



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

November 30, 2015

Group Chairman's Weather Study Report

METEOROLOGY

CEN16FA005

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A. ACCIDENT

Location: 10 miles south-southwest of Chadron, Nebraska
Date: October 6, 2015
Time: approximately 1125 mountain daylight time (1725 UTC¹)
Aircraft: Beech model P35, registration: N877DM

B. METEOROLOGY GROUP

Paul Suffern
Senior Meteorologist
National Transportation Safety Board
Operational Factors Division, AS-30
Washington, D.C. 20594-2000

C. SUMMARY

For a summary of the accident, refer to the *Accident Summary* report, which is available in the docket for this investigation.

D. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's (NTSB) Meteorologist did not travel for this investigation and gathered the weather data for this investigation from the NTSB's Washington D.C. office and from official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources including the National Climatic Data Center (NCDC). All times are mountain daylight time (MDT) on October 6, 2015, and are based upon the 24-hour clock, where local time is -6 hours from UTC, and UTC=Z (unless otherwise noted). Directions are referenced to true north and distances in nautical miles. Heights are above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles.

The accident location was located at latitude 42.69° N, longitude 103.07° W, approximate elevation 4,102 feet.

¹ UTC – is an abbreviation for Coordinated Universal Time.

E. FACTUAL INFORMATION

1.0 Synoptic Situation

The synoptic or large scale migratory weather systems influencing the area were documented using standard NWS charts issued by the National Center for Environmental Prediction (NCEP) and the Weather Prediction Center (WPC), located in College Park, Maryland. These are the base products used in describing synoptic weather features and in the creation of forecasts and warnings for the NWS. Reference to these charts can be found in the joint NWS and Federal Aviation Administration (FAA) Advisory Circular “Aviation Weather Services”, AC-0045G CHG 1.

1.1 Surface Analysis Chart

The NWS Surface Analysis Chart for 1200 MDT is provided as figure 1, with the approximate location of the accident site marked. The chart depicted a cold front stretched from southern Wyoming eastward into central Nebraska then northeastward into southern Minnesota. The station models around the accident site depicted temperatures in the mid 50’s to low 60’s Fahrenheit (F), with temperature-dew point spreads of 11° F or less, a variable surface wind under 5 knots, and cloudy skies. With a light surface wind environment it would be expected for any low clouds, fog, or mist conditions to continue until the surface or low-level wind increased or another feature helped move those clouds away.

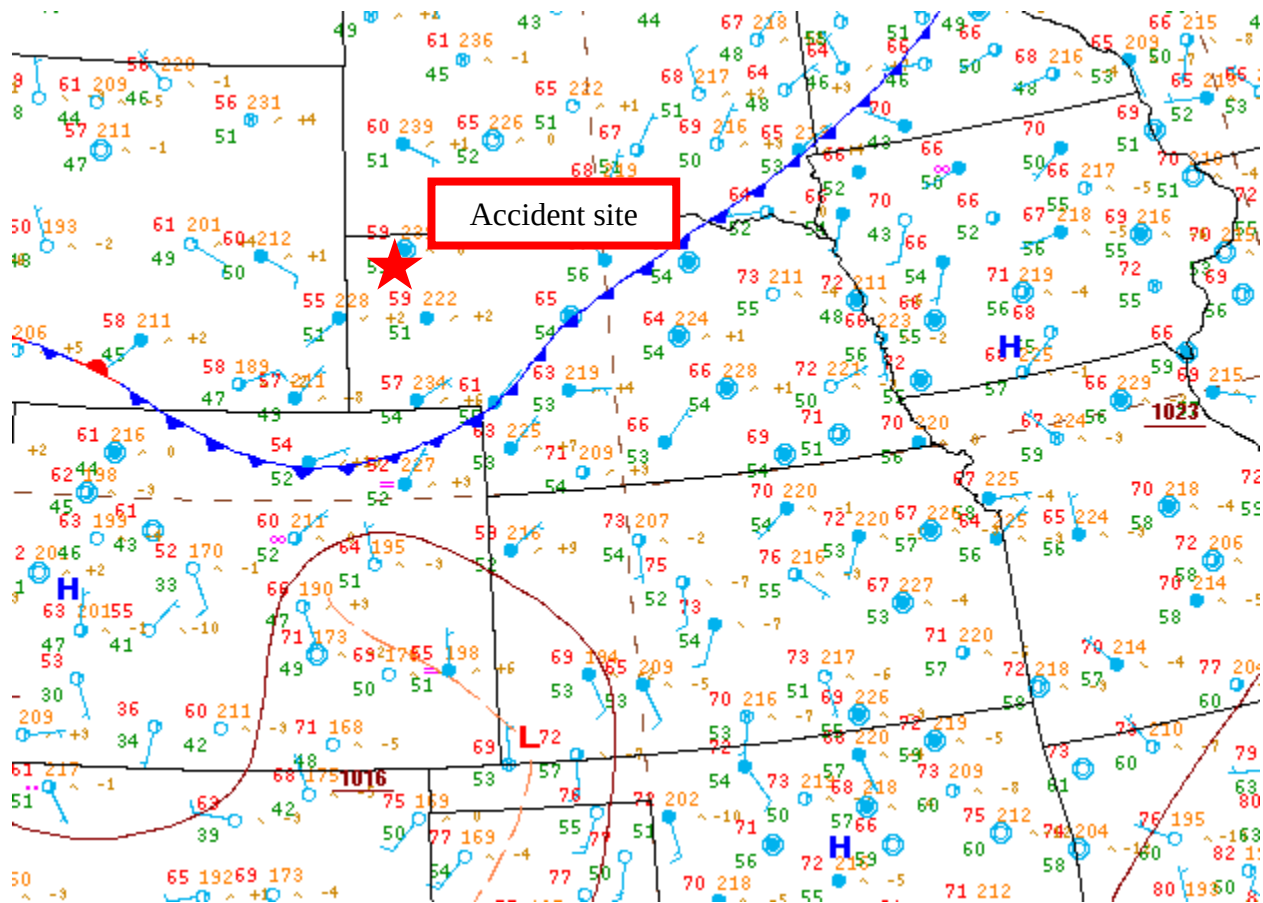


Figure 1 – NWS Surface Analysis Chart for 1200 MDT

1.2 Upper Air Charts

The NWS Storm Prediction Center (SPC) Constant Pressure Charts for 0600 MDT at 850-, 700-, 500-, and 300- hectopascals (hPa) are presented in figures 2 through 5. The 850-hPa chart depicted a relatively light wind environment above the surface. There was a weak mid-level trough² just to the southwest of the accident site at 0600 MDT at 700- and 500-hPa (figures 3 and 4). Areas near and ahead of troughs (to the east of the trough in this case) are typically areas where enhanced lift, clouds, and precipitation can occur. The wind remained out of the west to southwest from 700- through 300-hPa with the strongest wind at 300-hPa near 40 knots.

² Trough – An elongated area of relatively low atmospheric pressure or heights.

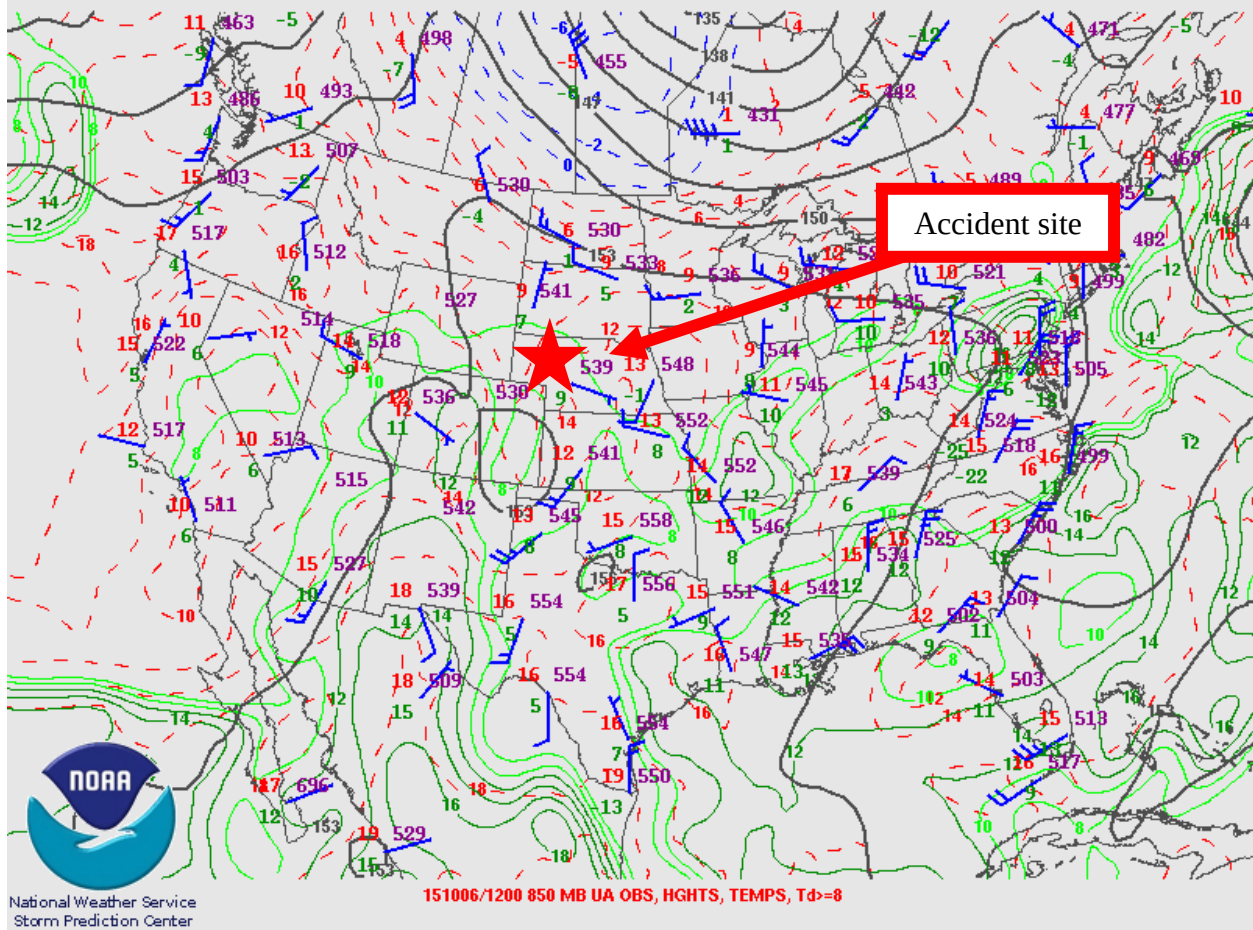


Figure 2 – 850-hPa Constant Pressure Chart for 0600 MDT

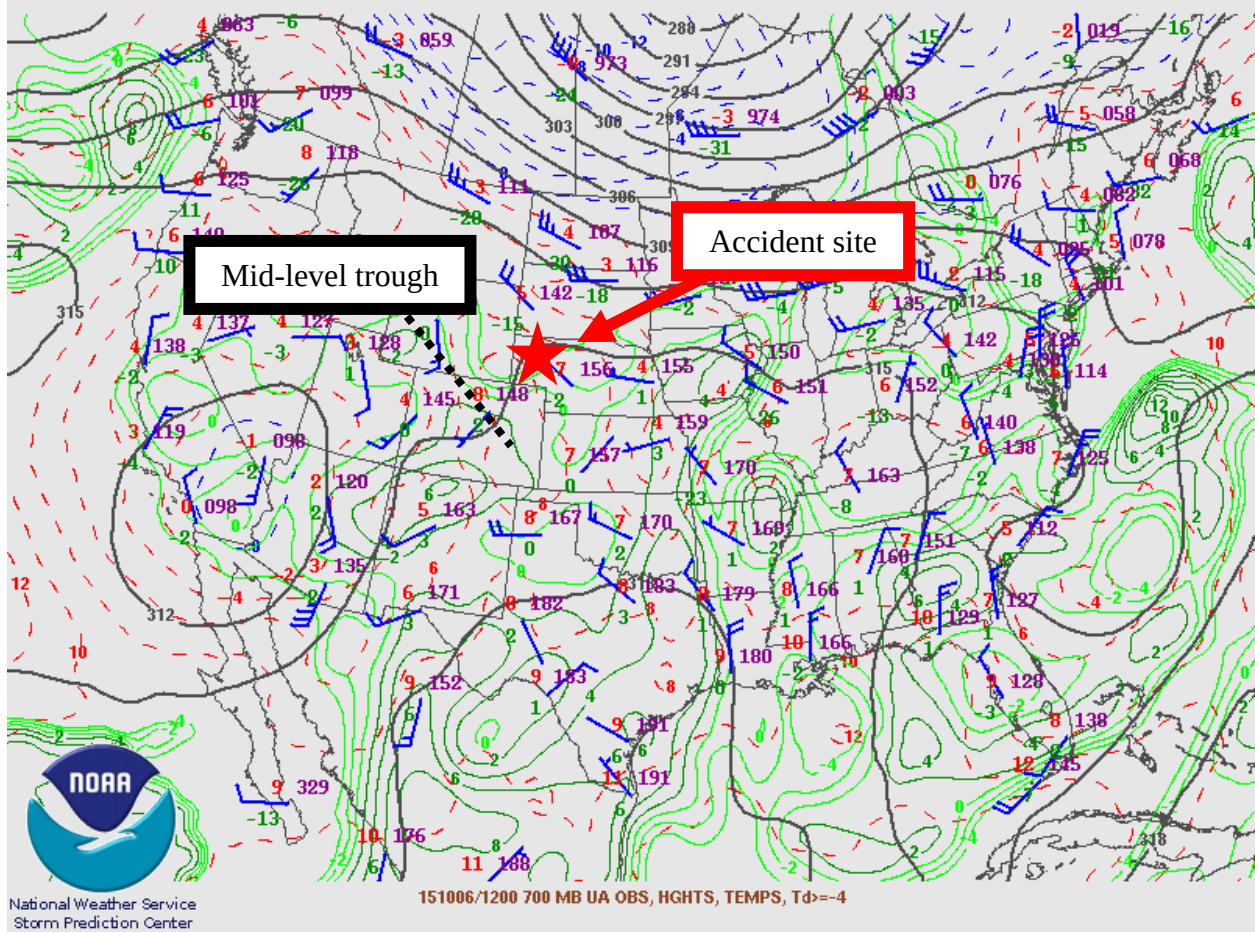


Figure 3 – 700-hPa Constant Pressure Chart for 0600 MDT

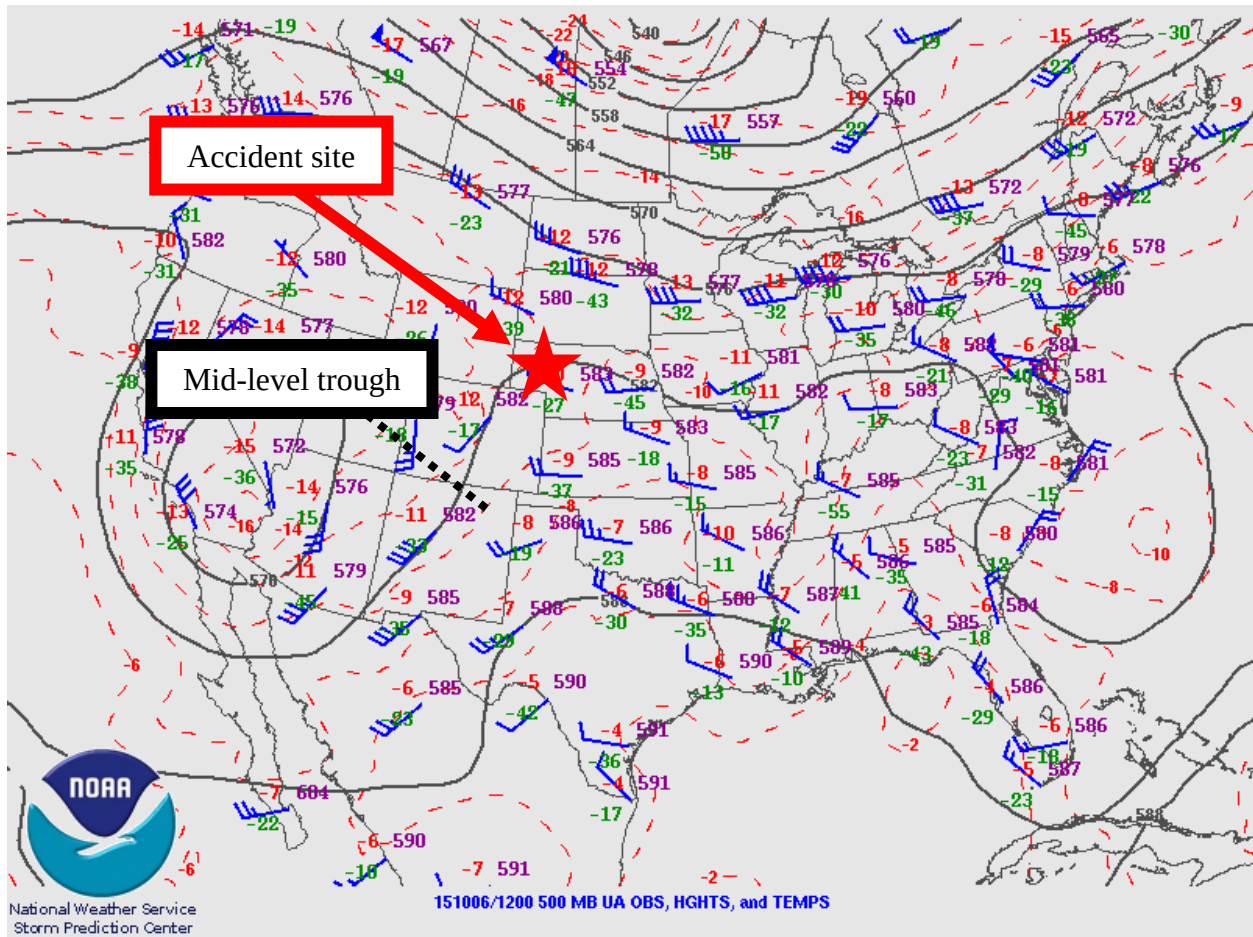


Figure 4 – 500-hPa Constant Pressure Chart for 0600 MDT

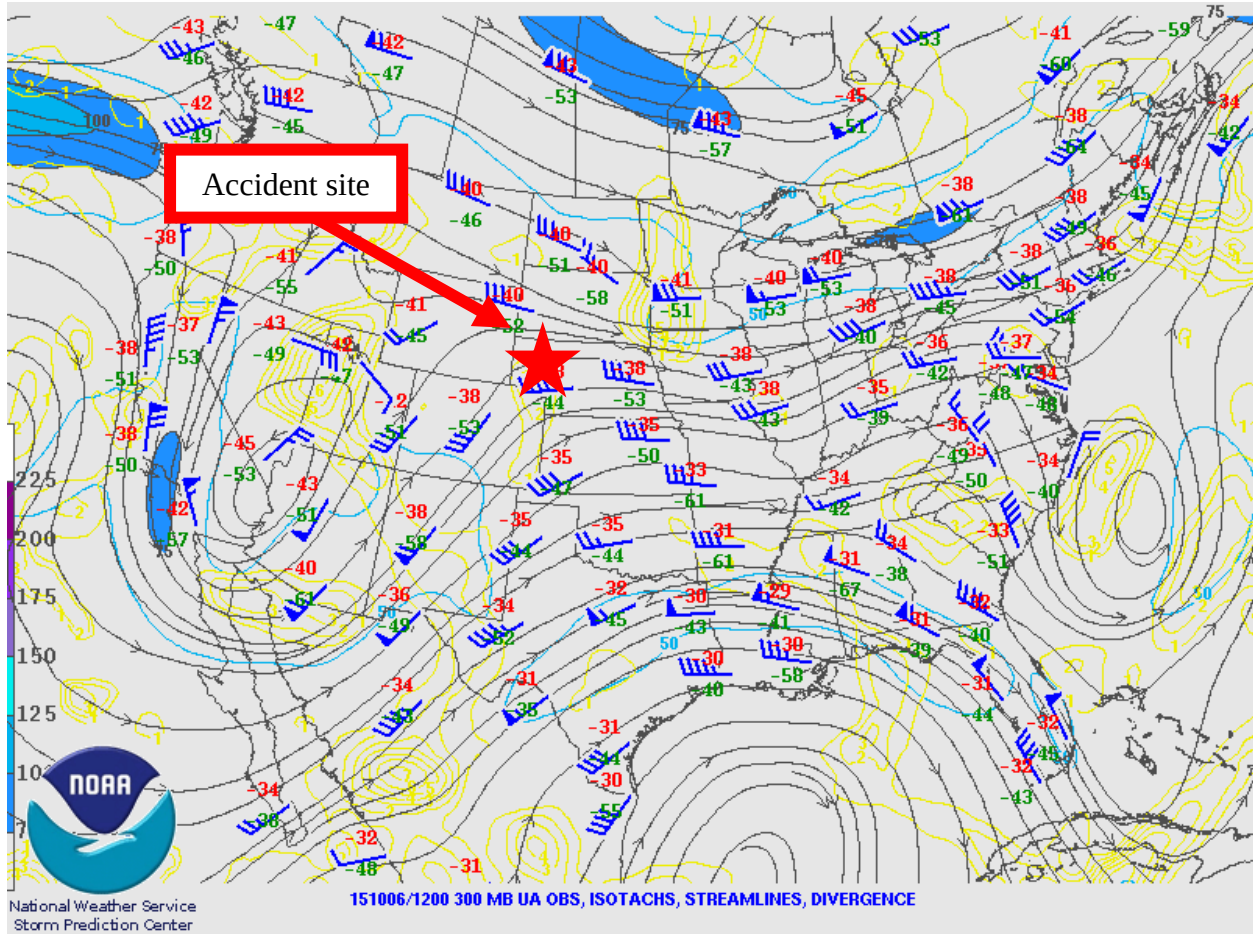


Figure 5 – 300-hPa Constant Pressure Chart for 0600 MDT

2.0 Storm Prediction Center Products

No thunderstorms or severe storms were forecast.

3.0 Surface Observations

The area surrounding the accident site was documented utilizing official NWS Meteorological Aerodrome Reports (METARs) and Specials (SPECIs). The following observations were taken from standard code and are provided in plain language.

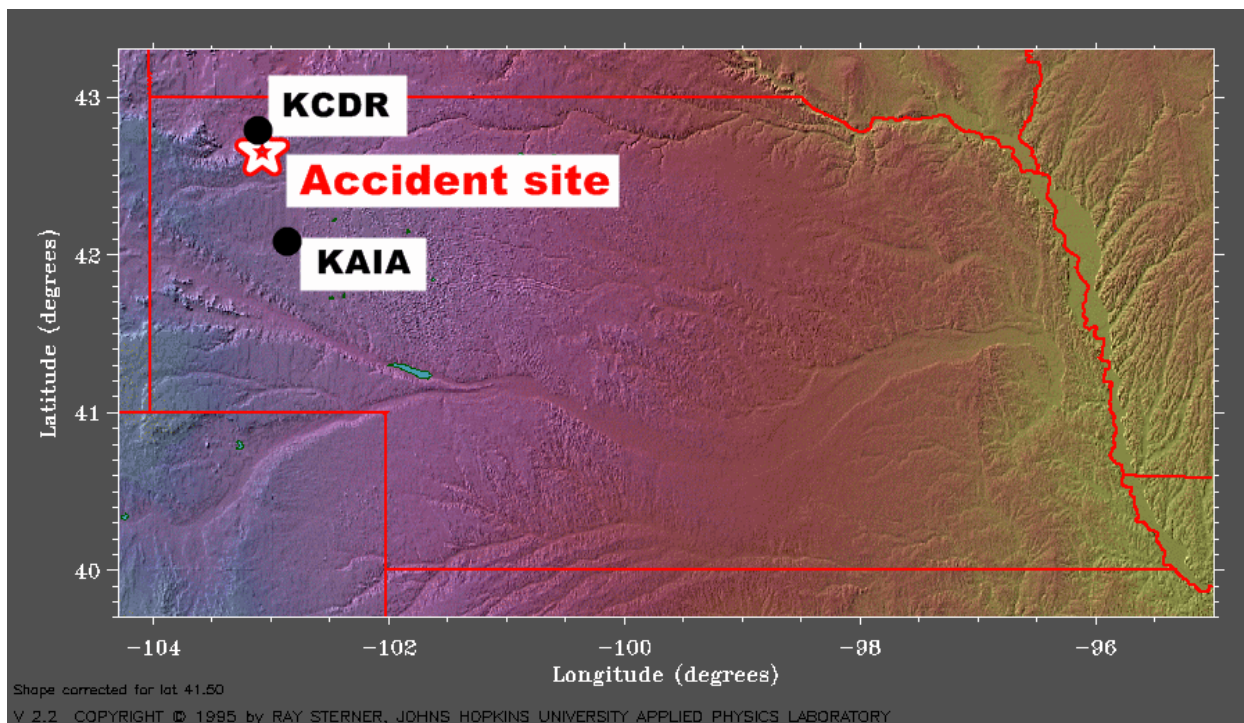


Figure 6 – Map of Nebraska with the location of the accident site and surface observation sites

Chadron Municipal Airport (KCDR) was the closest official weather station to the accident site as well as the takeoff location and KCDR was located 4 miles west of Chadron, Nebraska. KCDR had an Automated Surface Observing System (ASOS)³ whose reports were not supplemented. KCDR was located 9 miles north-northwest of the accident site, at an elevation of 3,298 feet, and had an 11° easterly magnetic variation⁴ (figure 6). The following observations were taken and disseminated during the times surrounding the accident⁵:

[0853 MDT] KCDR 061453Z AUTO 03005KT 6SM BR OVC004 12/10 A3024
RMK AO2 SLP242 T01170100 51019=

[0914 MDT] KCDR 061514Z AUTO 02005KT 6SM BR OVC005 12/11 A3024
RMK AO2 T01220106=

[0953 MDT] KCDR 061553Z AUTO 05003KT 7SM BKN007 OVC032 13/11 A3025
RMK AO2 SLP242 T01280106=

[1022 MDT] KCDR 061622Z AUTO 10003KT 8SM SCT008 SCT025 OVC034
14/11 A3025 RMK AO2 T01390106=

³ ASOS – Automated Surface Observing System is equipped with meteorological instruments to observe and report wind, visibility, ceiling, temperature, dewpoint, altimeter, and barometric pressure.

⁴ Magnetic variation – The angle (at a particular location) between magnetic north and true north.

⁵ The bold sections in this NWS product and the rest of products in the weather factual report are to highlight the individual sections that directly reference the weather conditions that are or will affect the accident location around the accident time.

**[1049 MDT] KCDR 061649Z AUTO 00000KT 8SM BKN014 OVC034 14/11 A3025
RMK AO2=**

**[1053 MDT] KCDR 061653Z AUTO 00000KT 9SM BKN015 OVC034 14/11 A3025
RMK AO2 SLP242 T01390106=**

ACCIDENT TIME 1125 MDT

**[1153 MDT] KCDR 061753Z AUTO 00000KT 9SM FEW016 OVC030 15/11 A3024
RMK AO2 SLP239 T01500106 10156 20100 58000=**

**[1253 MDT] KCDR 061853Z AUTO 00000KT 9SM SCT023 BKN032 17/11 A3023
RMK AO2 SLP229 T01720106=**

**[1302 MDT] KCDR 061902Z AUTO 00000KT 10SM BKN023 BKN033 17/11
A3022 RMK AO2 T01670106=**

**[1353 MDT] KCDR 061953Z AUTO 00000KT 9SM SCT024 OVC033 17/11 A3021
RMK AO2 SLP226 T01670106=**

**[1453 MDT] KCDR 062053Z AUTO 32003KT 10SM CLR 18/11 A3019 RMK
AO2 SLP217 T01780111 58017=**

**[1553 MDT] KCDR 062153Z AUTO 06003KT 10SM CLR 18/11 A3018 RMK
AO2 SLP216 T01780111=**

KCDR weather at 1049 MDT was reported as wind calm, 8 miles visibility, a broken ceiling at 1,400 above ground level (agl), overcast skies at 3,400 feet agl, temperature of 14° Celsius (C), dew point temperature of 11° C, and an altimeter setting of 30.25 inches of mercury. Remarks: automated station with precipitation discriminator.

KCDR weather at 1053 MDT was reported as wind calm, 9 miles visibility, a broken ceiling at 1,500 agl, overcast skies at 3,400 feet agl, temperature of 14° C, dew point temperature of 11° C, and an altimeter setting of 30.25 inches of mercury. Remarks: automated station with precipitation discriminator, sea level pressure 1024.2 hPa, temperature 13.9° C, dew point temperature 10.6° C.

KCDR weather at 1153 MDT was reported as wind calm, 9 miles visibility, few clouds at 1,600 feet agl, an overcast ceiling at 3,000 feet agl, temperature of 15° C, dew point temperature of 11° C, and an altimeter setting of 30.24 inches of mercury. Remarks: automated station with precipitation discriminator, sea level pressure 1023.9 hPa, temperature 15.0° C, dew point temperature 10.6° C, 6-hourly maximum temperature of 15.6° C, 6-hourly minimum temperature of 10.0° C, 3-hourly pressure change of 0.0 hPa.

KCDR weather at 1253 MDT was reported as wind calm, 9 miles visibility, scattered clouds at 2,300 feet agl, a broken ceiling at 3,200 agl, temperature of 17° C, dew point temperature of 11° C, and an altimeter setting of 30.23 inches of mercury. Remarks: automated station with precipitation discriminator, sea level pressure 1022.9 hPa, temperature 17.2 C, dew point temperature 10.6° C.

Alliance Municipal Airport (KAIA) was the destination airport for the accident flight and was located 3 miles southeast of Alliance, Nebraska. KAIA had an ASOS whose reports were not supplemented. KAIA was located 40 miles south-southeast of the accident site, at an elevation of 3,931 feet, and had an 11° easterly magnetic variation (figure 6). The following observations were taken and disseminated during the times surrounding the accident:

[0853 MDT] KAIA 061453Z AUTO 00000KT 9SM OVC010 12/10 A3023 RMK
AO2 CIG 008V013 SLP220 T01220100 53015=

[0908 MDT] KAIA 061508Z AUTO 00000KT 6SM BR OVC009 12/10 A3023
RMK AO2 T01220100=

[0927 MDT] KAIA 061527Z AUTO 00000KT 10SM OVC011 12/10 A3023 RMK
AO2 T01170100=

[0953 MDT] KAIA 061553Z AUTO 04003KT 10SM OVC013 13/10 A3023 RMK
AO2 SLP223 T01280100=

**[1051 MDT] KAIA 061651Z AUTO 30004KT 10SM OVC015 14/10 A3024 RMK
AO2=**

**[1053 MDT] KAIA 061653Z AUTO VRB03KT 10SM OVC015 14/10 A3024 RMK
AO2 SLP222 T01440100=**

ACCIDENT TIME 1125 MDT

**[1153 MDT] KAIA 061753Z AUTO VRB04KT 10SM OVC018 15/11 A3024 RMK
AO2 SLP222 T01500106 10150 20111 51002=**

**[1253 MDT] KAIA 061853Z AUTO 00000KT 10SM BKN023 16/11 A3022 RMK
AO2 SLP215 T01610106=**

[1353 MDT] KAIA 061953Z AUTO 00000KT 10SM SCT026 17/11 A3021 RMK
AO2 SLP207 T01720111=

[1453 MDT] KAIA 062053Z AUTO 08006KT 10SM FEW031 18/12 A3019 RMK
AO2 SLP199 T01830117 58016=

KAIA weather at 1051 MDT was reported as wind from 300° at 4 knots, 10 miles visibility, an overcast ceiling at 1,500 feet agl, temperature of 14° C, dew point temperature of 10° C, and an altimeter setting of 30.24 inches of mercury. Remarks: automated station with precipitation discriminator.

KAIA weather at 1053 MDT was reported as wind variable at 3 knots, 10 miles visibility, an overcast ceiling at 1,500 feet agl, temperature of 14° C, dew point temperature of 10° C, and an altimeter setting of 30.24 inches of mercury. Remarks: automated station with precipitation discriminator, sea level pressure 1022.2 hPa, temperature 14.4° C, dew point temperature 10.0° C.

KAIA weather at 1153 MDT was reported as wind variable at 4 knots, 10 miles visibility, an overcast ceiling at 1,800 feet agl, temperature of 15° C, dew point temperature of 11° C, and an altimeter setting of 30.24 inches of mercury. Remarks: automated station with precipitation discriminator, sea level pressure 1022.2 hPa, temperature 15.0° C, dew point temperature 10.6° C, 6-hourly maximum temperature of 15.0° C, 6-hourly minimum temperature of 11.1° C, 3-hourly pressure increase of 0.2 hPa.

KAIA weather at 1253 MDT was reported as wind calm, 10 miles visibility, a broken ceiling at 2,300 feet agl, temperature of 16° C, dew point temperature of 11° C, and an altimeter setting of 30.22 inches of mercury. Remarks: automated station with precipitation discriminator, sea level pressure 1021.5 hPa, temperature 16.1° C, dew point temperature 10.6° C.

The observations from KCDR and KAIA indicated MVFR⁶ ceilings around the accident site at the accident time. Using the surface elevations from KCDR and KAIA, cloud ceilings would have ranged from 4,700 feet to 5,400 feet msl directly above the KCDR and KAIA site location. It was likely that closer to the higher terrain in between the takeoff and destination locations that cloud ceilings were lower and caused mountain obscuration conditions (sections 4.0, 9.0, and 14.0).

⁶ Marginal Visual Flight Rules – Refers to the general weather conditions pilots can expect at the surface. MVFR criteria means a ceiling between 1,000 and 3,000 feet agl and/or 3 to 5 miles visibility.

4.0 Upper Air Data

The closest official upper air sounding to the accident site was from Rapid City, South Dakota, (KRAP), located 83 miles north-northwest of the accident site, with a site number 72662, and an elevation of 3,169 feet. The 0600 MDT sounding from KRAP was plotted on a standard Skew-T log P diagram⁷ with the derived stability parameters included in figure 7 (with data from the surface to 600-hPa, or 14,000 feet msl.) This data was analyzed utilizing the RAOB⁸ software package. The sounding depicted the Lifted Condensation Level (LCL)⁹ at 3,960 feet msl and a Convective Condensation Level (CCL)¹⁰ of 5,869 feet. The freezing level was located at 12,904 feet. The precipitable water value was 0.58 inches.

⁷ Skew T log P diagram – is a standard meteorological plot using temperature and the logarithmic of pressure as coordinates, used to display winds, temperature, dew point, and various indices used to define the vertical structure of the atmosphere.

⁸ RAOB – (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Environmental Research Services, Matamoras, Pennsylvania.

⁹ Lifting Condensation Level (LCL) - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

¹⁰ Convective Condensation Level (CCL) – The level in the atmosphere to which an air parcel, if heated from below, will rise dry adiabatically, without becoming colder than its environment just before the parcel becomes saturated.

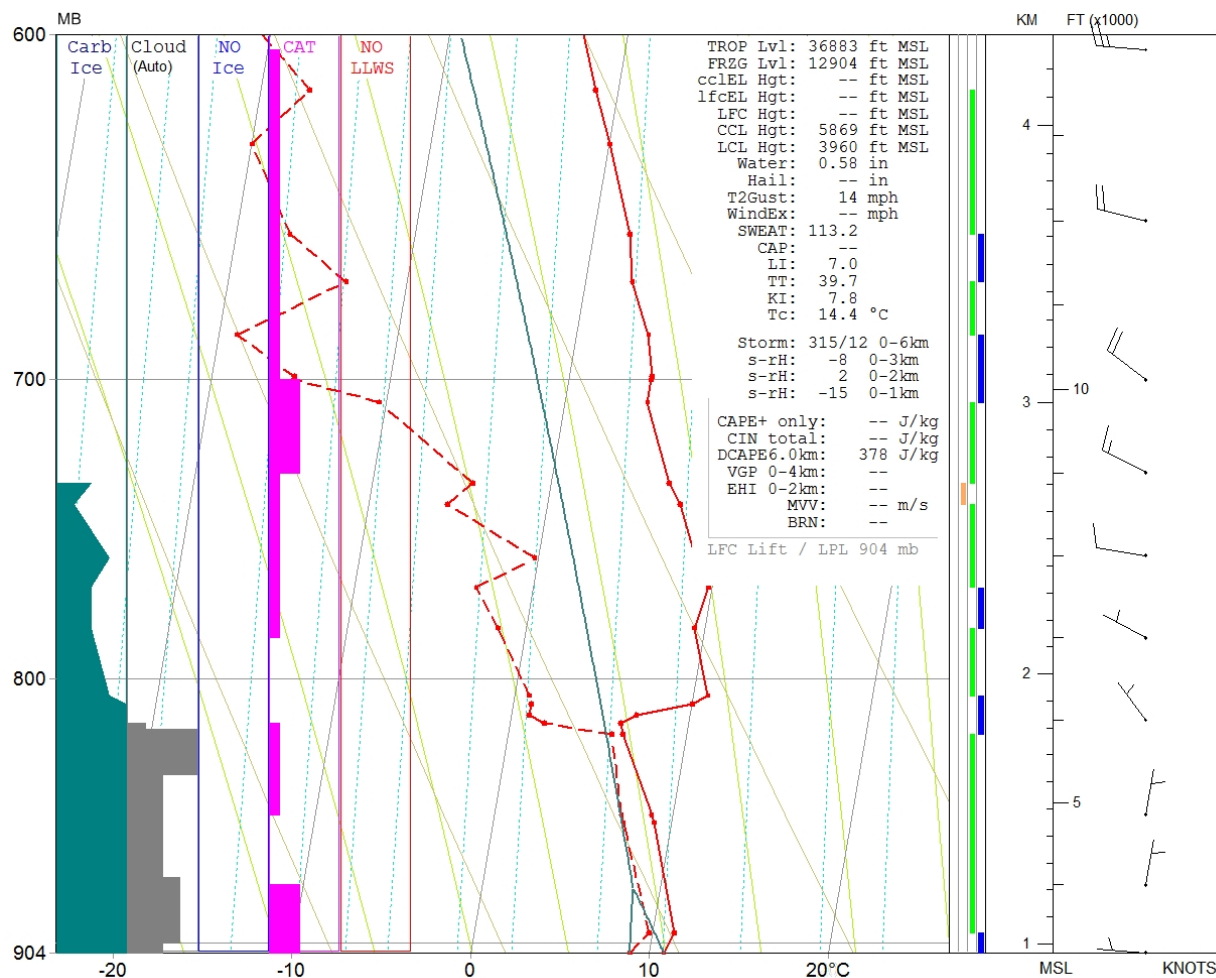


Figure 7 – 0600 MDT KRAP sounding

The 0600 MDT KRAP sounding indicated a relatively moist vertical environment from the surface through 6,000 feet msl with a layer of conditional instability. This environment would have been conducive of cloud formation as indicated by RAOB from the surface to 6,000 feet msl. No icing was indicated by RAOB below 14,000 feet. There was an inversion at 6,000 feet that would have made it difficult for any cloud layer below 6,000 feet to dissipate throughout the day especially given the light wind environment. Given no change in the wind conditions below 6,000 feet or any other external weather phenomena moving into the accident site area, the cloud layer below 6,000 feet would have been expected to remain throughout the day.

The sounding wind profile indicated there was a surface wind from 275° at 4 knots and the wind remained light and variable below 10 knots through 7,000 feet msl. Above 7,000 feet msl the wind shifted to the west and increased in speed to 25 knots by 14,000 feet. Low-level wind shear (LLWS) was not indicated by RAOB in the lowest 2,000 feet. Several layers of possible clear-air turbulence were identified by RAOB the surface through 14,000 feet.

5.0 Satellite Data

Visible and infrared data from the Geostationary Operational Environmental Satellite number 15 (GOES-15) was obtained from the NCDC and processed with the NTSB's Man-computer Interactive Data Access System (McIDAS) workstation. Visible and infrared imagery (GOES-15 bands 1 and 4) at a wavelength of 0.65 microns (μm) and 10.7 μm retrieved brightness temperatures for the scene. Satellite imagery surrounding the time of the accident, from 0900 MDT through 1400 MDT at approximately 15-minute intervals, were reviewed and the closest images to the time of the accident are documented here.

Figures 8 and 9 present the GOES-15 visible imagery from 1115 and 1130 MDT at 2X magnification with the accident site highlighted with a red square. Inspection of the visible imagery indicated a general southwest to northeast movement of the clouds over the accident site at the accident time with several different layers of clouds present. Figure 10 presents the GOES-15 infrared imagery from 1130 MDT at 7X magnification with the accident site highlight with a red star. The more enhanced bands (yellows and greens, higher cloud tops) were located north and directly southwest of the accident site around the accident time. Based on the brightness temperatures above the accident site and the vertical temperature profile provided by the 0600 MDT KRAP sounding, the approximate cloud-top heights over the accident site were 26,000 feet msl at 1130 MDT. With the higher cloud cover moving over the accident site at the accident time, it was not possible to view the cloud top height of the lower stratus cloud deck layer (depicted on the 0600 MDT KRAP sounding and KCDR and KAIA observations) over the accident site at the accident time (sections 3.0 and 4.0).

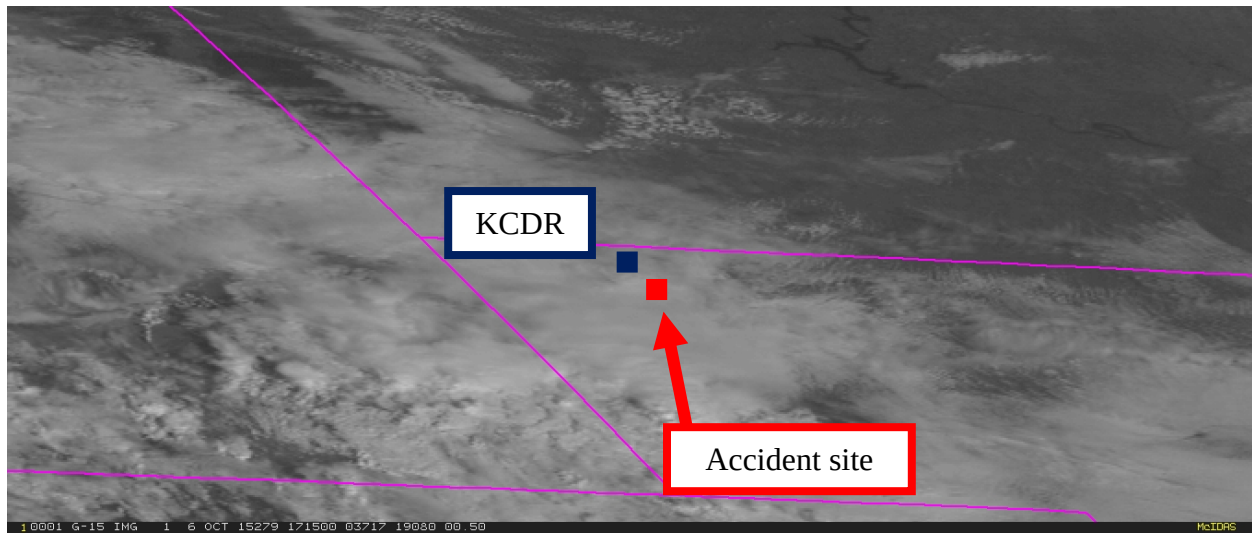


Figure 8 – GOES-15 visible image at 1115 MDT

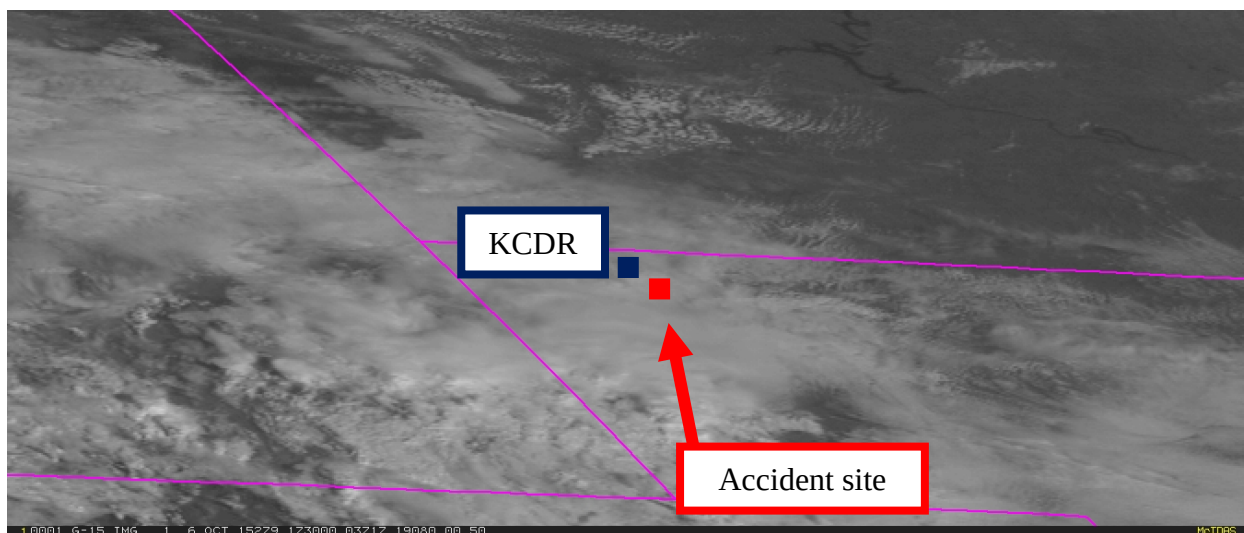


Figure 9 – GOES-15 visible image at 1130 MDT

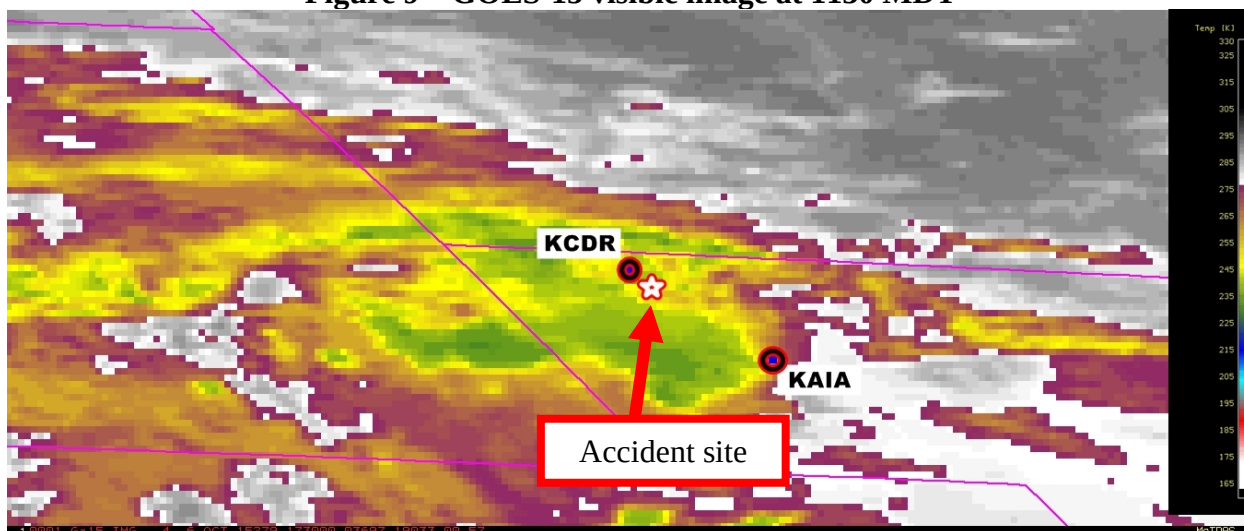


Figure 10 – GOES-15 infrared image at 1130 MDT

6.0 Radar Imagery Information

There were no precipitation targets over or near the accident site at the accident time. There were no lightning strikes near the accident site at the accident time.

7.0 Pilot Reports

All pilot reports (PIREPs) were reviewed close to the accident site from around two hours prior to the accident time to around two hours after the accident time and the PIREPs displayed below are the PIREPs valid below 18,000 feet with altitude heights in feet msl:

BFF UA /OV BFF340010/TM 1845/FL150/TP C210/TA 13/IC LGT RIME/RM ZDV=

Routine pilot report (UA); 10 miles from Scottsbluff, Nebraska, on the 340° radial; Time – 1245 MDT (1845Z); Altitude – 15,000 feet; Type aircraft – Cessna 210; Temperature – 13° C; Icing – Light rime. The PIREP likely meant to code -13° C, not +13° C, however, +13° C is what was coded in the PIREP.

8.0 SIGMET and CWSU Advisories

No SIGMETs was valid for the accident site at the accident time.

No Center Weather Service Unit (CWSU) Advisory (CWA) was valid for the accident site at the accident time.

No Meteorological Impact Statement (MIS) was valid for the accident site at the accident time.

9.0 AIRMETs

AIRMET Sierra issued at 0845 MDT (and updated at 1102 MDT expanding area), and valid at the accident time, was the only AIRMET valid for the accident site at the accident time at the accident flight level (figures 11 and 12). AIRMET Sierra forecasted IFR¹¹ conditions with ceiling below 1,000 feet agl and visibility below 3 miles in mist and fog:

WAUS43 KKCI 061702

WA3S

_CHIS WA 061702 AMD

AIRMET SIERRA UPDT 6 FOR IFR VALID UNTIL 062100

.

AIRMET IFR...ND SD

FROM 20WNW ISN TO MOT TO 60SE BIS TO 50NW DPR TO 60WSW DIK TO 20WNW ISN

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

.

AIRMET IFR...SD NE KS...UPDT

FROM 60NW RAP TO 60SE RAP TO 30NW LBF TO HLC TO 50SE LAA TO GLD TO BFF TO 70SW RAP TO 60NW RAP

CIG BLW 010/VIS BLW 3SM BR/FG. CONDS ENDG 18-21Z.

.

AIRMET IFR...IA WI LM MI LH IL IN...UPDT

FROM 50SSW RHI TO 30ENE TVC TO 30ESE ASP TO 30SE ECK TO FWA TO 40WSW ROD TO 40N PXV TO 40ESE UIN TO 20W BDF TO 50WNW DBQ TO 50SSW RHI

CIG BLW 010/VIS BLW 3SM BR/FG. CONDS ENDG 18-21Z.

....

WAUS43 KKCI

WA3S

_CHIS WA 061445

¹¹ Instrument Flight Rules – Refers to the general weather conditions pilots can expect at the surface. IFR criteria means a ceiling below 1,000 feet agl and/or less than 3 miles visibility.

AIRMET SIERRA UPDT 5 FOR IFR VALID UNTIL 062100

AIRMET IFR...ND SD

FROM 20WNW ISN TO MOT TO 60SE BIS TO 50NW DPR TO 60WSW DIK TO 20WNW ISN

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

AIRMET IFR...IA WI LM MI LH IL IN

FROM 30ENE TVC TO 30ESE ASP TO 30SE ECK TO FWA TO 40WSW ROD TO 40N PXV TO 40ESE UIN TO 20W BDF TO 50WNW DBQ TO 50SSW RHI TO 30ENE TVC

CIG BLW 010/VIS BLW 3SM BR/FG. CONDS ENDG 18-21Z.

AIRMET IFR...SD NE KS

FROM 60NW RAP TO 60SE RAP TO 20N HLC TO 50SE LAA TO GLD TO BFF TO 70SW RAP TO 60NW RAP

CIG BLW 010/VIS BLW 3SM BR/FG. CONDS ENDG 18-21Z.

....

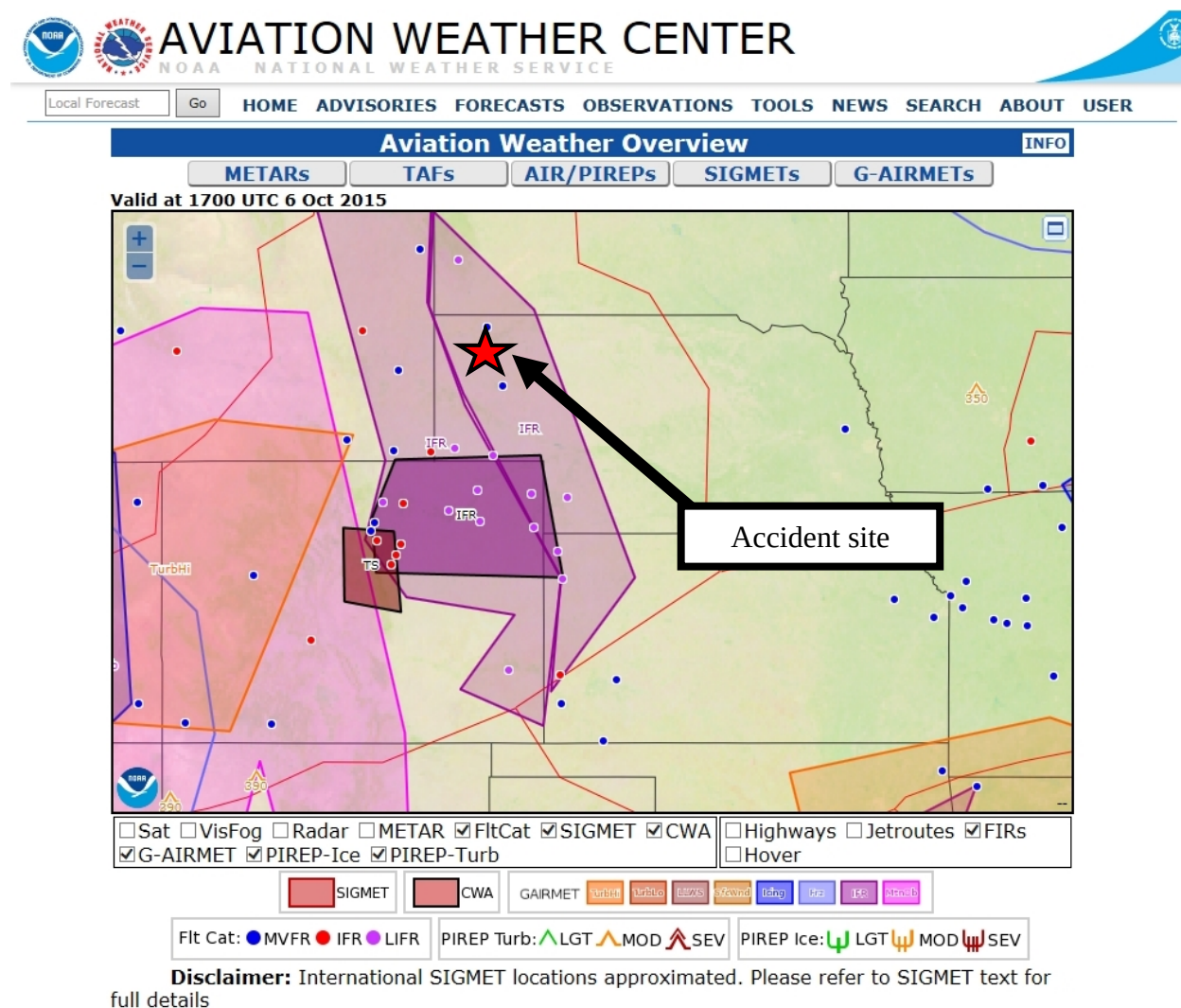


Figure 11 – AIRMETs and CWAs valid for the accident area at 1100 MDT

The AIRMETs valid for the accident site (including the CWA) at 1200 MDT, 1000 MDT, and 0900 MDT are provided in figures 12, 13, and 14. The AIRMETs all mentioned the IFR conditions across western Nebraska.

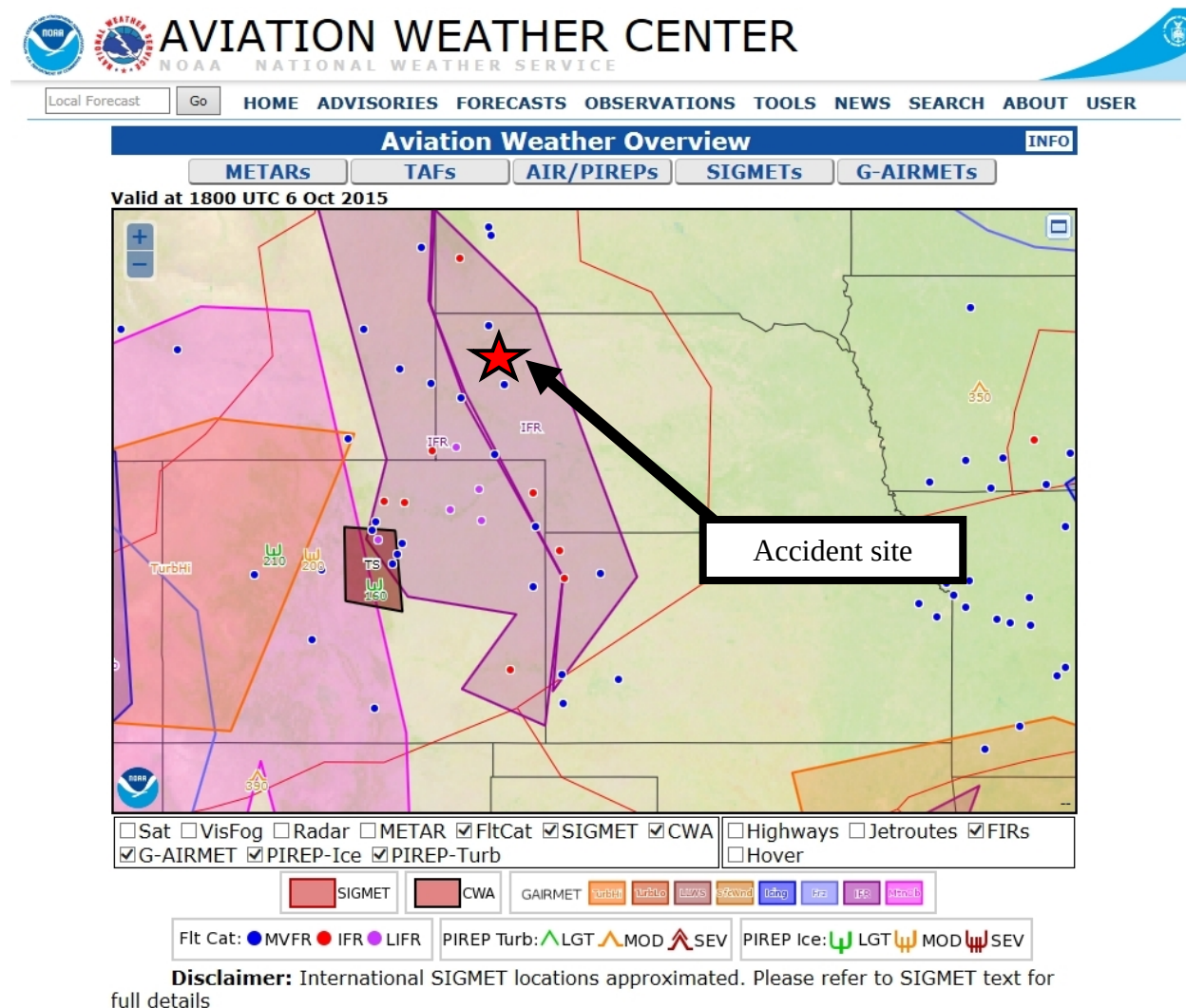


Figure 12 – AIRMETs and CWAs valid for the accident area at 1200 MDT

Aviation Weather Overview

INFO

METARs

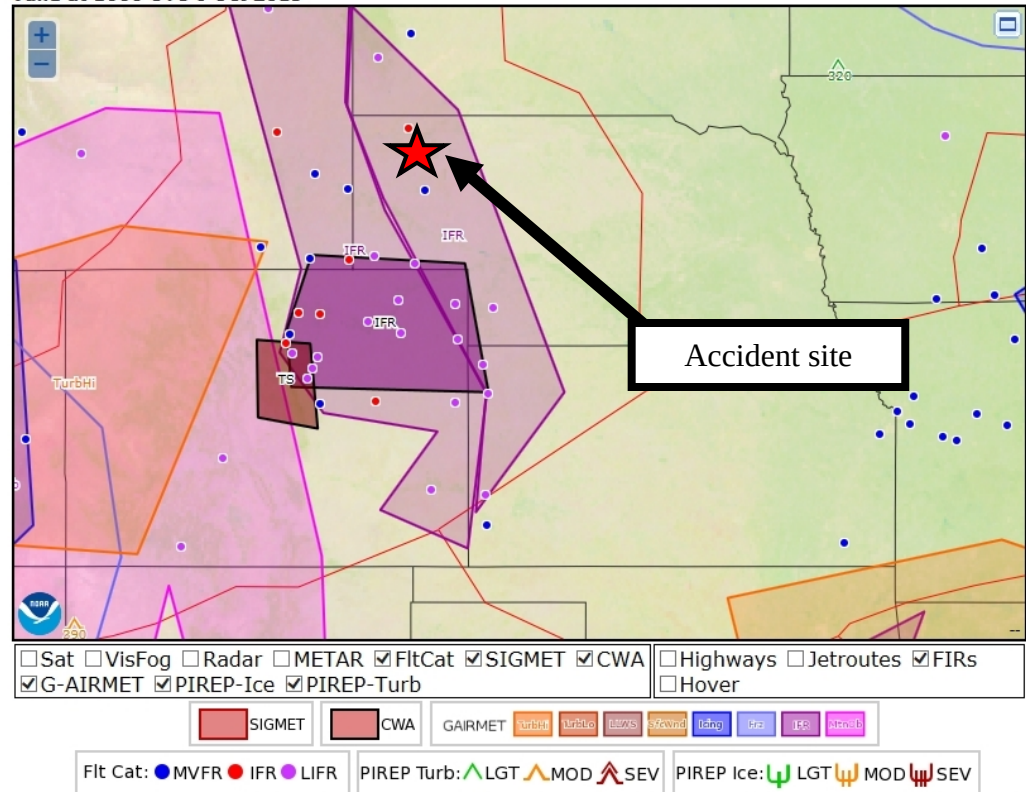
TAFs

AIR/PIREPs

SIGMETs

G-AIRMETs

Valid at 1600 UTC 6 Oct 2015



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

Figure 13 – AIRMETs and CWAs valid for the accident area at 1000 MDT

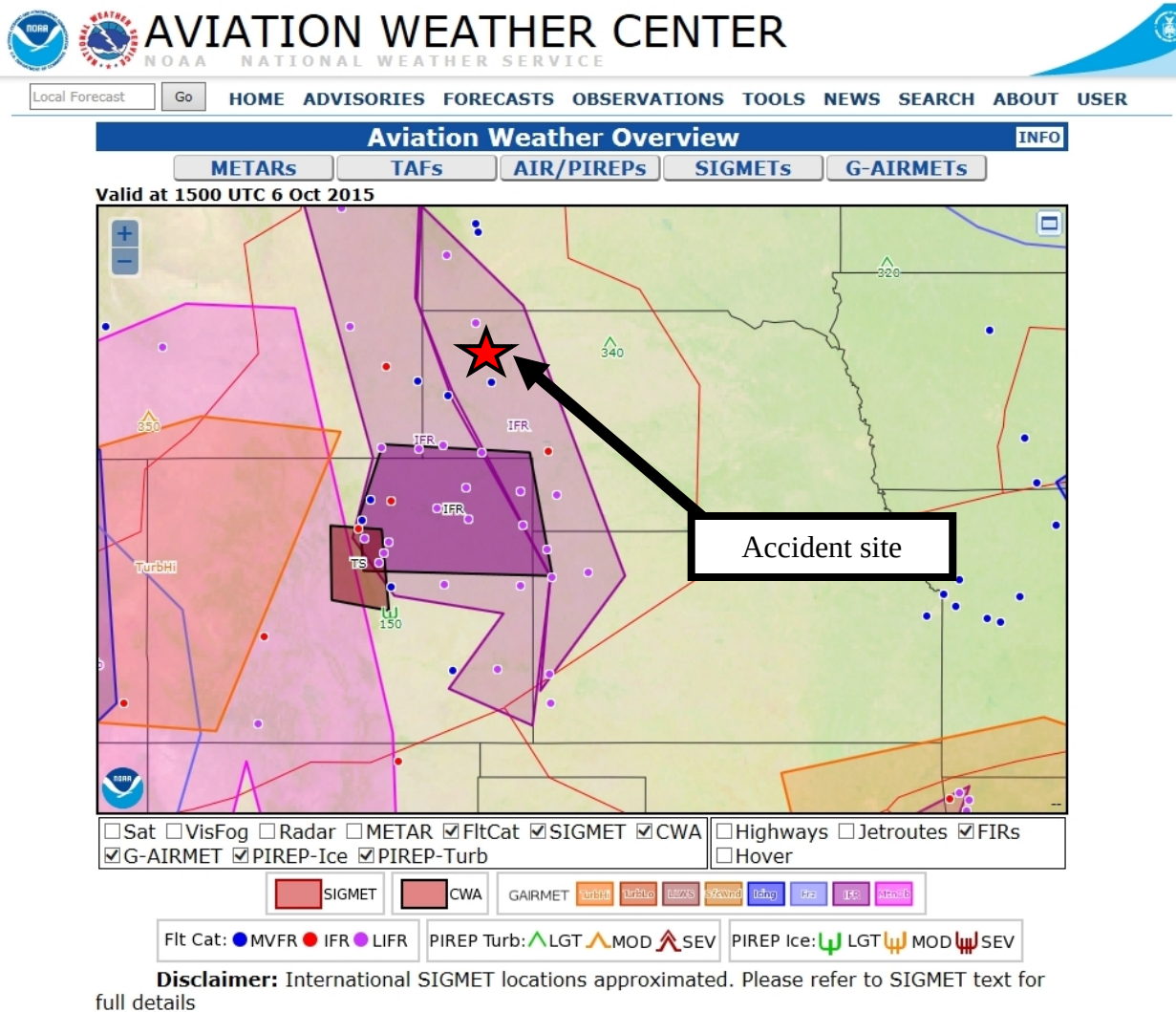


Figure 14 – AIRMETs and CWAs valid for the accident area at 0900 MDT

10.0 Area Forecast

The Area Forecast issued at 0525 MDT valid at the accident time forecasted an overcast ceiling at 5,000 feet msl with tops at 8,000 feet msl. Visibility was forecast between 3 and 5 miles in mist, with skies becoming a broken ceiling at 6,000 feet msl with tops at 16,000 msl between 1000 and 1200 MDT:

FAUS43 KPCI 061125 AAA
 FA3W
 _CHIC FA 061125 AMD
 SYNOPSIS AND VFR CLDS/WX
 SYNOPSIS VALID UNTIL 070400
 CLDS/WX VALID UNTIL 062200...OTLK VALID 062200-070400
 ND SD NE KS MN IA MO WI LM LS MI LH IL IN KY

SEE AIRMET SIERRA FOR IFR CONDS AND MTN OBSCN.

TS IMPLY SEV OR GTR TURB SEV ICE LLWS AND IFR CONDS.
NON MSL HGTS DENOTED BY AGL OR CIG.

.
SYNOPSIS...CDFNT EXTRM NERN MN-SWRN MN-SERN SD-NE PNHDL. HI PRES
ELSW. 00Z CDFNT ERN UPR MI-SERN MN-NERN NE-NE PNHDL. TROF TN TO
NERN AL. 04Z CDFNT NRN LH-SRN WI-NERN IA-NERN NE BECMG WRMFNT OVR
SWRN SD.

.
ND
W...SCT050 BKN CI. TIL 15Z OCNL VIS 3-5SM BR. OTLK...VFR.
NERN...SCT040. 15Z SCT CI. OTLK...VFR.
SE...BKN080 TOP 120. 14Z SCT CI. OTLK...VFR.

.
SD
W...BKN070 TOP 140. 12Z BKN040. VIS 3-5SM BR. 20Z SCT060.
OTLK...VFR.
N CNTRL...BKN090 TOP 140. 15Z SCT090. OTLK...VFR.
S CNTRL...BKN-OVC090 TOP 140. BECMG 1113 BKN030 TOP 100. VIS
3-5SM BR. 17Z SCT060. OTLK...VFR.
E...OVC070 TOP 100. 18Z SCT070. OTLK...VFR.

.
NE
PNHDL...OVC050 TOP 080. VIS 3-5SM BR. BECMG 1618 BKN060 TOP 160.
OTLK...MVFR CIG.
CNTRL...BKN-OVC060 TOP 100. OCNL VIS 3-5SM BR. 20Z BKN070.
OTLK...VFR.
E...OVC090 TOP 140. 20Z SCT050. OTLK...VFR.

.
KS
W...SKC. BECMG 1113 OVC040-045 TOP 070. VIS 3-5SM BR. 17Z SCT060.
OTLK...VFR.
CNTRL...BKN100 TOP 140. CNL VIS 3-5SM BR. 15Z SCT100. OTLK...VFR.
E...BKN-OVC100 TOP FL180. 20Z SCT100. OTLK...VFR.

.
MN
N HLF...OVC090 TOP 120. 15Z SCT080 SCT CI. OTLK...VFR.
S HLF...OVC070 TOP 100. 20Z BKN050. OTLK...VFR.

.
IA
W HLF...OVC090 TOP 150. 15Z SCT100. OTLK...VFR.
E HLF...SCT150 BKN CI. OCNL VIS 3-5SM BR. 12Z BKN100 TOP 140. 19Z
BKN080. OTLK...VFR.

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MO...UPDT
NW...BKN035 BKN-OVC130 TOP FL220. -RA. 21Z SCT040 BKN100 TOP 140.
OTLK...VFR.
NERN...BKN050 BKN160 TOP FL240. 21Z BKN040 BKN130 TOP FL180.
OTLK...VFR.
SW...BKN150 TOP FL180. 12Z BKN020 BKN150. VIS 3-5SM BR. BECMG
1618 SCT050 BKN100 TOP 150. OTLK...VFR.
SE...BKN CI. TIL 15Z VIS 3-5SM BR. 20Z SCT050 SCT CI. OTLK...VFR.

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WI
N HLF...OVC070 TOP 120. OTLK...VFR.
SW...SCT020 SCT CI. VIS 3-5SM BR. 15Z BKN070 TOP 100. OTLK...VFR.
SE...OVC020 TOP 060. VIS 3-5SM BR. BECMG 1517 SCT080. 20Z BKN080.

OTLK...VFR.

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LS UPR MI

W HLF...OVC090 TOP 120. BECMG 1517 SCT040 SCT CI. OTLK...VFR.

E HLF...OVC090 TOP 120. BECMG 1113 OVC030. VIS 3-5SM BR. BECMG 1315 OVC050. OTLK...VFR.

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LM LWR MI LH

NW...OVC020-025 TOP 050. VIS 3-5SM BR. 17Z SCT040. OTLK...VFR.

NERN...OVC020 TOP 060. VIS 3-5SM BR. 21Z BKN050 TOP 080.

OTLK...VFR.

SE...OVC020 TOP 050. VIS 3-5SM BR. BECMG 1820 BKN025. OTLK...MVFR

CIG.

SW...OVC010 TOP 060. VIS 3-5SM BR. 18Z OVC025. 21Z SCT030.

OTLK...VFR.

.

IL...UPDT

NRN...BKN-OVC020 LYRD FL240. VIS 3-5SM BR. BECMG 1517 SCT100.

OTLK...VFR.

CNTRL...BKN020 TOP 060. VIS 3-5SM BR. BECMG 1820 SCT050 SCT CI.

OTLK...VFR.

SRN...BKN CI. 13Z SCT020 BKN CI. OCNL VIS 3-5SM BR. 20Z SCT050

BKN CI. OTLK...VFR.

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IN

NRN...OVC020 TOP 100. VIS 3-5SM BR. 18Z BKN040 TOP 080 BKN CI.

OTLK...VFR.

SRN...FEW100 BKN CI. 15Z BKN100 TOP 140. OTLK...VFR.

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KY

W...BKN CI. 21Z BKN050 TOP 090. OTLK...VFR.

CNTRL...BKN CI. OTLK...VFR.

E...BKN CI. TIL 15Z OCNL VIS 5SM BR. OTLK...VFR.

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11.0 Terminal Aerodrome Forecast

KCDR was the closest site with a NWS TAF. The TAF valid at the time of the accident was issued at 0754 MDT and was valid for a 22-hour period beginning at 0800 MDT. The TAF for KCDR was as follows:

TAF AMD KCDR 061354Z 0614/0712 03005KT 2SM BR OVC003

FM061600 10008KT P6SM SCT007 OVC020

FM070000 10008KT 5SM -SHRA BKN015 OVC040=

The forecast expected a wind from 100° at 8 knots, greater than 6 miles visibility, scattered clouds at 700 feet agl, and an overcast ceiling at 2,000 feet agl at the time of the accident.

12.0 National Weather Service Area Forecast Discussion

The National Weather Service Office in Cheyenne, Wyoming, issued an Area Forecast Discussion (AFD) at 0704 MDT. The aviation section of the AFD mentioned the areas of dense fog and low cloud ceilings near KCDR and KAIA having slow improvement in conditions through the morning, however, conditions were not expected to improve much above MVFR:

FXUS65 KCYS

AFDCYS

AREA FORECAST DISCUSSION

NATIONAL WEATHER SERVICE CHEYENNE WY

704 AM MDT TUE OCT 6 2015

.UPDATE...

ISSUED AT 649 AM MDT TUE OCT 6 2015

UPDATED THE FORECAST FOR A FEW THUNDERSTORMS THIS MORNING. ALSO CORRECTED THE AFTERNOON AND EVENING FORECAST WHICH SHOULD HAVE HAD A MENTION OF THUNDERSTORMS.

A SMALL AREA OF ELEVATED THUNDERSTORMS HAS DEVELOPED OVER FAR SOUTHEAST WYOMING EARLY THIS MORNING. WEAK ELEVATED THETA E ADVECTION AND MID LEVEL INSTABILITY IS THE DRIVING FACTOR FOR THUNDERSTORMS. THIS ACTIVITY WILL SLOWLY LIFT NORTHWARD OVER THE NEXT FEW HOURS.

FOG REMAINS IN PLACE OVER PORTIONS OF THE AREA THIS MORNING WITH SOME DENSE FOG INTO FAR SOUTHERN NEBRASKA PANHANDLE. FOG WILL LIFT THROUGH THE MORNING HOURS.

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.SHORT TERM...(TODAY THROUGH THURSDAY AFTERNOON)

ISSUED AT 315 AM MDT TUE OCT 6 2015

LOW FOG AND STRATUS REMAINS IN PLACE ACROSS THE PLAINS OF SOUTHEAST WYOMING AND INTO THE NEBRASKA PANHANDLE. THERE IS CURRENTLY AN AREA OF DENSE FOG AROUND SIDNEY NEBRASKA OVER TOWARDS PINE BLUFFS WYOMING. SHOULD THIS AREA OF DENSE FOG EXPAND FURTHER THEN MAY NEED TO ISSUE A DENSE FOG ADVISORY. MOST LIKELY STRATUS WILL INHIBIT FOG DEVELOPMENT OVER THE REST OF THE PLAINS AREA TONIGHT BUT IT WILL BE SOMETHING TO KEEP AN EYE ON.

UPPER LEVEL LOW PRESSURE CONTINUES TO SPIN OVER SOUTHERN CALIFORNIA AT THIS TIME. MID AND UPPER LEVEL MOISTURE IS LIFTING NORTHWARD AHEAD OF THE LOW AND INTO SOUTHEAST WYOMING. CURRENTLY THERE IS VERY LITTLE PRECIPITATION OVER THE FORECAST AREA BUT THAT SHOULD CHANGE THIS AFTERNOON AS AN UPPER LEVEL JET NOSES INTO THE AREA. THERE SHOULD BE ENOUGH MOISTURE AND LIFT FOR AT LEAST SCATTERED SHOWERS AND A FEW WEAK THUNDERSTORMS OVER SOUTHERN PORTIONS OF THE FORECAST AREA. WHILE THE MAIN CHANCES FOR MEASURABLE PRECIPITATION WILL BE IN THE SOUTH A FEW SHOWERS AND THUNDERSTORMS MAY REACH INTO EAST CENTRAL WYOMING AND NORTHERN NEBRASKA PANHANDLE.

NORTHERN STREAM SHORTWAVE TROUGH WILL SLIDE OUT OF CANADA AND INTO THE NORTHERN PLAINS TONIGHT. AS THIS OCCURS WESTERLY WINDS ALOFT WILL START TO PUSH DRIER AIR INTO THE REGION WITH CHANCES FOR PRECIPITATION ENDING FROM WEST TO EAST ACROSS THE AREA. BY LATE WEDNESDAY MORNING THE MAIN CHANCES FOR PRECIPITATION WILL HAVE SHIFTED EAST OF THE AREA. MAY SEE SOME ISOLATED CONVECTION OFF THE MOUNTAINS OF SOUTHEAST WYOMING WEDNESDAY AFTERNOON...BUT OTHERWISE IT SHOULD BE DRY WEDNESDAY AND THURSDAY.

.LONG TERM...(THURSDAY NIGHT THROUGH MONDAY)

ISSUED AT 315 AM MDT TUE OCT 6 2015

A WARM AND DRY WEATHER PATTERN EXPECTED TO AFFECT THE CWA THIS PERIOD AS AN UPPER RIDGE OVER THE WESTERN CONUS EDGES EAST OVER THE AREA WHILE WEAKENING THROUGH SATURDAY...LEAVING A GENERALLY ZONAL FLOW ALOFT FOR SUNDAY THROUGH MONDAY. PLENTY OF SUN COMBINED WITH DOWNSLOPE FLOW WILL ALLOW TEMPS TO WARM TO WELL ABOVE AVERAGE LEVELS OVER THE WEEKEND WITH HIGH SURPASSING 80 DEGREES OVER MANY LOWER ELEVATION AREAS. A WEAK FRONT SHOULD PASS ACROSS LATER SUNDAY AS A SHORTWAVE TREKS EAST ALONG THE CANADIAN BORDER WITH TEMPS A LITTLE COOLER ON MONDAY.

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.AVIATION...(FOR THE 12Z TAFS THROUGH 12Z WEDNESDAY MORNING)

ISSUED AT 315 AM MDT TUE OCT 6 2015

WIDESPREAD STRATUS WITH IFR/LIFR CIGS OVER MANY AREAS EAST OF THE MTNS THIS MORNING WITH AREAS OF DENSE FOG OVER THE SOUTHERN NEB PANHANDLE. EXPECT SLOW IMPROVEMENT DURING THE MORNING HOURS EXCEPT AT KCDR AND KAIA WHERE LOW CIGS SHOULD PERSIST THROUGH TUESDAY NIGHT. AREAS OF RAIN WITH ISOLD TSTRMS EXPECTED TO SPREAD OVER THE AREA THIS AFTERNOON AND CONTINUE INTO THIS EVENING.

&&

.FIRE WEATHER...

ISSUED AT 315 AM MDT TUE OCT 6 2015

NO FIRE WEATHER CONCERNS FOR THE REST OF THIS WEEK AS COOL CONDITIONS AND LIGHT WINDS WILL BE IN PLACE. CHANCES FOR SHOWERS AND THUNDERSTORMS WILL SPREAD ACROSS SOUTHEAST WYOMING TODAY AND THEN INTO THE NEBRASKA PANHANDLE THIS EVENING. CHANCES FOR PRECIPITATION WILL DECREASE FROM WEST TO EAST ACROSS THE AREA LATE TONIGHT. DRY AND MILD FROM WEDNESDAY THROUGH FRIDAY.

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.CYS WATCHES/WARNINGS/ADVISORIES...

WY...NONE.

NE...NONE.

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13.0 Pilot Weather Briefing

A search of official weather briefing sources, such as Lockheed Martin Flight Service (LMFS) and Direct User Access Terminal Service (DUATS), did not reveal the pilot received a weather briefing prior to departure. There is no knowledge of any additional weather briefing information the accident pilot received.

14.0 Ground Witness

There was a witness of the weather conditions around the accident site at the accident time. The ground witness reported that there was light precipitation, mist, fog, and low clouds that obscured the surrounding ridgelines throughout the morning of the accident. Weather conditions improved shortly before noon. It was likely that the weather conditions in the mountainous terrain surrounding the accident site were lower than the observed weather conditions at KCDR and KAIA, and that IFR conditions were prevalent near the accident site, especially within the mountainous terrain. Mist, low cloud ceiling conditions, and mountain obscuration due to clouds likely restricted the forward visibility of the accident flight at the accident time. For more information please see the Memorandum of Conversation located in the docket of this accident.

15.0 Astronomical Data

The astronomical data obtained from the United States Naval Observatory for the accident site on October 6, 2015, indicated the following:

SUN

Begin civil twilight	0627 MDT
Sunrise	0655 MDT
Sun transit	1240 MDT
Sunset	1825 MDT
End civil twilight	1853 MDT

F. LIST OF ATTACHMENTS

None.

Paul Suffern
NTSB, AS-30