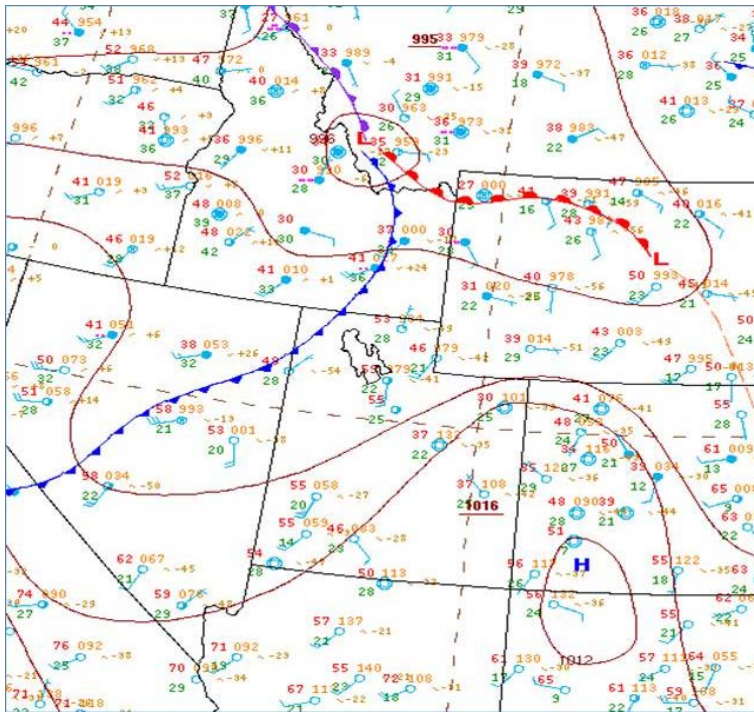


From: [Eick Donald](#)
To: [Nixon Albert](#)
Subject: WPR16FA036 - Hurricane, UT Weather
Date: Wednesday, December 16, 2015 11:40:31 AM
Attachments: [image002.png](#)
[image007.png](#)
[image030.png](#)

Weather conditions on December 10, 2015 in the vicinity of Hurricane, UT regarding Vans Aircraft RV-7, N307AB accident

Synoptic conditions – The National Weather Service (NWS Surface Analysis Chart for 1400 MST (2100Z) on December 10, 2015 centered over the area is included below. The chart depicted a deep low pressure system off the Pacific northwest coast at 968-hectopascals (hPa) associated with an occluded front which extended across northern Washington, Idaho, into Montana to the triple point, where another low pressure center at 995-hPa was located and the front split into a warm front extending eastward and a cold front southward across Idaho into northwest Utah, and across Nevada into central and southern California. A cold core high pressure area was located over southwest Colorado at 1016-hPa. The accident site was located between the cold front to the northwest and the high pressure area to the southwest in an area of strong pressure gradient. The station models ahead of the cold front in Utah and Nevada indicated south-southwesterly winds at 20 to 30 knots, with temperatures in the mid 50's degrees Fahrenheit (F), with dew point temperatures in the teens to 20's F, with the closest station model of Saint George, UT reporting calm wind and clear skies at the time.



A review of the NWS National weather radar mosaic indicated no significant weather echoes across southwestern Utah surrounding the period.

Observations – the surround area was documented utilizing standard NWS METAR/SPECI observations.

The closest weather reporting location to the accident site was from [Saint George Regional Airport \(KSGU\), St. George, Utah](#) located approximately 12 miles west-southwest of the accident site in the valley at an elevation of 2,884 feet. The airport had an Automated Weather Observation System (AWOS), and listed a magnetic variation of 15° E. The following conditions were reported surrounding the period:

METAR KSGU 101955Z 18003KT 10SM CLR 10/M02 A2994 RMK AO1=
METAR KSGU 102015Z 15004KT 10SM CLR 11/M02 A2991 RMK AO1=
METAR KSGU 102035Z 15004KT 10SM CLR 12/M02 A2989 RMK AO1=
Accident 2047Z
METAR KSGU 102055Z 00000KT 10SM CLR 12/M02 A2987 RMK AO1 57047=
METAR KSGU 102115Z 31003KT 10SM CLR 12/M02 A2986 RMK AO1=
METAR KSGU 102135Z 30005KT 10SM CLR 12/M02 A2985 RMK AO1=
METAR KSGU 102155Z 30004KT 10SM CLR 12/M02 A2984 RMK AO1=

The Terminal Aerodrome Forecast (TAF) current at the time was as follows:

TAF KSGU 101736Z 1018/1118 VRB05KT P6SM BKN220
FM102100 24011G18KT P6SM BKN220
FM110200 12010KT P6SM SCT120 BKN180
FM111100 28009KT P6SM VCSH SCT040 BKN060 AMD LTD TO CLD VIS AND WIND=

[Colorado City Municipal Airport \(KAZC\), Colorado City, Arizona](#) was located 21 east-southeast of the accident site at an elevation of 4874 feet. The airport had an AWOS and a magnetic variation 13° E.

The following conditions were reported:

METAR KAZC 101955Z AUTO 00000KT 10SM CLR 15/M04 A2998 RMK AO2 T01541037=
METAR KAZC 102015Z AUTO 00000KT 10SM CLR 15/M04 A2996 RMK AO2 T01541042=
METAR KAZC 102035Z AUTO 00000KT 10SM CLR 16/M04 A2994 RMK AO2 T01581041=
Accident 2047Z
METAR KAZC 102055Z AUTO 00000KT 10SM CLR 16/M04 A2993 RMK AO2 T01601040=

METAR KAZC 102115Z AUTO 00000KT 10SM CLR 16/M04 A2991 RMK AO2 T01641041=
METAR KAZC 102135Z AUTO 00000KT 10SM CLR 16/M04 A2991 RMK AO2 T01631041=
METAR KAZC 102155Z AUTO 00000KT 10SM CLR 16/M05 A2990 RMK AO2 T01611054=
METAR KAZC 102215Z AUTO 02003KT 10SM CLR 16/M05 A2989 RMK AO2 T01591050=
METAR KAZC 102235Z AUTO 02003KT 10SM CLR 16/M05 A2987 RMK AO2 T01561047=

Cedar City Regional Airport (KCDC), Cedar City, Utah was located approximately 36 miles north of the accident site at an elevation 5,622 feet. The airport had an Automated Surface Observation System (ASOS) and reported a magnetic variation of 14° E. The following conditions were reported:

METAR KCDC 101853Z AUTO 22023G31KT 10SM CLR 13/M06 A2988 RMK AO2 PK WND 22032/1840 SLP096 T01281056=
METAR KCDC 101953Z AUTO 21017G26KT 10SM CLR 14/M09 A2984 RMK AO2 PK WND 22031/1912 PRESFR SLP080 T01391094=
Accident 2047Z
METAR KCDC 102053Z AUTO 22021G31KT 10SM CLR 13/M10 A2979 RMK AO2 PK WND 20037/2019 SLP059 T01281100 8033=
METAR KCDC 102153Z AUTO 20022G34KT 10SM CLR 13/M12 A2975 RMK AO2 PK WND 20037/2110 SLP051 T01331117=
SPECI KCDC 102228Z AUTO 21031G42KT 5SM HZ FEW002 14/M13 A2974 RMK AO2 PK WND 21042/2225 T01391128=
METAR KCDC 102253Z AUTO 19038G46KT 10SM CLR 14/M13 A2972 RMK AO2 PK WND 20046/2252 SLP029 T01391128=
METAR KCDC 102353Z AUTO 20022G38KT 10SM CLR 12/M10 A2974 RMK AO2 PK WND 19044/2318 SLP034 T01221100 10144 20111 55015=
METAR KCDC 110053Z AUTO 19025G34KT 10SM CLR 12/M08 A2970 RMK AO2 PK WND 19041/0017 SLP024 T01171078=

A review of the 5-minute ASOS data provided the following data:

METAR KCDC 102140Z AUTO 21026G31KT 10SM CLR 13/M12 A2976 5770 16 6900 200/26G31
METAR KCDC 102145Z AUTO **21020G34KT** 10SM CLR 13/M12 A2976 5780 16 6900 200/20G34
Accident 2047Z
METAR KCDC 102150Z AUTO **21021G34KT** 10SM CLR 13/M12 A2976 5780 16 6900 200/21G34
METAR KCDC 102155Z AUTO **20031G40KT** 10SM CLR 13/M12 A2975 5780 16 6900 190/31G40

The Terminal Aerodrome Forecast (TAF) current at the time was as follows:

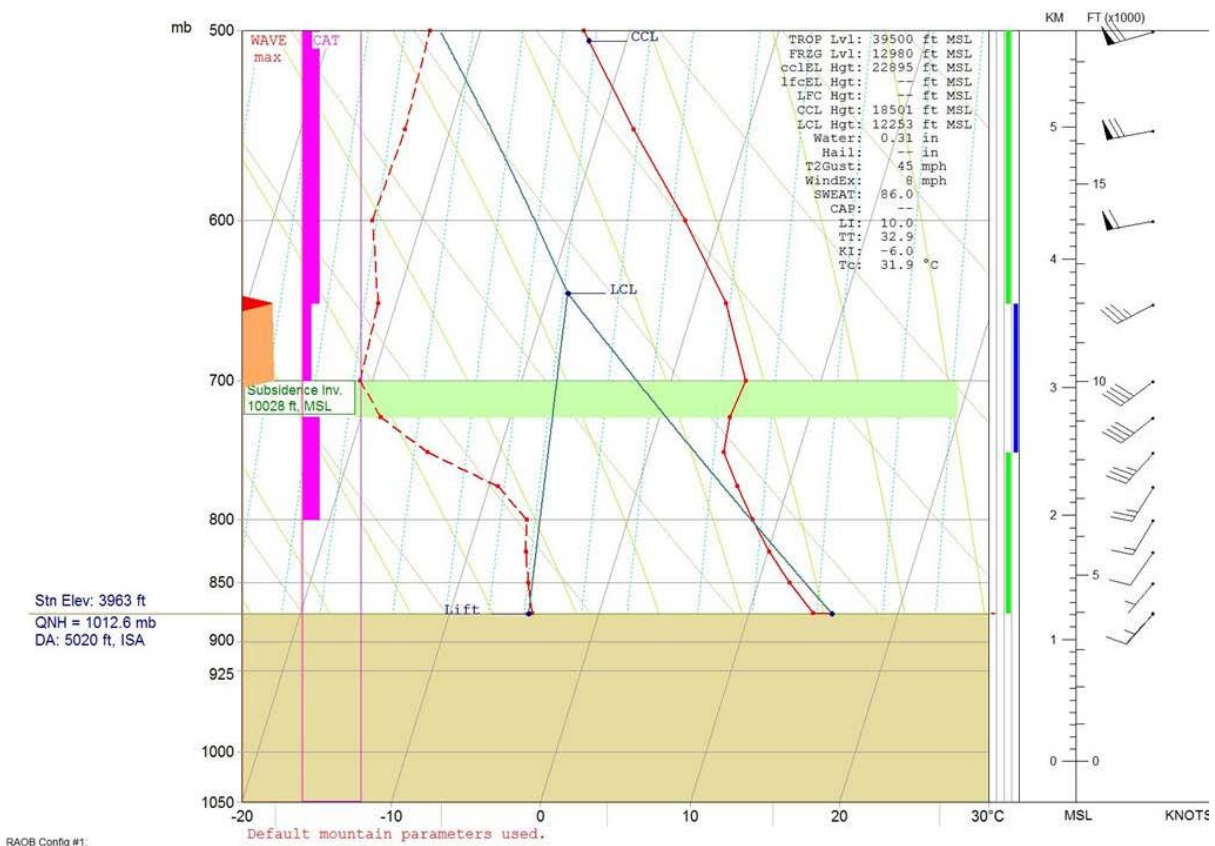
TAF KCDC 101736Z 1018/1118 19009KT P6SM BKN200
FM101900 21024G37KT P6SM BKN200
FM110100 20014G21KT P6SM SCT070 BKN150
FM111200 34010KT 4SM -RASN SCT020 BKN035
FM111600 01008KT P6SM SCT030 BKN050=

- As a general rule wind speeds of 30 knots or more at the surface imply moderate low level turbulence.

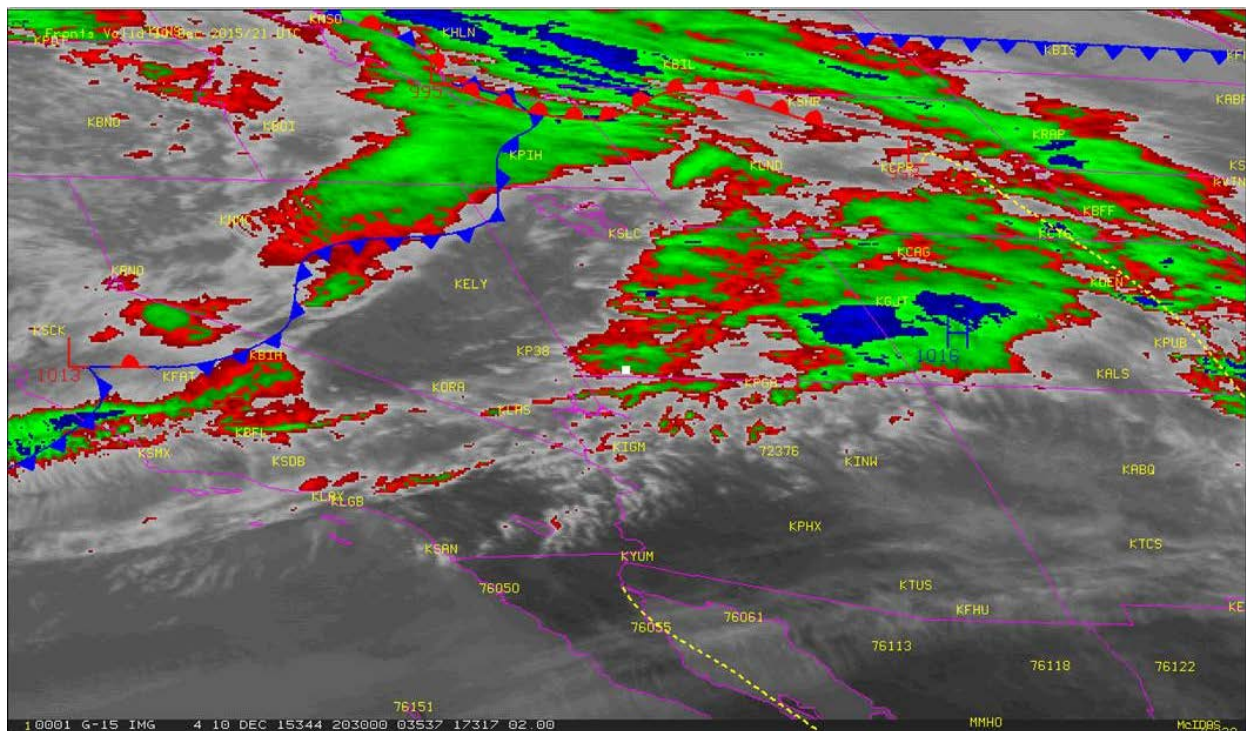
Milford Municipal Airport (KMLF), Milford, Utah located approximately 78 miles north of the accident site at an elevation of 5,042 feet also had an AWOS and reported strong winds during the period:

METAR KMLF 101852Z AUTO 21026G37KT 10SM CLR 11/M03 A2982 RMK AO2 PK WND 21040/1837 SLP083 T01111028=
METAR KMLF 101952Z AUTO 20022G31KT 10SM CLR 13/M04 A2980 RMK AO2 PK WND 20036/1908 SLP069 T01331039=
Accident 2047Z
METAR KMLF 102052Z AUTO 20027G35KT 10SM CLR 13/M07 A2975 RMK AO2 PK WND 19035/2050 SLP058 T01281067 58027=
METAR KMLF 102152Z AUTO 21029G38KT 10SM CLR 14/M08 A2971 RMK AO2 PK WND 21040/2119 SLP038 T01441078=
METAR KMLF 102252Z AUTO 21028G44KT 10SM CLR 13/M08 A2967 RMK AO2 PK WND 21045/2235 SLP025 T01331083=

Sounding – The NOAA Air Resources Laboratory (ARL) North American Mesoscale (NAM) numerical model data was utilized to create a sounding over the accident site for 1400 MST. The model sounding is attached and depicted a cloud free low level environment with the base of any clouds at 8,290 feet agl. The sounding had a relative humidity of 24% at the surface and was stable with a defined temperature inversion at 10,000 feet. The wind profile indicated a surface wind from 220° at 8 knots with winds increasing in speed with height and veering to the west. The mean 0 to 18,000 feet wind was from 250° at 52 knots, with the maximum wind from 260° at 110 knots located at the tropopause at 39,500 feet. The sounding supported mountain wave development from 10,000 to 12,000 feet (orange with wave in red on left diagram) and general light to moderate clear air turbulence from 6,400 through 8,000 feet msl, and at higher altitude (show as purple on left side of sounding).

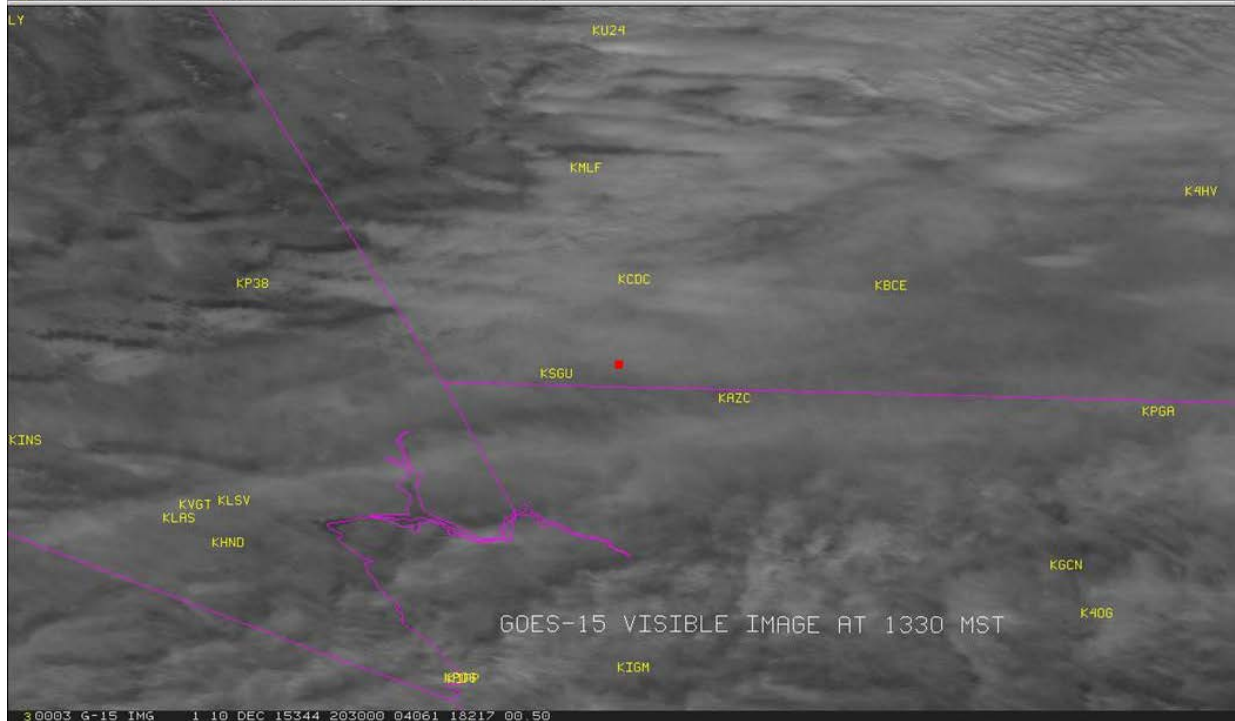
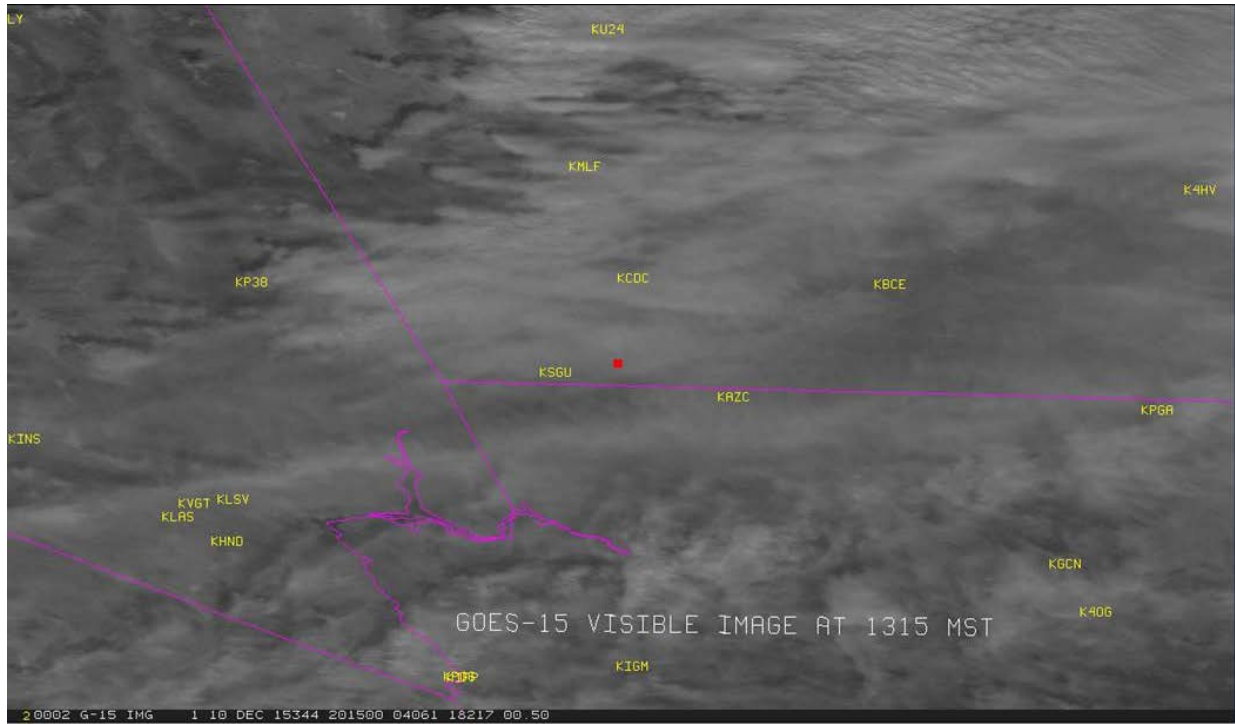


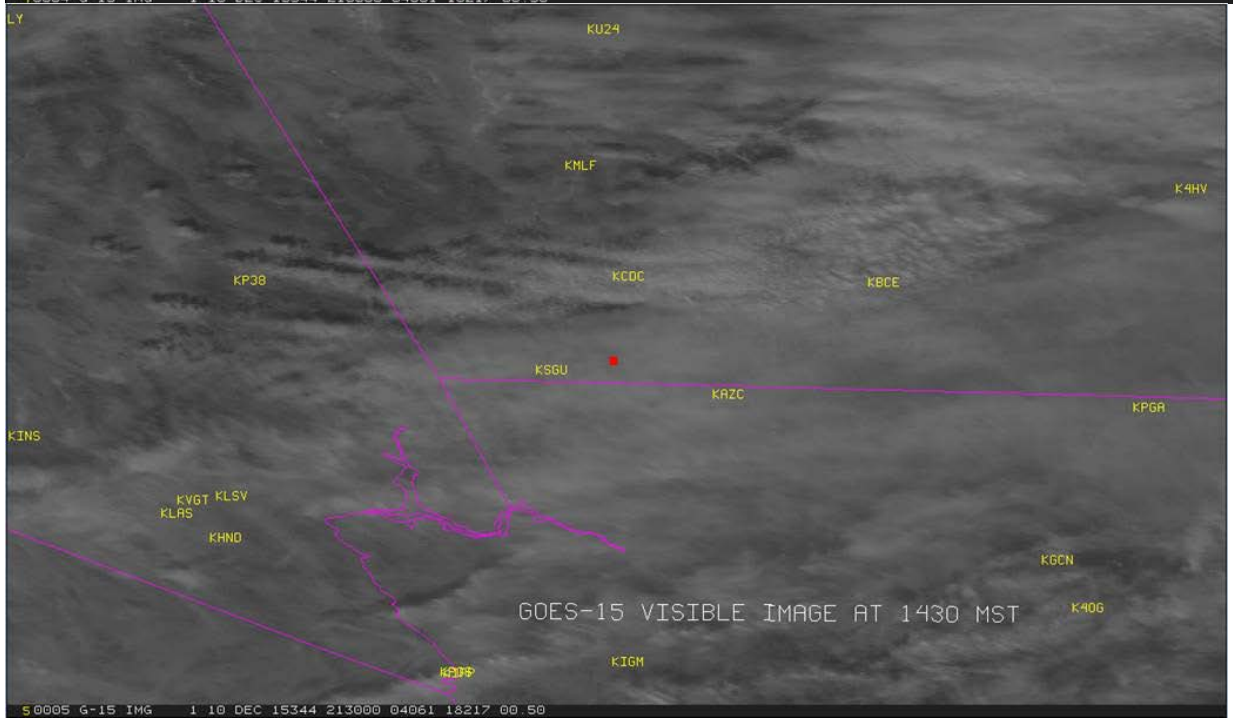
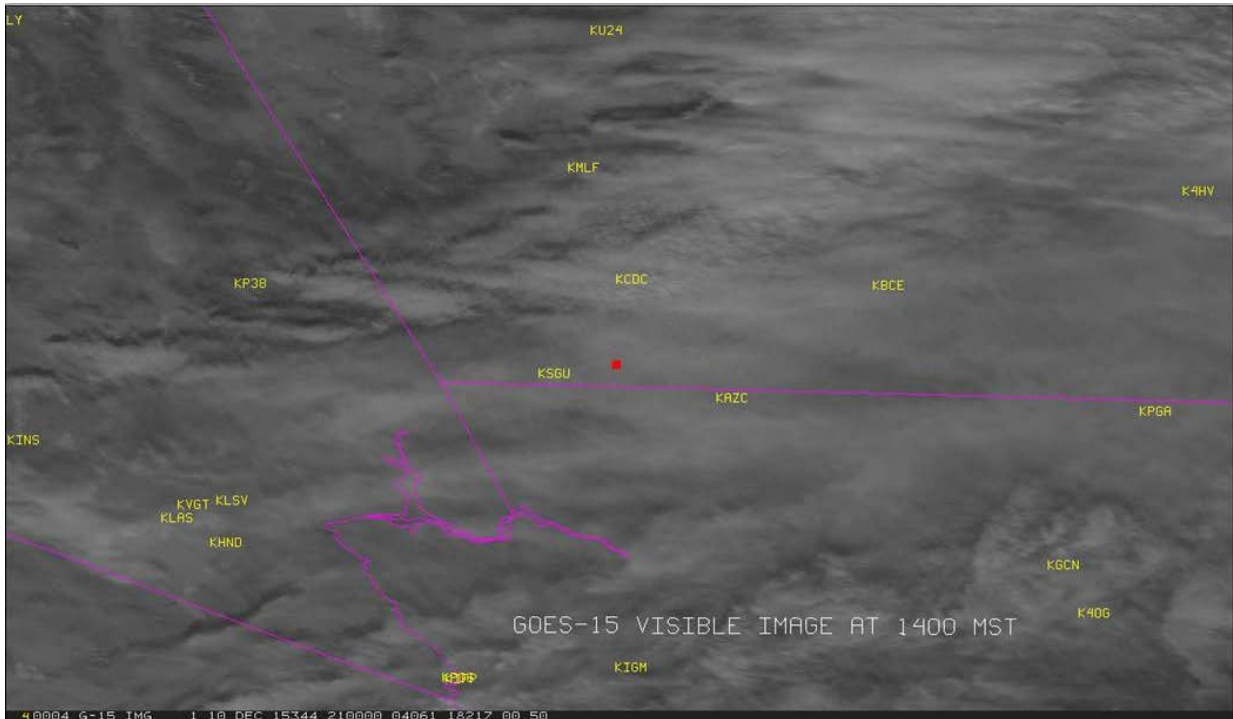
Satellite imagery – The GOES-15 infrared and visible satellite imagery surrounding the period was examined and documented. The GOES-15 infrared image at 1330 MST (2030Z) at 2X magnification and a standard MB temperature enhancement curve applied is included below, with the frontal positions overlaid. The image depicted an enhanced area of clouds over the region associated with high cirriform clouds. The radiative cloud top temperature over the accident site was 232° Kelvin or -41.16° Celsius (C), which corresponded to cloud tops near 31,500 feet.



The GOES-15 visible image at 2X magnification and at 1 kilometer resolution showed several bands of mid-to-high level clouds in the vicinity of the accident site with the higher cirrus clouds overhead. The AWOS/ASOS systems failed to detect the higher clouds as they only report clouds below 12,000 feet. The visible images from 1315 through 1430 MST are provided below. The cloud bands of interest appear to be near 25,000 feet but are aligned in parallel bands suggesting mountain wave conditions or

orographic type clouds and suggest a wave like flow over the accident site.





Pilot Reports (UA/UUA)— the following pilot reports were recorded over Utah surrounding the period:

- SGU UA /OV BLD050065/TM 1551/FL450/TP UNKN/TB MOD CHOP 400/RM MOUNTAIN WAVE +- 50FT ZLAWC AWC-WEB/FAAZLA
- SGU UA /OV MMM/TM 1947/FL065/TP C208/TB MOD CHOP 065/RM DESC 065 INTO 67L-ZLAWC AWC-WEBFAAZLA
- SGU UUA /OV MMM/TM 2024/FL065/TP C208/TB SEV CHOP 065/RM UDDFS +700FT. ZLAWC. AWC-WEBFAAZLA
- SGU UA /OV MMM/TM 2031/FL105/TP C208/TB LGT-MOD 105/RM ZLAWC AWC-WEB:FAAZLA=
- SGU UA /OV MMM075050/TM 2258/FL260/TP C17/TA M25/IC LGT RIME 260/RM LT RIME FL260THRU230 DESCENT ZLAWC AWC-WEB:FAAZLA=

- SLC UA /OV BTF090001 /TM 1857 /FL055 /TP P28A /TB MOD /RM OVR I 15=
- SLC UA /OV TCH 166/025/TM 1920/FL080/TP H/B763/TB MDT 080-170/RM DURING CLIMB=
- SLC UA /OV KSLC/TM 1950/FL150/TP A320/TB MOD CHOP DURC SFC-150/IC NONE=
- SLC UA /OV TCH 180/005/TM 2000/FL062/TP A321/VV 254@65/TB MDT 062-140/IC NEG/RM DURGC=
- SLC UA /OV TCH010010/TM 2131/FL060/TP PA44/TB CONS MOD=
- SLC UUA /OV KSLC235005/TM 2142/FL110/TP CRJ2/TB CONS MOD-OCNL SEV=
- SLC UA /OV 3 MILES NORTH OF SLC/TM 2308/FL080/TP B737/TB CONT MODERATE TURB=
- SLC UUA /OV TCH160008/TM 2346/FL075/TP PC12/TB MOD-SVR TURB/RM BETWEEN 075-065=

The pilot reports noted evidence of mountain wave activity over the regions with moderate –to-severe turbulence noted in the vicinity of the accident site at 6,500 feet msl consistent with the NAM model sounding of CAT.

NWS Area Forecast (FA) – The enroute forecast for the region was as follows:

FAUS45 KKCI 101145
FA5W
-SLCC FA 101145
SYNOPSIS AND VFR CLDS/WX
SYNOPSIS VALID UNTIL 110600
CLDS/WX VALID UNTIL 110000...OTLK VALID 110000-110600
ID MT WY NV UT CO AZ NM
.
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...ALF...11Z STG WLY TO NWLY FLOW ACRS RGN EXCP MDT NWLY FLOW OVER AZ/NM. 06Z STG SWLY FLOW DVLP'S OVER NV/UT/WY/CO. MDT
SWLY FLOW OVER AZ/NM. LGT SELY FLOW OVER NCNTRL-NWRN MT. SFC...STNR FNT FM ECNTRL CO-NERN UT. WRM FNT FM NERN UT-NWRN NV.
BY 06Z CDFNT FM SERN WY-SRN NV. TROUGH ACRS ERN CO/ERN NM. TROUGH FM SERN WY-NCNTRL MT.
.
UT
NRN HLF...BKN CI. AFT 19Z WND S 20G35KT. 23Z OVC140 TOPS FL180. WND SW 20G35KT. OTLK...VFR WND 04Z MVFR CIG SN.
SRN HLF...BKN CI. 21Z WND SW 25G35KT. OTLK...VFR WND.
.
NV
NWRN...BKN CI. WND S G25KT. 14Z SCT-BKN100 BKN CI. VIS 4SM BLDU. ISOL -SHRA. WND SW 25G35KT. 18Z OVC070 TOPS FL220. VIS 5SM -RA.
WND SW 20G30KT. OTLK...MVFR CIG RA WND 02Z VFR RA.
NERN...BKN CI. 16Z VIS 4SM BLDU. WND SW 20G30KT. 21Z OVC070 TOPS FL180. VIS 5SM -RASN. WND SW G25KT. OTLK...MVFR CIG RASN WND 02Z
MVFR CIG SN.
SRN...BKN CI. AFT 22Z WND SW G25KT. OTLK...VFR WND.
AZ
NRN HLF...BKN CI. 19Z WND SW 20G30KT. OTLK...VFR WND.
SWRN...SCT-BKN CI. OTLK...VFR.
SERN...SCT-BKN CI. OTLK...VFR.
.

NWS In-Flight Weather Advisories – A full series of AIRMETS however only AIRMET Tango for moderate turbulence below 18,000 feet current over accident site:

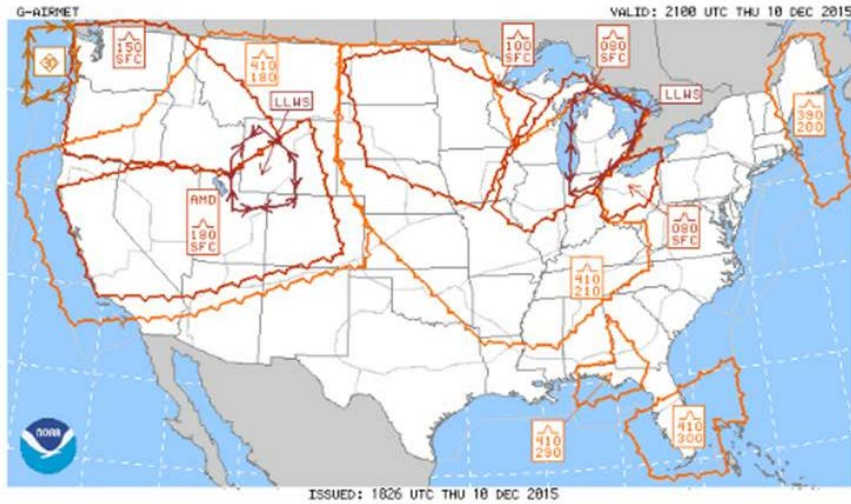
WAUS45 KKCI 101445 2015344 1454
WAS5
-SLCS WA 101445
AIRMET SIERRA UPDT 2 FOR IFR AND MTN OBSCN VALID UNTIL 102100
.
NO SGFNT IFR EXP OUTSIDE OF CNVTV ACT.
.
AIRMET MTN OBSCN...ID MT WY NV UT WA OR CA
FROM 50WSW YXC TO 60ESE YXC TO 20NNE BIL TO 30NNW OCS TO 70W BAM TO 60SSE FMG TO 20ESE EHF TO 20NW CZQ TO 30SW ENI TO 70WNW OED TO 30N TOU TO 20SE YDC TO 50WSW YXC
MTNS OBSC BY CLDS/PCPN/BR. CONDS CONTG BYD 21Z THRU 03Z.
.
OTLK VALID 2100-0300Z...MTN OBSCN ID MT WY NV UT CO AZ WA OR CA
BOUNDED BY YDC-50WSW YXC-60WSW YQL-20NNE BIL-LAR-20NNE JNC-70SSE BAM-40SSE REO-60SSE FMG-70ESE EHF-30WNW SNS-20S FOT-80WNW OED-30NNW TOU-YDC
MTNS OBSC BY CLDS/PCPN/BR. CONDS CONTG THRU 03Z.
....
WAUS45 KKCI 101445 2015344 1445
WASZ
-SLCZ WA 101445
AIRMET ZULU UPDT 2 FOR ICE AND FRZLVL VALID UNTIL 102100
.
AIRMET ICE...ID MT WY NV UT WA OR CA
FROM YDC TO 50WSW YXC TO 30NNW HVR TO 70SSW GGW TO 40ESE BPI TO 50ENE MOD TO 40SE LKV TO YDC
MOD ICE BTN FRZLVL AND FL220. FRZLVL 050-090. CONDS CONTG BYD 21Z THRU 03Z.
.
OTLK VALID 2100-0300Z...ICE ID MT WY NV UT CO WA OR CA
BOUNDED BY YDC-50WSW YXC-50NNE GGW-20W ISN-80SW DIK-60S BIL-70SW DDY-60SW MTU-30N BVL-40ESE BAM-40SE LKV-40E PDT-YDC
MOD ICE BTN FRZLVL AND FL220. FRZLVL 020-090. CONDS CONTG THRU 03Z.
.
FRZLVL...RANGING FROM SFC-155 ACRS AREA
SFC ALG 30ENE GEG-30WSW MLP-20WNW RSK-20ESE RSK-40SW ALS-20WNW PUB-30NNW BFF
SFC ALG 80NW RAP-60ESE MLS-30SW ISN
080 ALG 40WNW DEN-40S CYS-20SE SNY
080 ALG 70SSE FMG-20S BAM-50S TWF-40WSW MLD-40NE SLC
120 ALG 30SSE BTY-50ESE BCE-70WSW RSK-70WNW FTI-20NNW TBE-40ESE LAA
....
WAUS45 KKCI 101856 AAD
WAST
-SLCT WA 101856 AMD
AIRMET TANGO UPDT 7 FOR TURB AND LLWS VALID UNTIL 102100
.
...SEE SIGMET NOVEMBER SERIES...UPDT
...SEE SIGMET WHISKEY SERIES...
...SEE SIGMET XRAY SERIES...
.
AIRMET TURB...ID MT WY NV UT CO AZ NM WA OR CA AND CSTL WTRS
FROM YDC TO 50WSW YXC TO 50NNW ISN TO 70SW RAP TO BFF TO GLD TO 50W LBL TO 30ESE TBE TO 60S EED TO 160SW RZS TO 140WSW FOT TO 160WSW ONP TO YDC
MOD TURB BTN FL180 AND FL410. CONDS CONTG BYD 21Z THRU 03Z.

AIRMET TURB...ID MT WY WA OR CA AND CSTL WTRS
FROM YDC TO 50WSW YXC TO 40E HLN TO 30N BOY TO 50ESE MLD TO 70WSW OED TO 40NNW TOU TO YDC
MOD TURB BLW 150. CONDS CONTG BYD 21Z THRU 03Z.

AIRMET TURB...WY CO...UPDT
FROM 70SW RAP TO BFF TO GLD TO 50W LBL TO 40SE DBL TO 20SW DDY TO 70SW RAP
CANCEL AIRMET. CONDS HV ENDED.

AIRMET TURB...ID MT WY NV UT CO AZ NM OR CA AND CSTL WTRS...UPDT
FROM 40ENE SHR TO 20NNE TBE TO EED TO 40WSW RZS TO 40SSW FOT TO 70WSW OED TO 50ESE MLD TO 40ENE SHR
MOD TURB BLW FL180. CONDS CONTG BYD 21Z THRU 03Z.

LLWS POTENTIAL...ID MT WY NV UT CO OR CA
BOUNDED BY 60WSW HLN-60NNW BOY-50ESE CHE-20SSE ELY- 50SE OAL-40NE CZQ-40SE RBL-40NNW REO-90SSE GEG-60WSW HLN
LLWS EXP. CONDS CONTG BYD 21Z THRU 03Z.



SIGMETs issued during the period, none extended over the accident site:

WSUS05 KKCI 101857 2015344 1856
WSSN
-SLCN WS 101857
SIGMET NOVEMBER 1 VALID UNTIL 102257
WY CO
FROM 40E DDY TO 40NE PUB TO 30ESE HBU TO 60NE OCS TO 40E DDY
OCNL SEV TURB BLW 150. DUE TO STG LOW LVL WINDS. RPTD BY PA46 AND TG16. CONDS CONTG BYD 2257Z.

WSUS05 KKCI 101833 2015344 1832
WSSW
-SLCW WS 101833
SIGMET WHISKEY 2 VALID UNTIL 102233
NV UT AZ CA
FROM 40SSW BVL TO 30S TBC TO 40NE LAX TO 40S CZQ TO 40NW FMG TO 40SSW BVL
OCNL SEV TURB BTN FL290 AND FL410. DUE TO WNDSHR ASSOC'D WITH JTST. RPTD BY GLF5. CONDS CONTG BYD 2233Z.

WSUS05 KKCI 101823 2015344 1823
WSSX
-SLCX WS 101823
SIGMET XRAY 1 VALID UNTIL 102223
NV CA
FROM 30NW BAM TO 60SSW ILC TO 40NNE EHF TO 20NNE RBL TO 30NW BAM
OCNL SEV TURB BLW 140. DUE TO STG LOW LVL WINDS. RPTD BY C550. CONDS CONTG BYD 2223Z.

Center Weather Advisory:

FAUS21 KZLC 101654 2015344 1654
ZLC1 CWA 101700
ZLC CWA 102 VALID UNTIL 101800
FROM 30E DLN-15NE MLD-50SE REO-25NW DNJ-30E DLN
AREA MOD TO ISOL SEV TURB. FL080-140. ASSOCIATED WITH COLD FRONT
MOVING WEST TO EAST, EXPECT CONDITIONS TO TRANSIT EAST WITH FRONT.

FAUS22 KZLC 102156 2015344 2156
ZLC2 CWA 102155
ZLC CWA 201 VALID UNTIL 102355
SLC
AREA...DIAM 30NM...MOD OCNL SEV TURB BLW FL180. SEV TURB RPRT BYCRJ2...5MI SSW OF SLC AT 110.

Winds and Temperature Aloft Forecast (FD) – winds for 12,000 feet was the lowest level provided and were from 250° at 46 knots with a temperature +1° C.

WINDS ALOFT FORECASTS
DATA BASED ON 101800Z
VALID 110000Z FOR USE 2000-0300Z. TEMPS NEG ABV 24000
FT 3000 6000 9000 12000 18000 24000 30000 34000 39000
BCE - - - 2546+01 2680-13 2588-26 760442 269751 750462

Donald E. Eick
Senior Meteorologist
National Transportation Safety Board
Office of Aviation Safety
Operational Factors Division (AS-30)
[REDACTED]
Washington, D.C. 20594-2000
[REDACTED]
[REDACTED]

