from 0.5° to 6.4° in 7-minutes. This scanning strategy’s is typically used for detecting scattered to widespread light to moderate intensity precipitation from non-convective type clouds such as nimbostratus type clouds.

Figure 14 is the NWS KBIS WSR-88D base reflectivity image at 2244 CST which depicted a large area of very light intensity echoes between 0 and 20 dBZ extending northwest through northeast of KBIS. The echoes were consistent with those of light snow. The flight track of N441CX is included in black.



Figure 14 - KBIS WSR-88D for 2244 CST with flight track overlaid

Figure 15 is a enlarge image showing the KBIS WSR-88D base reflectivity at a constant altitude plan position indicator (CAPPI) at 8,000 ft⁸ with the flight track of N441CX. The image depicted echoes of -10 to 5 dBZ along the flight track.

⁸ The 8,000 ft CAPPI level was used to depict the conditions in the climb, as the accident airplane reached the cruising level.

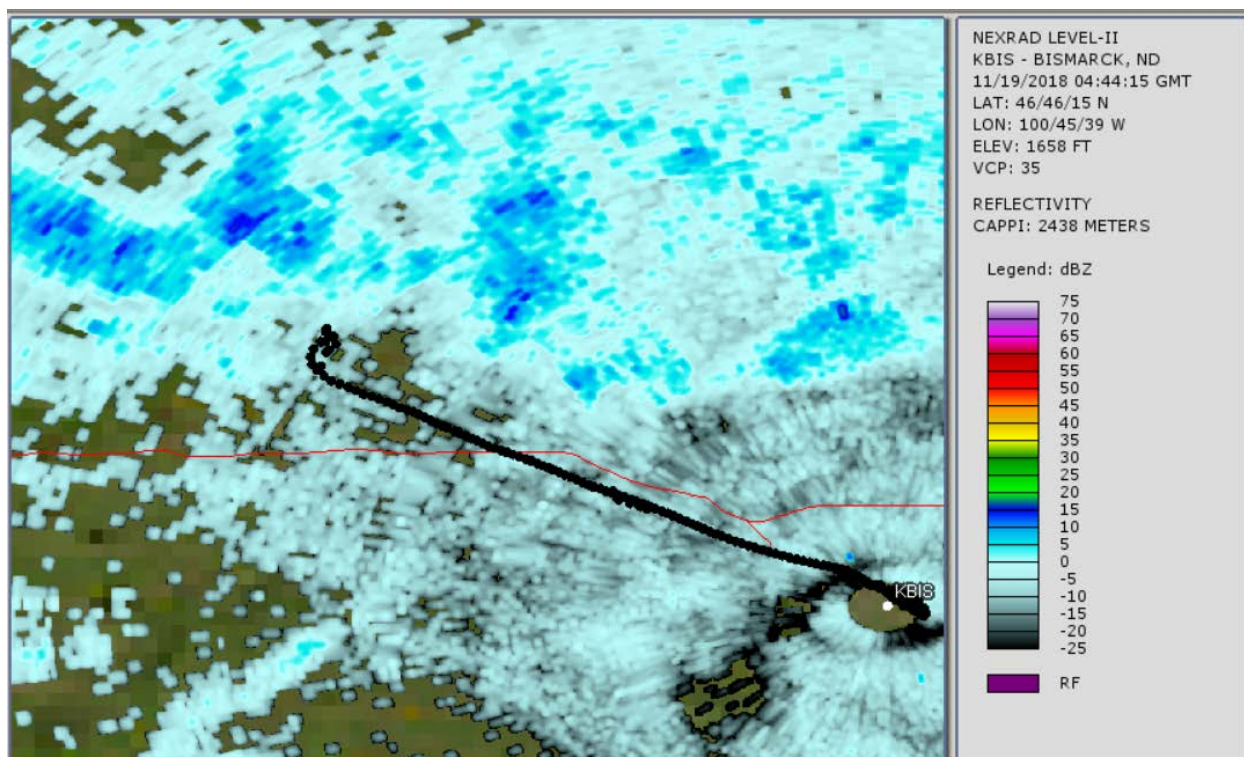


Figure 15 - KBIS WSR-88D base reflectivity at 8,000 ft

6.0 Pilot Reports

A search of the NWS data base provided only two pilot report (PIREP) over the area surrounding the period from 1600 through 0400 CST on November 19, 2018. The raw reports were as follows:

BIS UA /OV 20 E BIS/TM 2225/FLDURD/TP CRJ2/SK 090OVC TOP UNKN/IC LGT RIME 130B090

GDV UA /OV GDV300015/TM 0112/FL060/TP C402/TA M02/IC LGT MXD/RM ZLC

The first report was made 20 miles east of KBIS at 1625 CST from a pilot operating a Canadair CRJ regional air carrier jet that on descent reported overcast clouds with tops unknown and bases at 9,000 ft, with the flight encountering light rime icing conditions between 13,000 and 9,000 ft.

Another report 15 miles northwest of Glendive (GDV), Montana, or approximately 160 miles west of the accident site at 1912 CST from a pilot flying a Cessna 402 reported encountering light mixed type icing conditions at 6,000 ft with a temperature of -2° C.

7.0 NWS Forecasts

The following aviation forecast products were issued surrounding the period.

7.1 Terminal Aerodrome Forecast

The Terminal Aerodrome Forecasts (TAF) issued for KBIS and KISN during the period were issued by the NWS KBIS Weather Forecast Office (WFO) were as follows:

Departure (KBIS):

TAF KBIS 182340Z 1900/1924 34004KT P6SM OVC070
TEMPO 1903/1905 SCT025 OVC035
FM190500 02006KT P6SM BKN025 OVC035
FM190800 03005KT P6SM OVC025
FM191500 08004KT P6SM BKN025
FM192000 14005KT P6SM SCT020 BKN035

AMD TAF KBIS 190502Z 1905/1924 05006KT P6SM -SHSN BKN025 OVC035
TEMPO 1906/1908 4SM -SN SCT009 BKN015
FM191000 07005KT P6SM OVC025
FM191500 09004KT P6SM BKN025
FM192000 14005KT P6SM SCT020 BKN035=

Destination (KISN):

TAF KISN 182340Z 1900/1924 34004KT P6SM -SHSN SCT020 OVC050
FM190200 03005KT P6SM BKN020 OVC035
FM190800 07004KT P6SM SCT018 OVC025
FM191200 10004KT P6SM OVC015
FM191700 16005KT P6SM OVC020=

AMD TAF KISN 190058Z 1901/1924 36004KT P6SM -SHSN SCT015 OVC035
TEMPO 1901/1903 BKN015
FM190300 03005KT P6SM BKN015 OVC035
FM190800 07004KT P6SM SCT018 OVC025
FM191200 10004KT P6SM OVC015
FM191700 16005KT P6SM OVC020

The forecasts for KBIS expected VFR conditions to prevail with broken to overcast cloud cover, with MVFR conditions after 2000 CST. The forecast was amended immediately after the accident to include lower ceilings and light snow showers. The destination forecast for KISN also expected MVFR conditions to prevail with ceiling broken at 1,500 to 2,000 ft agl, with overcast clouds at 3,500 ft, with light snow showers ending after 2100 CST.

7.2 Area Forecast Discussion

Although not a routine aviation flight planning product, the Area Forecast Discussion (AFD) is a plain language description of the weather conditions impacting a region and includes an aviation discussion by the NWS forecaster on their reasoning behind the issued TAF forecasts. The NWS KBIS WFO issued AFD at 1541 CST was as follows:

FXUS63 KBIS 182141
AFDBIS

Area Forecast Discussion

National Weather Service Bismarck ND
341 PM CST Sun Nov 18 2018

.SHORT TERM...(This evening through Monday)
Issued at 234 PM CST Sun Nov 18 2018

Current surface analysis places cold front stretching east to west across northern North Dakota. Some snow is being reported in the wake of the front, mainly in the Minot area. Upper level analysis continues to show broad cyclonic flow over the region with weak clipper zipping into the area. Ridge remains over the west coast.

For the rest of this afternoon into tonight, clipper will continue its advance through the region with snow chances sliding southward, although not much in the way of accumulation is expected. After midnight precipitation chances will be mainly over southwestern areas as a secondary wave slides into the area.

On Monday, snow chances linger into the morning. There will be the potential for a little light freezing drizzle as ice aloft comes into question. Quiet weather expected across the area in the afternoon, with snow chances developing over the north central, mainly in the late evening and overnight. By late night, a little warmer air moving in aloft could result in a little bit of freezing rain, but it would be short lived.

.AVIATION...(For the 18Z TAFS through 18Z Monday afternoon)
Issued at 1133 AM CST Sun Nov 18 2018

Widespread MVFR conditions with localized IFR conditions will develop as a cold front moves south across North Dakota later this afternoon into early this evening. Areas of light snow and fog will accompany the fronts passage.

.BIS WATCHES/WARNINGS/ADVISORIES...NONE.

SHORT TERM...JJS
LONG TERM...JJS
AVIATION...JJS

The AFD aviation section indicated that widespread MVFR conditions with localized IFR conditions were expected behind the cold front that had moved across North Dakota and was moving south. Areas of light snow and fog were expected. No weather watches or warnings were in effect during the period. The forecast discussion was updated at 2239 CST with no significant changes.

FXUS63 KBIS 190439
AFDBIS
Area Forecast Discussion
National Weather Service Bismarck ND
1039 PM CST Sun Nov 18 2018

.UPDATE...
Issued at 1038 PM CST Sun Nov 18 2018

Models doing poorly to say the least picking up the snow showers across central ND. Back edge now appears to be moving into far north central ND. POPs were increased to account for this activity.

UPDATE
Issued at 551 PM CST Sun Nov 18 2018

Modified POPs based on latest radar imagery and surface reports. Basically two areas of light snow, one over my east and the other across my southwest. We start to loose ice aloft overnight, and this will result in some patchy/areas freezing drizzle southwest early Monday morning.

*.SHORT TERM...(This evening through Monday)
Issued at 234 PM CST Sun Nov 18 2018*

Current surface analysis places cold front stretching east to west across northern North Dakota. Some snow is being reported in the wake of the front, mainly in the Minot area. Upper level analysis continues to show broad cyclonic flow over the region with weak clipper zipping into the area. Ridge remains over the west coast.

For the rest of this afternoon into tonight, clipper will continue its advance through the region with snow chances sliding southward, although not much in the way of accumulation is expected. After midnight precipitation chances will be mainly over southwestern areas as a secondary wave slides into the area.

On Monday, snow chances linger into the morning. There will be the potential for a little light freezing drizzle as ice aloft comes into question. Quiet weather expected across the area in the afternoon, with snow chances developing over the north central, mainly in the late evening and overnight. By late night, a little warmer air moving in aloft could result in a little bit of freezing rain, but it would be short lived.

.AVIATION...(For the 00Z TAFS through 00Z Monday evening)

Issued at 551 PM CST Sun Nov 18 2018

Widespread MVFR conditions with localized IFR conditions will expand across the local region as a cold front moves south across North Dakota early this evening. Areas of light snow and fog will accompany the fronts passage. Some freezing drizzle will then be possible after 06Z southwest through Monday morning. This includes KDIK.

.BIS WATCHES/WARNINGS/ADVISORIES...NONE.

*UPDATE...NH
SHORT TERM...JJS
LONG TERM...JJS
AVIATION...NH*

8.0 Inflight Weather Advisories

A search of NWS inflight weather advisories indicated that there were no Significant Meteorological Advisories (SIGMET), Convective SIGMETs, or Center Weather Advisories (CWA) issued for the region on November 18, 2018. The NWS Aviation Weather center (AWC) issued the following Airmen Meteorological Advisories (AIRMETs) during the period; AIRMET Sierra for IFR conditions, and AIRMET Zulu for icing conditions. The AIRMETs are listed below with the advisory plotted over the GOES-16 infrared satellite image at the time of issuance in figures 16 and 17 respectively.

AIRMET Sierra

WAUS43 KPCI 190245
WA3S
-CHIS WA 190245
AIRMET SIERRA FOR IFR AND MTN OBSCN VALID UNTIL 190900

.
 AIRMET IFR...ND SD NE MN WI LM LS MI LH
 FROM 30N INL TO YQT TO 30NW SSM TO 40WNW YVV TO 70SSE SAW TO 40E
 FSD TO 50E PIR TO 50WSW ANW TO 70SW RAP TO 50NNW ISN TO 30N INL
 CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS CONTG BYD 09Z THRU 15Z.

The advisory warned of ceilings below 1,000 ft agl and visibility below 3 miles in precipitation and mist. The conditions were expected to continue beyond 0300 CST through 1100 CST on November 19, 2018. The accident site was located within the boundaries of the advisory.

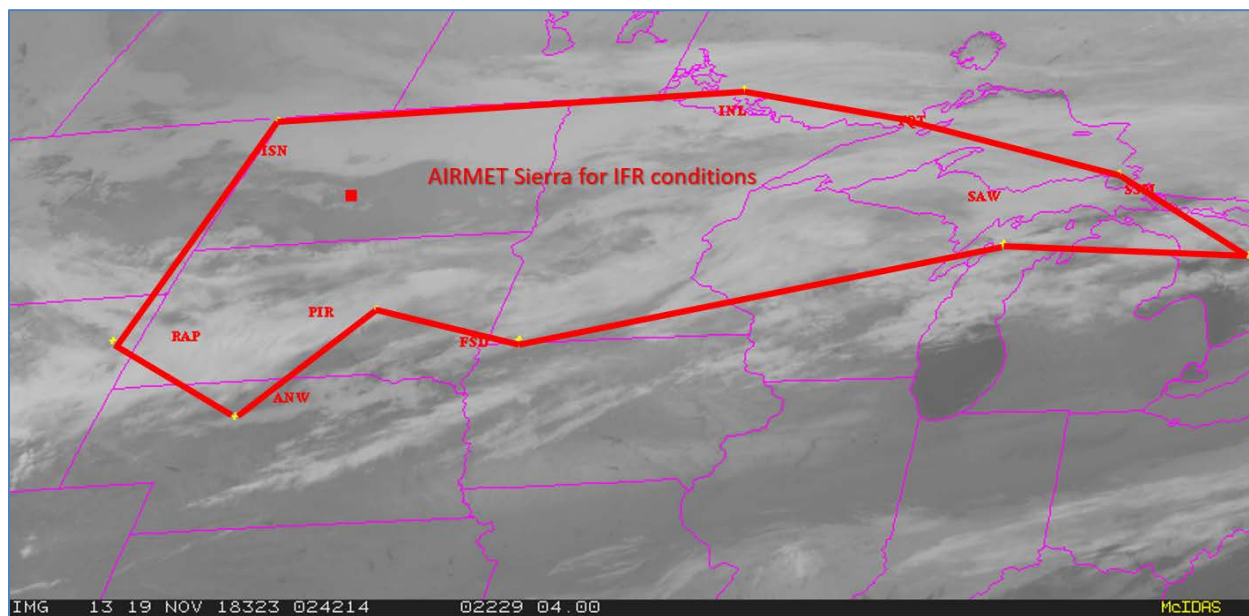


Figure 16 - AIRMET Sierra for IFR conditions over the GOES-16 infrared image at 2045 CST

AIRMET Zulu

WAUS43 KPCI 190245

WA3Z

-CHIZ WA 190245

AIRMET ZULU FOR ICE AND FRZLVL VALID UNTIL 190900

.
 AIRMET ICE...ND SD NE MN IA WI
 FROM 70NW MOT TO 50SW GFK TO 30SSW EAU TO 40W FOD TO 20W OBH TO
 40SSE SNY TO BFF TO 70SW RAP TO 50NNW ISN TO 70NW MOT
 MOD ICE BTN 040 AND 160. CONDS CONTG BYD 09Z THRU 15Z.

.
 AIRMET ICE...ND MN WI LM LS MI LH
 FROM 70NW MOT TO 30N INL TO 60E YQT TO 70NW YVV TO 50WSW YVV TO
 20WSW GRB TO 30SSW EAU TO 40ESE FAR TO 70NW MOT
 MOD ICE BLW 100. CONDS CONTG BYD 09Z THRU 15Z.

.
 FRZLVL...RANGING FROM SFC-100 ACRS AREA
 MULT FRZLVL BLW 100 BOUNDED BY 50NNW RWF-30WSW EAU-20W ORD-
 20N FWA-CVG-40SSE ARG-70SE TTT-50SSE ABI-40N MAF-20W TXO-
 50W LBL-GLD-BFF-70SW RAP-70WNW ANW-50NNW RWF

SFC ALG 30NW RZC-50SW COU-30E GIJ-20ENE DXO
 040 ALG 70SSE SGF-70W ARG-30W FAM-30SW TTH-50SW ROD
 080 ALG 60ENE DYR-20N HMV

The advisory warned of moderate icing between 4,000 and 16,000 ft with conditions continuing beyond 0300 through 0900 CST on November 19, 2018. The flight route and accident site were located within the boundaries of the advisory.

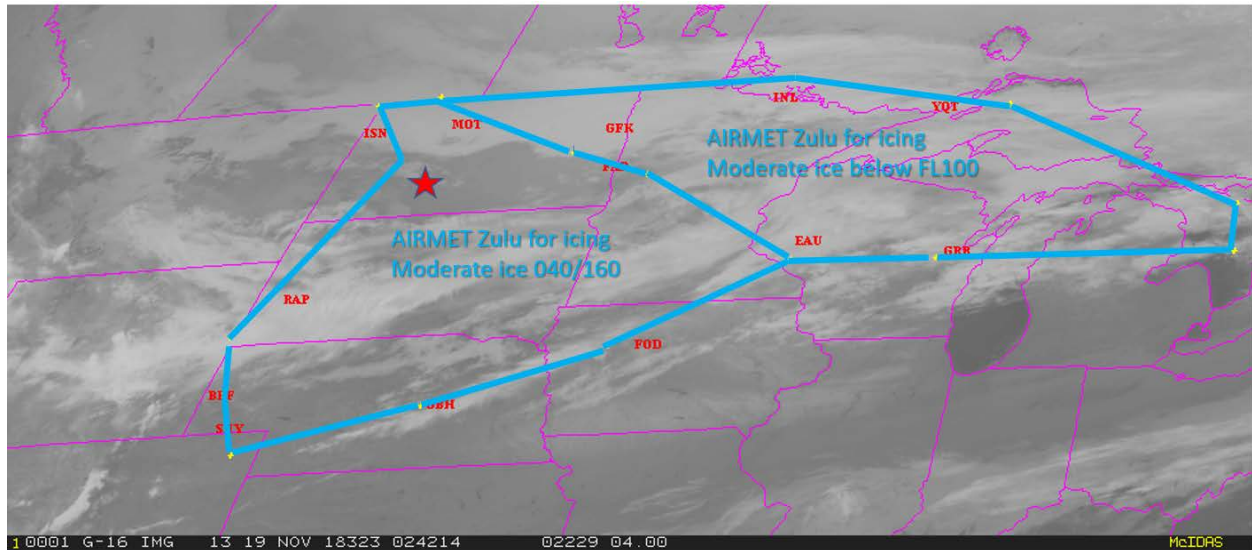


Figure 17 - AIRMET Zulu for icing conditions over the GOES-16 satellite image at 2045 CST

8.1 Winds and Temperatures Aloft

The Winds and Temperature Aloft Forecast (FD) for the route was valid for 0000 CST and for use between 2000 and 0300 CST was as follows:

FBUS31 KWN0 190158
 FD1US1
 -DATA BASED ON 190000Z
 VALID 190600Z FOR USE 0200-0900Z. TEMPS NEG ABV 24000

FT	3000	6000	9000	12000	18000	24000	30000	34000	39000
DIK	3225-07	3237-09	3143-15	3246-23	3244-34	324949	325556	336059	
MOT	3413-12	3329-13	3238-17	3255-24	3259-35	325851	325957	326660	
GGW	3327-05	3137-09	3242-13	3347-23	3365-33	347548	347756	337263	

The 3 wind forecast locations surrounding the accident site were for Dickinson (DIK), North Dakota, location approximately 85 miles west of KBIS. Minot (MOT), North Dakota, located 92 miles north-northwest of KBIS and generally along the planned route of flight, and Glasgow (GGW), Montana, was the closest forecast location to the destination at 118 miles west of KISN. The forecast indicated the following conditions at 12,000 and 18,000 ft.

<u>Station</u>	<u>12,000 ft</u>	<u>14,000 ft</u>	<u>18,000 ft</u>
DIK	310° 43 knots -15° C	315° 44 knots -17° C	320° 46 knots -23° C
MOT	320° 29 knots -17° C	320° 36 knots -19° C	320° 55 knots -24° C
GGW	320° 24 knots -13° C	325° 30 knots -16° C	330° 47 knots -23° C

9.0 Weather Briefing Data

A search of the FAA contract Automated Flight Service Station (AFSS) vendor Leidos indicated they had a flight plan on file, which was filed online through FltPlan.com, and that no weather briefing was requested. A similar search of Foreflight indicated that the pilot had an account with the company, but they did not show any recent activity prior to the accident. ForeFlight indicated that weather briefings had been requested for N441CX in the past and as early as November, but no briefings were requested on November 18, 2018. The NTSB also contact FltPlan.com, which did have a record of providing a weather document to the pilot at 2159 CST, a copy of that briefing is included as attachment 1.

A review of the FltPlan.com weather document indicated that it contained the NWS general public forecasts in pictorial form, and the METARs, TAFs, and notice to airmen (NOTAMs) for KBIS and KISN. The briefing did not include any winds and temperature aloft forecasts or any inflight weather advisories. It is unknown if the pilot obtained the adverse weather conditions or AIRMETs in this case, or any other enroute weather conditions or pilot reports.

An IFR flight plan was also filed at 2227 CST through FltPlan.com, with an estimated departure time of 2234 CST, from KBIS direct to KISN with a planned cruising altitude of 14,000 ft, with an estimated time enroute of 45-minutes at an air speed of 281 knots, and total fuel of 3:30. No alternate airport was listed in the IFR flight plan.

10.0 Astronomical Data

The United States Naval Observatory's website provided the following astronomical conditions for Bismarck, Burleigh County, North Dakota. The accident time has been added in bold italic type for reference below.

<u>Sun</u>	
Sunset	1706 CST
End of civil twilight	1739 CST
<i>Accident</i>	<i>2240 CST</i>
<u>Moon</u>	
Moonrise	1523 CST
Moon transit	2120 CST
<i>Accident</i>	<i>2240 CST</i>
Moonset	0327 CST on November 19, 2018

On November 18, the Moon phase was a waxing gibbous as illustrated in figure 18, and at the time of the accident the Moon was about 38° above the horizon at an azimuth of 205° and was 82% illuminated above the overcast cloud layer.



Figure 18 - Moon phase on November 18, 2018

11.0 Current Icing Potential

The Current Icing Product (CIP) for the area was recreated from data by the National Center for Atmospheric Research (NCAR) to determine what the icing probability, the intensity of icing, and any potential supercooled large droplet (SLD) conditions were over the region. These are the same products available at the NWS Aviation Weather Center (AWC) website⁹ that were issued during the period of the accident and available for preflight briefing purposes.

Figure 19 is the icing probability at 2208 CST over the region with the accident marked by the black dot. The image depicted the accident site on the northern border of an area of greater than 80% probability of icing conditions, with the general route of flight in a greater than 50% probability of icing conditions.

⁹ <https://aviationweather.gov/icing>

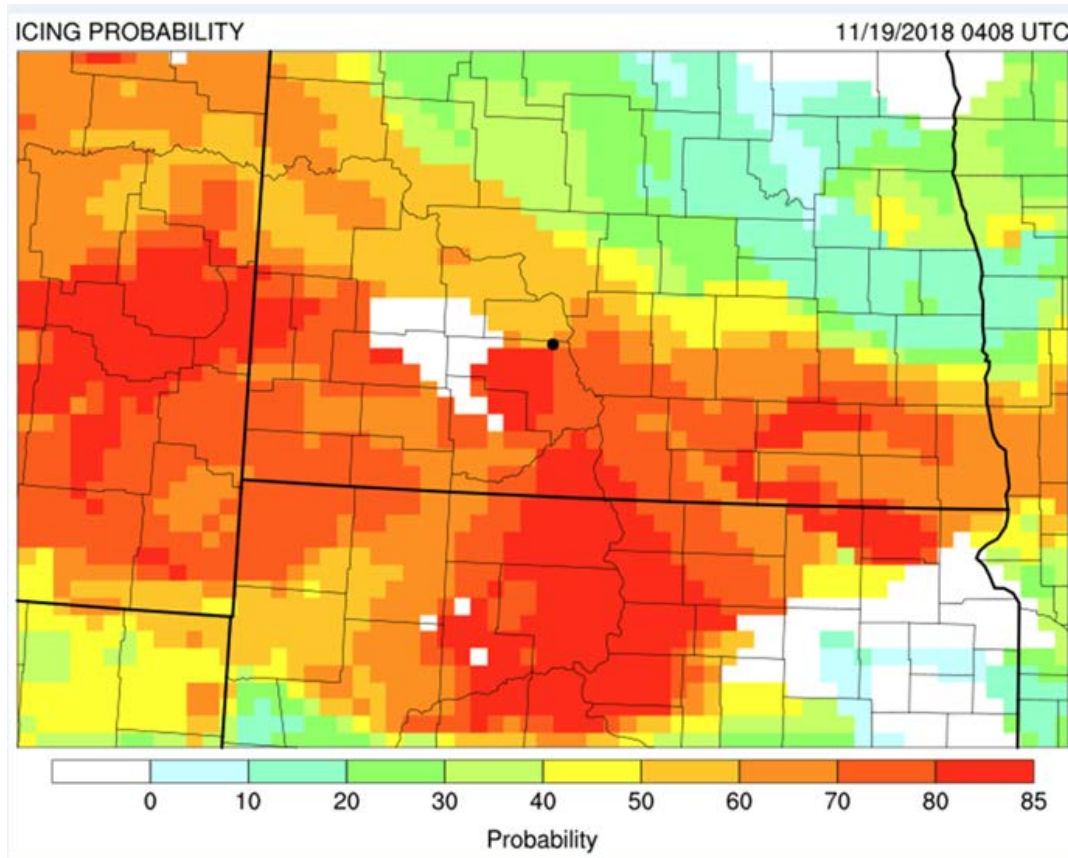


Figure 19 - Maximum icing probability for 2208 CST

Figure 20 is the maximum icing severity¹⁰ for 2208 CST and indicated light to moderate intensity icing was possible over North Dakota and along the route of flight, with general light intensity icing between KBIS and over the accident site.

¹⁰ CIP/FIP provide information on expected icing severity as five categories: none, trace, light, moderate, and heavy. On the display this field can be shown for all icing probabilities or masked (gray areas) to show only icing severity at icing probabilities greater than 25 or 50%.

The severity estimations are roughly based on the accretion rate of ice on an airplane, and the levels are determined by the time it would take for an airfoil to accrete 1/4 in on ice: trace, 1 h; light, 15 min-1 h; moderate, 5-15 min; and severe < 5 min. The rates are, in turn, estimated from the amount of supercooled liquid water expected with a nominal drop diameter of 15 microns, and are further tuned by nearby pilot reports of encountered severity. These are relative values and the use of which should take into account the airframe and the level of icing protection provided by the aircraft. The ultimate safety factor is the vigilance demonstrated by the pilot in potential icing situations.

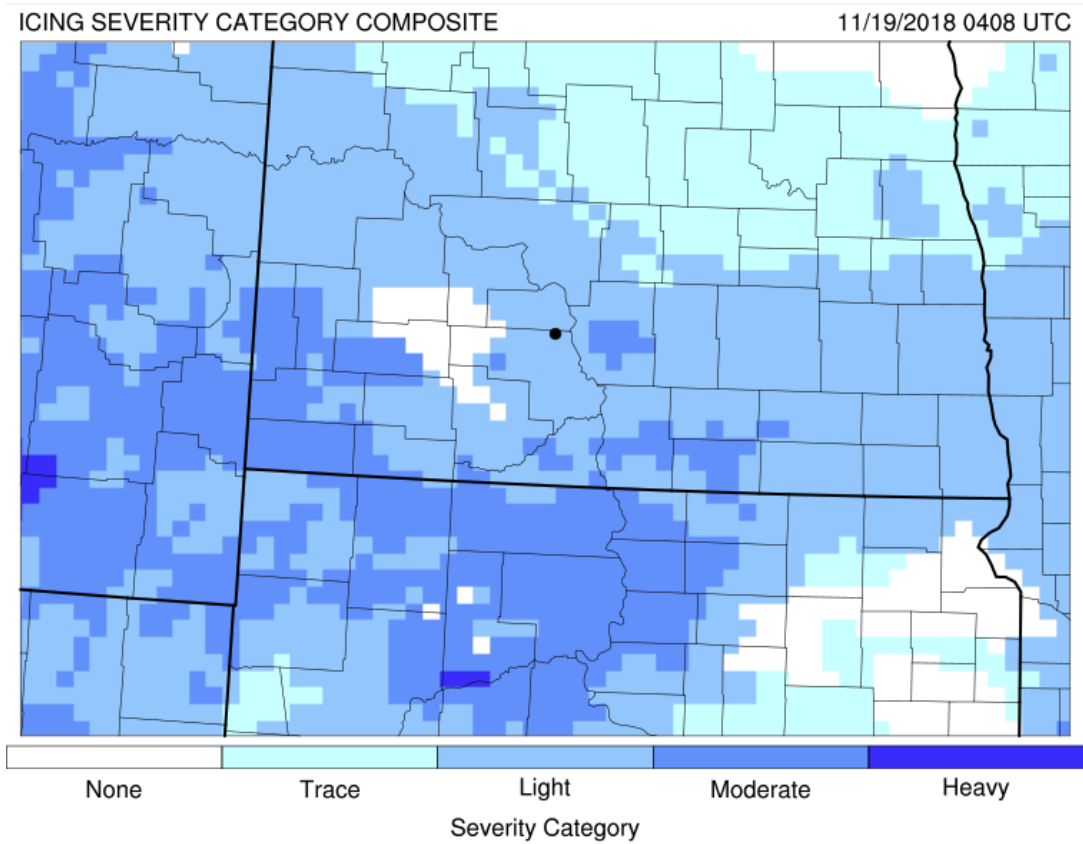


Figure 19 - Maximum Icing Severity for 2208 CST

F. LIST OF ATTACHMENTS

Attachment 1 – FltPlan.com weather document between KBIS-KISN

Submitted by:

Don Eick
Senior Meteorologist

NWS forecast for KBIS

Tonight	Monday	Monday Night	Tuesday	Tuesday Night	Wednesday	Wednesday Night	Thanksgiving Day	Thursday	Friday	Friday Night	Saturday	Saturday Night
												
Scattered Snow Showers and Patchy Fog Low: 9°F	Mostly Cloudy High: 18°F	Mostly Cloudy Low: 16°F	Decreasing Clouds High: 41°F	Partly Cloudy Low: 21°F	Mostly Sunny High: 34°F	Mostly Clear Low: 20°F	Mostly Sunny High: 41°F	Mostly Cloudy Low: 27°F	Partly Sunny High: 43°F	Mostly Cloudy Low: 24°F	Chance Snow High: 35°F	Slight Chance Snow Low: 17°F

NWS forecast for KISN

Tonight	Monday	Monday Night	Tuesday	Tuesday Night	Wednesday	Wednesday Night	Thanksgiving Day	Thursday	Friday	Friday Night	Saturday	Saturday Night
												
Scattered Snow Showers and Patchy Fog Low: 15°F	Cloudy High: 27°F	Mostly Cloudy Low: 26°F	Becoming Sunny High: 40°F	Mostly Clear Low: 23°F	Sunny High: 38°F	Mostly Clear Low: 22°F	Mostly Sunny High: 43°F	Mostly Cloudy Low: 26°F	Mostly Sunny High: 41°F	Chance Rain/Snow Low: 23°F	Mostly Cloudy High: 30°F	Mostly Cloudy Low: 14°F

Current METAR Grid

Wind

Airport	Ceiling	Visibility	Speed	Temp	METAR
---------	---------	------------	-------	------	-------

KBIS

 KBIS 190352Z 04007KT 10SM OVC027 M03/M05 A2999 RMK AO2
 SLP184 T10281050

KISN

 KISN 190352Z AUTO 01005KT 10SM OVC043 M03/M07 A3001 RMK
 AO2 SLP193 T10331067

MOS Forecast ☐

Weather Abbreviation

KBIS

Date/Time UTC	Ceil	Vis	Wind	Temp	Details
---------------	------	-----	------	------	---------

Mon 00:00Z					
11/19/2018					

Clouds: OVC 3000 - 6500 ft **Vis:** > 6 mi
Wind: 36004kt **Temp:** 28° --- See
 METARs/TAF ---

KBIS

Date/Time UTC	Ceil	Vis	Wind	Temp	Details
03:00Z					Clouds: OVC 2000 - 3000 ft Vis: > 6 mi Wind: 01006kt Temp: 23° --- See METARs/TAF ---
06:00Z					Clouds: OVC 1000 - 2000 ft Vis: > 6 mi Wind: 02006kt Temp: 20° Prob. Snow: 14% Amt.: No snow/trace
09:00Z					Clouds: OVC 500 - 1000 ft Vis: > 6 mi Wind: 03008kt Temp: 16° Prob. Snow: 14% Amt.: No snow/trace
12:00Z					Clouds: OVC 500 - 1000 ft Vis: > 6 mi Wind: 05006kt Temp: 12° Prob. Snow: 15% Amt.: No snow/trace
15:00Z					Clouds: OVC 500 - 1000 ft Vis: 3 to 5 mi Wind: 05005kt Temp: 8° Prob. Snow: 15% Amt.: No snow/trace
18:00Z					Clouds: OVC 1000 - 2000 ft Vis: > 6 mi Wind: 10004kt Temp: 9° Prob. Snow: 7% Amt.: No snow/trace
21:00Z					Clouds: OVC 3000 - 6500 ft Vis: > 6 mi Wind: 14004kt Temp: 11° Prob. Snow: 7% Amt.: No snow/trace
Tue 00:00Z 11/20/2018					Clouds: OVC 2000 - 3000 ft Vis: > 6 mi Wind: 13004kt Temp: 9°
03:00Z					Clouds: OVC 1000 - 2000 ft Vis: > 6 mi Wind: 15004kt Temp: 15°
06:00Z					Clouds: OVC 1000 - 2000 ft Vis: > 6 mi Wind: 17005kt Temp: 18°
09:00Z					Clouds: OVC 6500 - 12000 ft Vis: > 6 mi Wind: 19005kt Temp: 20°
12:00Z					Clouds: BKN > 12000 ft Vis: > 6 mi Wind: 23006kt Temp: 23° Prob. Snow: 7% Amt.: No snow/trace

KBIS

Date/Time UTC	Ceil	Vis	Wind	Temp	Details
15:00Z					Clouds: BKN > 12000 ft Vis: > 6 mi Wind: 27006kt Temp: 26° Prob. Snow: 7% Amt.: No snow/trace
18:00Z					Clouds: BKN > 12000 ft Vis: > 6 mi Wind: 28007kt Temp: 37° Prob. Snow: 7% Amt.: No snow/trace
21:00Z					Clouds: CLR > 12000 ft Vis: > 6 mi Wind: 29006kt Temp: 41°
00:00Z					Clouds: CLR > 12000 ft Vis: > 6 mi Wind: 01003kt Temp: 34°
03:00Z					Clouds: FEW > 12000 ft Vis: > 6 mi Wind: 10001kt Temp: 30°
Wed 06:00Z 11/21/2018					Clouds: FEW > 12000 ft Vis: > 6 mi Wind: 08002kt Temp: 27°
12:00Z					Clouds: SCT > 12000 ft Vis: > 6 mi Wind: 10005kt Temp: 23°
18:00Z					Clouds: FEW > 12000 ft Vis: > 6 mi Wind: 13007kt Temp: 33°

KISN

Date/Time UTC	Ceil	Vis	Wind	Temp	Details
Mon 00:00Z 11/19/2018					Clouds: OVC 3000 - 6500 ft Vis: > 6 mi Wind: 01005kt Temp: 24° --- See METARs/TAF ---
03:00Z					Clouds: OVC 2000 - 3000 ft Vis: > 6 mi Wind: 02005kt Temp: 22° --- See METARs/TAF ---
06:00Z					Clouds: OVC 1000 - 2000 ft Vis: 3 to 5 mi Wind: 04005kt Temp: 19° Prob. Snow: 19% Amt.: No snow/trace

KISN

Date/Time UTC	Ceil	Vis	Wind	Temp	Details
09:00Z					Clouds: OVC 500 - 1000 ft Vis: 3 to 5 mi Wind: 05005kt Temp: 17° Prob. Snow: 19% Amt.: No snow/trace
12:00Z					Clouds: OVC 500 - 1000 ft Vis: 3 to 5 mi Wind: 06005kt Temp: 15° Prob. Snow: 35% Amt.: No snow/trace
15:00Z					Clouds: OVC 500 - 1000 ft Vis: 3 to 5 mi Wind: 09004kt Temp: 13° Prob. Snow: 35% Amt.: No snow/trace
18:00Z					Clouds: OVC 1000 - 2000 ft Vis: > 6 mi Wind: 15004kt Temp: 17°
21:00Z					Clouds: OVC 2000 - 3000 ft Vis: > 6 mi Wind: 20005kt Temp: 22°
00:00Z					Clouds: OVC 3000 - 6500 ft Vis: > 6 mi Wind: 16003kt Temp: 20°
03:00Z					Clouds: OVC 3000 - 6500 ft Vis: > 6 mi Wind: 20003kt Temp: 23°
06:00Z					Clouds: BKN 6500 - 12000 ft Vis: > 6 mi Wind: 22005kt Temp: 23°
09:00Z					Clouds: OVC 6500 - 12000 ft Vis: > 6 mi Wind: 24006kt Temp: 23°
Tue 11/20/2018	12:00Z				Clouds: BKN > 12000 ft Vis: > 6 mi Wind: 26006kt Temp: 25° Prob. Snow: 7% Amt.: No snow/trace
	15:00Z				Clouds: SCT > 12000 ft Vis: > 6 mi Wind: 25004kt Temp: 26°
	18:00Z				Clouds: CLR > 12000 ft Vis: > 6 mi Wind: 24006kt Temp: 35°
	21:00Z				Clouds: CLR > 12000 ft Vis: > 6 mi Wind: 26006kt Temp: 40°

KISN

Date/Time UTC	Ceil	Vis	Wind	Temp	Details
00:00Z					Clouds: FEW > 12000 ft Vis: > 6 mi Wind: 34002kt Temp: 35°
03:00Z					Clouds: FEW > 12000 ft Vis: > 6 mi Wind: 09002kt Temp: 29°
Wed 06:00Z 11/21/2018					Clouds: FEW > 12000 ft Vis: > 6 mi Wind: 11003kt Temp: 26°
12:00Z					Clouds: FEW > 12000 ft Vis: > 6 mi Wind: 13001kt Temp: 22°
18:00Z					Clouds: CLR > 12000 ft Vis: > 6 mi Wind: 15004kt Temp: 34°

METAR Reports



24-Hour, Full Service FBO
The Best Customer Service!
GREAT FULL STOP
701.258.5024



View Plain Text

KBIS 190352Z 04007KT 10SM OVC027 M03/M05 A2999 RMK A02 SLP184 T10281050
KBIS 190336Z 04008KT 10SM BKN027 OVC060 M03/M04 A2999 RMK A02 T10281044
KBIS 190252Z 04007KT 10SM SCT030 OVC060 M02/M05 A2997 RMK A02 SLP176 T10221050 53012
KBIS 190152Z 05004KT 10SM FEW040 OVC065 M02/M04 A2995 RMK A02 SLP169 T10171044

KISN 190352Z AUTO 01005KT 10SM OVC043 M03/M07 A3001 RMK A02 SLP193 T10331067
KISN 190252Z AUTO 04006KT 10SM OVC045 M03/M06 A2998 RMK A02 SLP184 T10281061 51017
KISN 190152Z AUTO 02006KT 10SM OVC048 M02/M06 A2997 RMK A02 SLP179 T10221061
KISN 190102Z AUTO 01004KT 10SM SCT018 BKN034 OVC047 M02/M06 A2996 RMK A02 T10171061

Terminal Forecasts

View Plain Text

KBIS 182340Z 1900/1924 34004KT P6SM OVC070
TEMPO 1903/1905 SCT025 OVC035
FM190500 02006KT P6SM BKN025 OVC035
FM190800 03005KT P6SM OVC025
FM191500 08004KT P6SM BKN025
FM192000 14005KT P6SM SCT020 BKN035

KISN 190058Z 1901/1924 36004KT P6SM -SHSN SCT015 OVC035
TEMPO 1901/1903 BKN015
FM190300 03005KT P6SM BKN015 OVC035
FM190800 07004KT P6SM SCT018 OVC025
FM191200 10004KT P6SM OVC015
FM191700 16005KT P6SM OVC020

Recent NOTAMs (new or modified) from the last 12 hours

BIS 11/288 BIS RWY 03/21 CLSD 1811182030-1811191505
 BIS 11/289 BIS RWY 31 FICON(Field Condition report) 10 PCT COMPACTED SN AND 10 PCT 1/8IN DRY SN OBS AT 1811182031. 1811182031-1811192031
 BIS 11/290 BIS TWY C FICON(Field Condition report) COMPACTED SN AND 1/8IN DRY SN OBS AT 1811182032. 1811182032-1811192032
 BIS 11/291 BIS TWY D BTN RWY 13/31 AND TWY D3, TWY D BTN TWY D1 AND TWY C CLSD 1811182033-1811191505
 BIS 11/292 BIS TWY B FICON(Field Condition report) COMPACTED SN AND 1/8IN DRY SN OBS AT 1811182034. 1811182034-1811192034
 BIS 11/293 BIS APRON PASSENGER TERMINAL RAMP FICON(Field Condition report) 1/8IN DRY SN OVER COMPACTED SN OBS AT 1811182034. 1811182034-1811192034
 BIS 11/294 BIS APRON GA TERMINAL RAMP FICON(Field Condition report) 1/8IN DRY SN OVER COMPACTED SN OBS AT 1811182035. 1811182035-1811192035
 ISN 11/350 ISN APRON ALL FICON(Field Condition report) ICE AND COMPACTED SN OBS AT 1811190340. 1811190340-1811200340
 ISN 11/351 ISN TWY A, A1, A3, A4, C, TWY B BTN NORTH GA RAMP AND TWY C FICON(Field Condition report) ICE AND COMPACTED SN OBS AT 1811190341. 1811190341-1811200341

NOTAMs

Check Approach/Airway FDC Notams for: **KBIS KISN**

(International notams may be incomplete)

BIS 11/289 BIS RWY 31 FICON(Field Condition report) 10 PCT COMPACTED SN AND 10 PCT 1/8IN DRY SN OBS AT 1811182031. 1811182031-1811192031
 BIS 11/288 BIS RWY 03/21 CLSD 1811182030-1811191505
 BIS 11/226 BIS OBST TOWER LGT (ASR 1059580) 464837.00N1004411.00W (2.3NM NE BIS) 1866.1FT (206.0FT AGL) OUT OF SERVICE 1811161414-1812011414
 BIS 11/218 BIS OBST TOWER LGT (ASR 1219512) 465008.60N1004010.40W (4.9NM NE BIS) 2169.9FT (349.1FT AGL) OUT OF SERVICE 1811160309-1812010309
 BIS 11/025 BIS OBST TOWER LGT (ASR 1218693) 465532.30N1004224.00W (9.3NM NE BIS) 2425.2FT (370.1FT AGL) OUT OF SERVICE 1811061906-1811202359
 BIS 11/024 BIS OBST TOWER LGT (ASR 1219513) 465057.40N1002718.60W (12.8NM ENE BIS) 2102.0FT (349.1FT AGL) OUT OF SERVICE 1811061742-1811211741
 BIS 02/003 BIS NAV ILS RWY 31 OM DECOMMISSIONED 1802021505-PERM
 BIS 02/002 BIS NAV ILS RWY 31 JADAN LOM DECOMMISSIONED 1802021503-PERM
 BIS 11/292 BIS TWY B FICON(Field Condition report) COMPACTED SN AND 1/8IN DRY SN OBS AT 1811182034. 1811182034-1811192034
 BIS 11/290 BIS TWY C FICON(Field Condition report) COMPACTED SN AND 1/8IN DRY SN OBS AT 1811182032. 1811182032-1811192032
 BIS 11/291 BIS TWY D BTN RWY 13/31 AND TWY D3, TWY D BTN TWY D1 AND TWY C CLSD 1811182033-1811191505
 BIS 11/293 BIS APRON PASSENGER TERMINAL RAMP FICON(Field Condition report) 1/8IN DRY SN OVER COMPACTED SN OBS AT 1811182034. 1811182034-1811192034
 BIS 11/294 BIS APRON GA TERMINAL RAMP FICON(Field Condition report) 1/8IN DRY SN OVER COMPACTED SN OBS AT 1811182035. 1811182035-1811192035
 ISN 11/332 ISN RWY 02/20 CLSD 1811181115-1811200600
 ISN 11/203 ISN AD AP SFC COND NOT REP DLY 0700-1100 1811140700-1904151100
 ISN 10/112 ISN AD AP SELF SERVE FUEL NOT AVBL 1810302053-1811300500
 ISN 11/211 ISN OBST TOWER LGT (ASR 1288070) 480848.60N1032557.30W (8.6NM ESE ISN) 2520.7FT (258.9FT AGL) OUT OF SERVICE 1811142325-1812142325
 ISN 01/415 ISN NAV ILS RWY 29 OM DECOMMISSIONED 1801242007-PERM
 ISN 08/046 ISN COM REMOTE COM OUTLET 123.6 CHANGED TO 122.5 1808101652-PERM
 ISN 11/351 ISN TWY A, A1, A3, A4, C, TWY B BTN NORTH GA RAMP AND TWY C FICON(Field Condition report) ICE AND COMPACTED SN OBS AT 1811190341. 1811190341-1811200341
 ISN 11/349 ISN TWY A, A1, A3, A4, C, TWY B BTN NORTH GA RAMP AND TWY C FICON(Field Condition report) ICE AND COMPACTED SN OBS AT 1811190228. 1811190228-1811200228
 ISN 11/333 ISN TWY D, TWY B BTN NORTH GA RAMP AND APCH END RWY 20 CLSD 1811181115-1811200600
 ISN 11/350 ISN APRON ALL FICON(Field Condition report) ICE AND COMPACTED SN OBS AT 1811190340. 1811190340-1811200340
 ISN 11/348 ISN APRON ALL FICON(Field Condition report) ICE AND COMPACTED SN OBS AT 1811190227. 1811190227-1811200228
 ISN 11/290 ISN APRON NORTH GA RAMP OPEN HOLE BARRICADED 1811170529-1811192359

PIREPs

No PIREPs For KBIS Found

***** PIREPs For KISN *****

GDV UA /OV GDV300015/TM 0112/FL060/TP C402/TA M02/IC LGT MX/RM ZLC

GPS NOTAMs

No GPS NOTAMs found