National Transportation Safety Board

Office of Aviation Safety

Washington, D.C. 20594-2000

July 12, 2011

WEATHER STUDY

WPR11FA302

A. Accident

Location: Lone Pine, California
Date: July 2, 2011
Time: approximately 1219 Pacific daylight time (1919 UTC[1])
Aircraft: Schleicher ASW-20, Registration: N838KS

B. Meteorological Specialist

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

C. Summary

Glider impacted mountainous terrain under vfr conditions.

[1] UTC – is an abbreviation for Coordinated Universal Time.

D. Details of Investigation

The National Transportation Safety Board's (NTSB) Meteorologist was not on scene for this investigation and gathered all relevant weather data from the Washington D.C. office from official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources including the National Climatic Data Center (NCDC). All times are Pacific daylight time (PDT) on July 2, 2011, and are based upon the 24-hour clock, where local time is -7 hours from UTC, and UTC=Z. Directions are referenced to true north and distances are 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 site was located at latitude 36.48° N, longitude 118.09° W; elevation: 7,478 feet.

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) located in Camp Springs, 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-0045G CHG 1.

1.1 Surface Analysis Chart

The NWS Surface Analysis Chart for 1100 PDT is provided as figure 1, with the approximate location of the accident site marked. The chart depicted a low pressure system in southeastern California with a surface inverted trough[2] to the west of accident site that stretched north to south in the Central Valley of California. The station models in the vicinity of the accident site depicted temperatures in the low 90's Fahrenheit (F) to upper 70's F, with temperature-dew point spreads of 29° F or more, light and variable winds, and mostly clear skies.

[2] Trough - An elongated area of relatively low atmospheric pressure or heights.

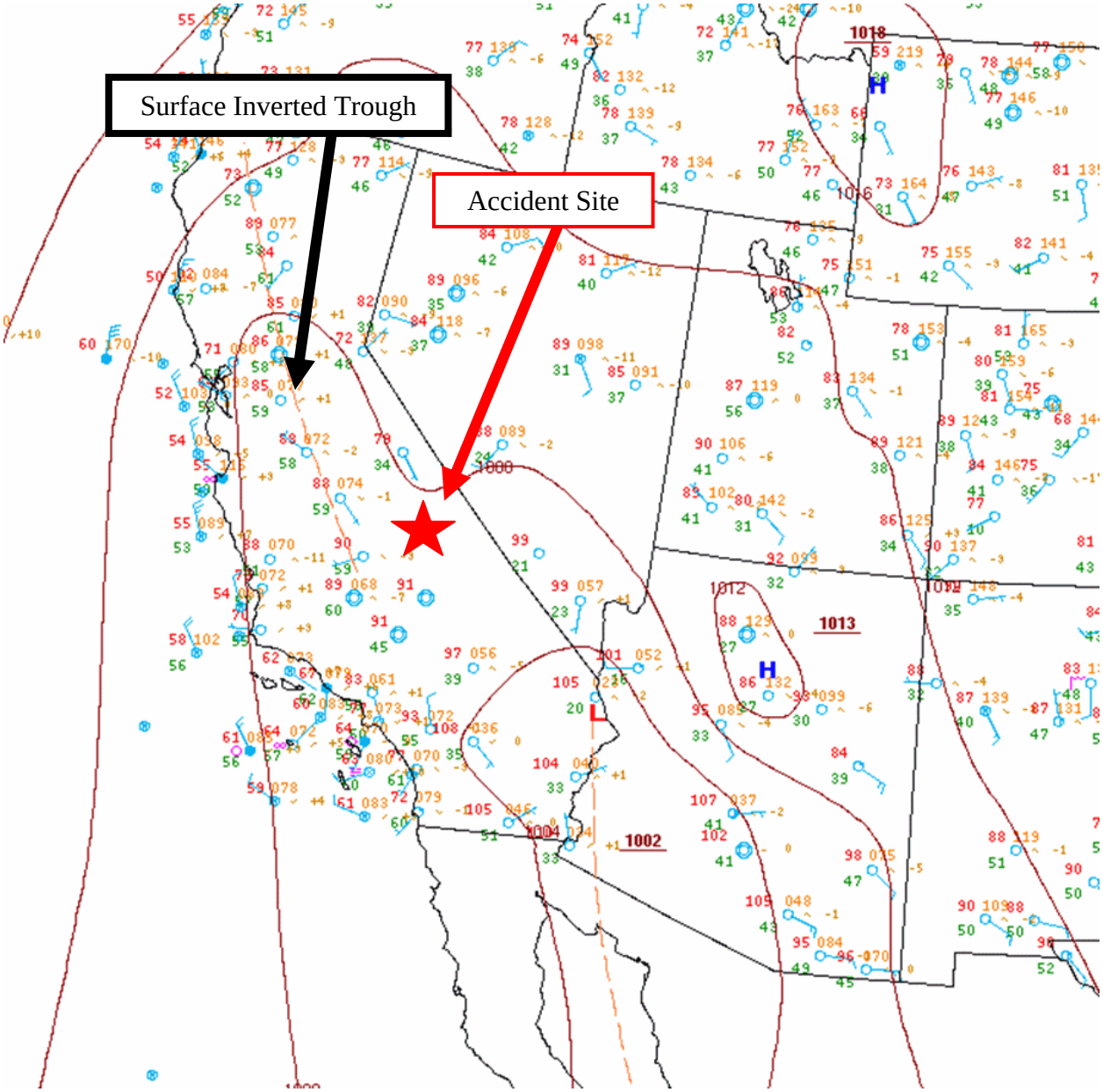

Figure 1 – NWS Surface Analysis Chart for 1100 PDT

1.2 Upper Air Charts

The NWS Storm Prediction Center (SPC) archive Constant Pressure Charts for 1700 PDT are presented for 700-, 500-, and 300-hectopascals (hPa) in figures 2 through 4. The charts depicted a very weak wind flow pattern above the accident site from 700-hPa through 300-hPa with the closest upper air sounding at Las Vegas retrieving a southwest wind of 20 knots at 700-hPa and weaker winds at 500-hPa and 300-hPa. Given the mid- and upper-level wind pattern and the location of the Sierra Nevada Mountain Range, the accident site was not in a favorable location for mountain wave activity or mountain wave turbulence.

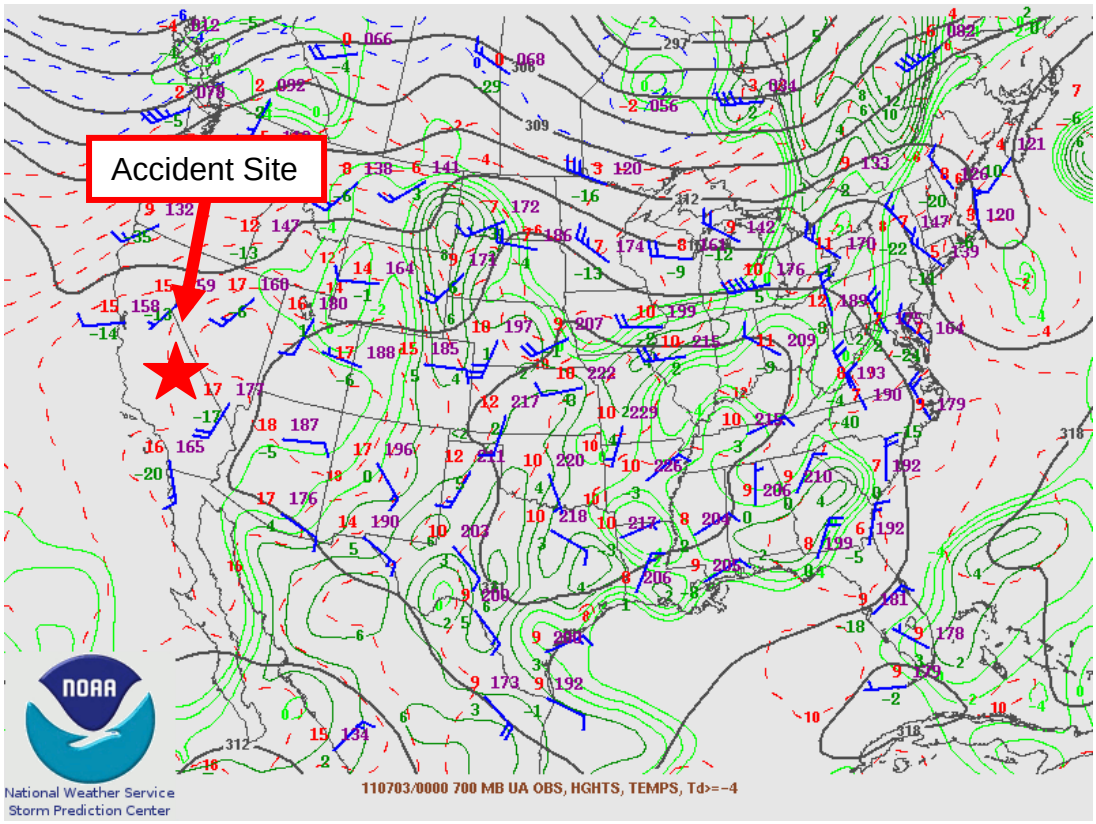

Figure 2 – 700-hPa Constant Pressure Charts for 1700 PDT

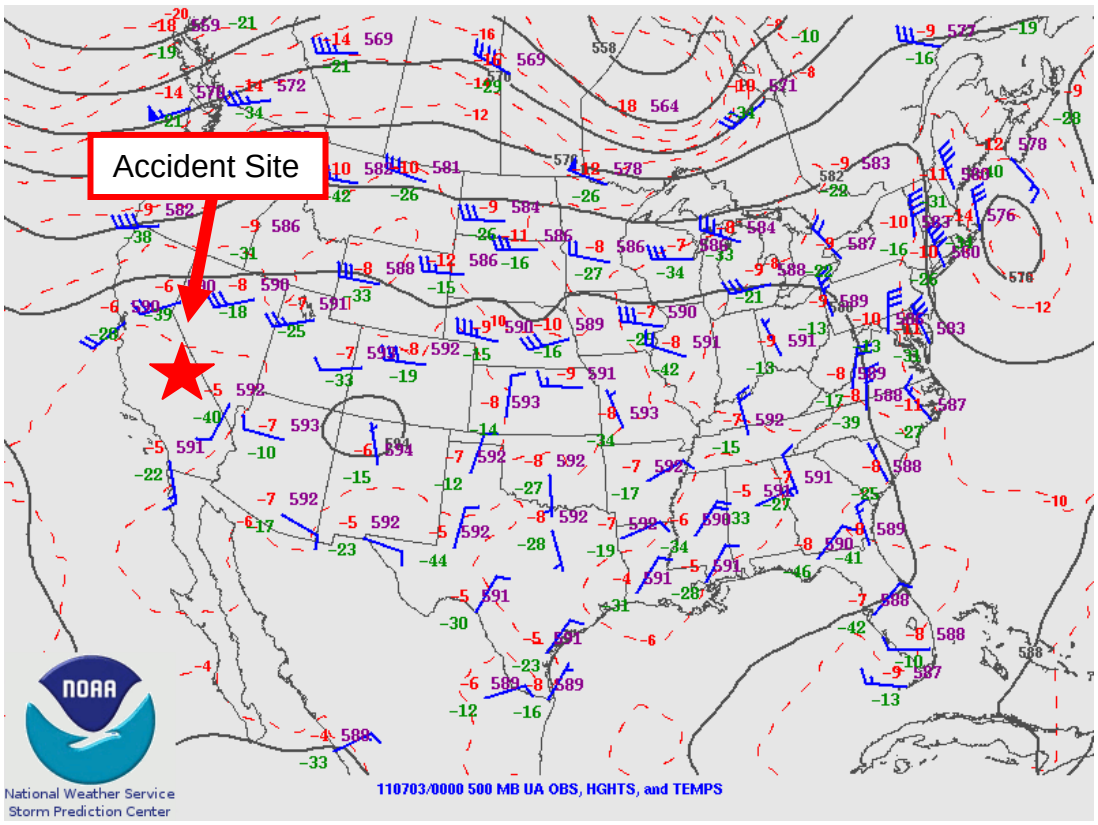

Figure 3 – 500-hPa Constant Pressure Charts for 1700 PDT

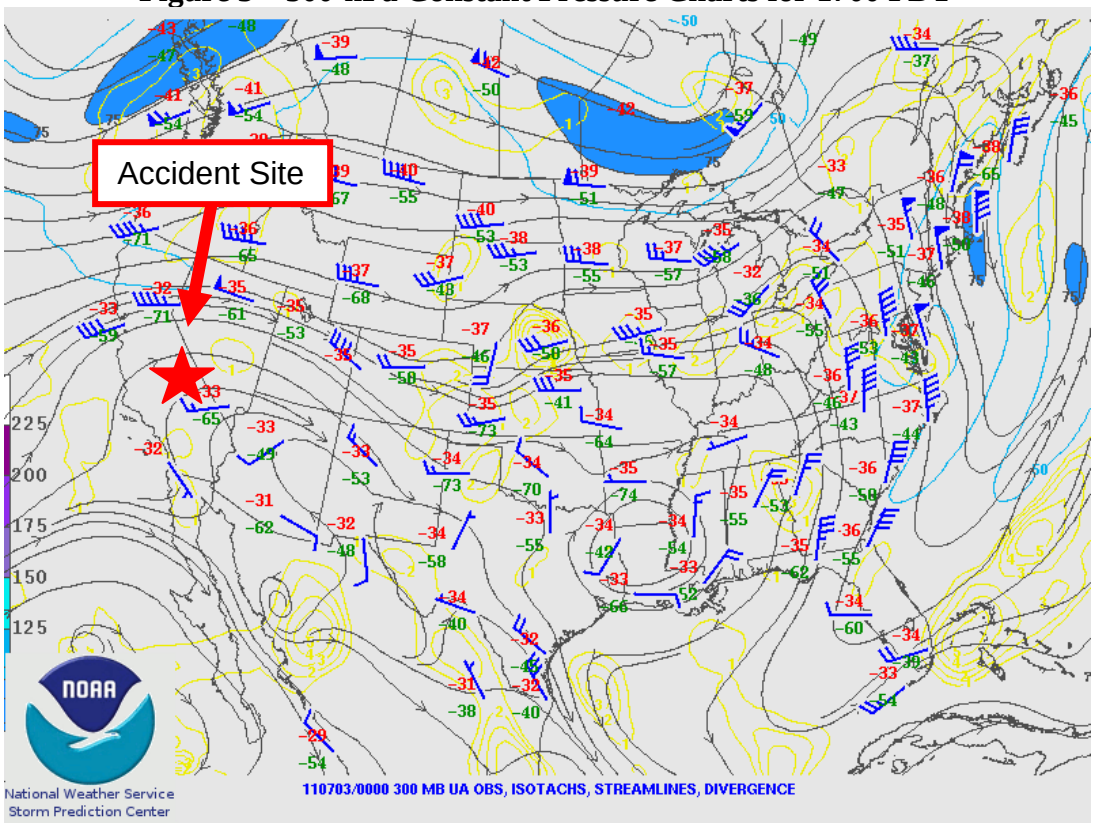

Figure 4 – 300-hPa Constant Pressure Charts for 1700 PDT

2.0 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, with cloud heights reported above ground level (agl).

The closest weather reporting to the accident site was from an Automated Weather Observing System (AWOS[3]) located at China Lake Naval Air Weapons Station (KNID) 3 miles northwest of China Lake, California. These observations were taken from automated equipment and were not supplemented by a human observer. KNID was located approximately 52 miles south-southeast of the accident site (shown in figure 5) at an elevation of 2,283 feet, and had a 14° easterly magnetic variation[4]. The following observations were disseminated around the time of the accident:

[3] AWOS – Automated Weather Observing System is equipped with meteorological instruments to observe and report temperature, dewpoint, wind speed and direction, visibility, cloud coverage and ceiling up to twelve thousand feet, and altimeter setting.
[4] Magnetic variation – The angle (at a particular location) between magnetic north and true north.

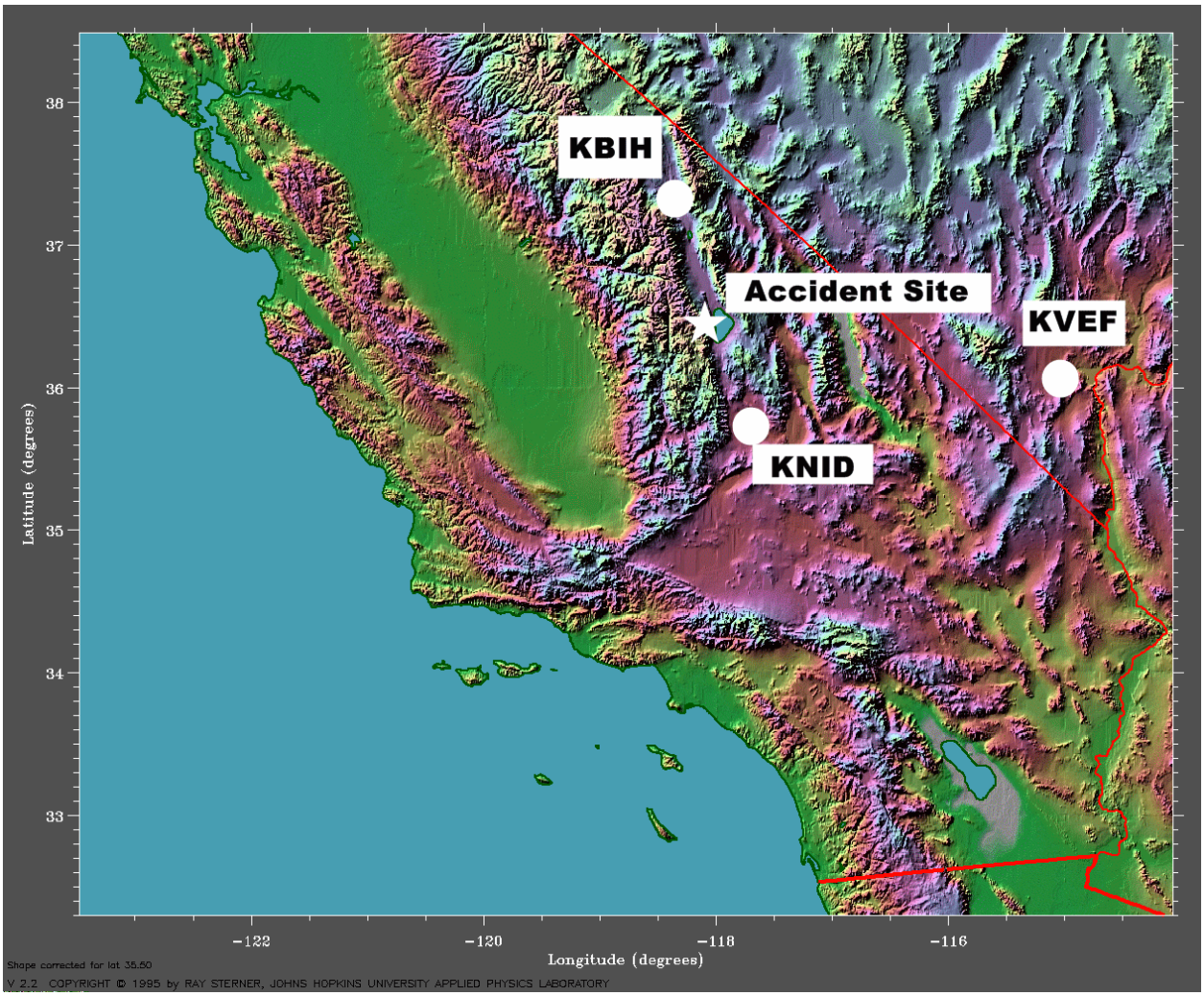

Figure 5 – Topography with NWS METAR stations

[0956 PDT] KNID 021656Z AUTO 00000KT 10SM CLR 33/06 RMK AO2 SLPNO T03330056 TSNO $

[1056 PDT] KNID 021756Z AUTO 03003KT 10SM CLR 37/04 RMK AO2 SLPNO T03670039 10367 20183 TSNO $

[1156 PDT] KNID 021856Z AUTO VRB03KT 10SM CLR 39/03 RMK AO2 SLPNO T03890028 TSNO $

Accident Time 1219 PDT

[1256 PDT] KNID 021956Z AUTO 31003KT 10SM CLR 39/M01 RMK AO2 SLPNO T03941006 TSNO $

[1356 PDT] KNID 022056Z AUTO VRB04KT 10SM CLR 42/M02 RMK AO2 SLPNO T04171017 TSNO $

[1456 PDT] KNID 022156Z AUTO VRB04KT 10SM CLR 42/M02 RMK AO2 SLPNO T04171022 TSNO $

At 1056 PDT, KNID reported wind from 030° at 3 knots, 10 miles visibility, clear skies below 12,000 feet, temperature of 37° Celsius (C), dew point temperature of 4° C. Remarks: station with a precipitation discriminator, sea-level pressure not currently available, temperature 36.7° C, dew point temperature 3.9° C, 6-hourly maximum temperature 36.7° C, 6-hourly minimum temperature 18.3° C, no thunderstorm detector, maintenance is needed on the system.

At 1156 PDT, KNID reported a variable wind at 3 knots, 10 miles visibility, clear skies below 12,000 feet, temperature of 39° C, dew point temperature of 3° C. Remarks: station with a precipitation discriminator, sea-level pressure not currently available, temperature 38.9° C, dew point temperature 2.8° C, no thunderstorm detector, maintenance is needed on the system.

At 1256 PDT, KNID reported wind from 310° at 3 knots, 10 miles visibility, clear skies below 12,000 feet, temperature of 39° C, dew point temperature of -1° C. Remarks: station with a precipitation discriminator, sea-level pressure not currently available, temperature 39.4° C, dew point temperature -0.6° C, no thunderstorm detector, maintenance is needed on the system.

Another weather reporting station north of the accident site was an Automated Surface Observing System (ASOS[5]) located at Eastern Sierra Regional Airport (KBIH) 2 miles east of Bishop, California. These observations were taken from automated equipment and were not supplemented by a human observer. KBIH was located approximately 55 miles north-northwest of the accident site (figure 5) at an elevation of 4,124 feet, and had a 15° easterly magnetic variation. The following observations were disseminated around the time of the accident:

[0956 PDT] KBIH 021656Z AUTO 00000KT 10SM CLR 29/04 A2996 RMK AO2 SLP086 T02940044 TSNO

[1056 PDT] KBIH 021756Z AUTO VRB04KT 10SM CLR 33/03 A2995 RMK AO2 SLP083 T03280033 10328 20122 58008 TSNO

[1156 PDT] KBIH 021856Z AUTO 16015G21KT 10SM CLR 36/01 A2993 RMK AO2 SLP074 T03610011 TSNO

Accident Time 1219 PDT

[1256 PDT] KBIH 021956Z AUTO 16015G23KT 10SM CLR 37/M01 A2992 RMK AO2 SLP074 T03721011 TSNO

[1356 PDT] KBIH 022056Z AUTO 17014G21KT 10SM CLR 38/M03 A2990 RMK AO2 SLP068 T03781028 58016 TSNO

[1456 PDT] KBIH 022156Z AUTO 18010G19KT 10SM CLR 39/M02 A2988 RMK AO2 SLP062 T03891022 TSNO

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

At 1056 PDT, KBIH reported a variable wind at 4 knots, 10 miles visibility, clear skies below 12,000 feet, temperature of 33° C, dew point temperature of 3° C, and an altimeter setting of 29.95 inches of mercury. Remarks: station with a precipitation discriminator, sea-level pressure of 1008.3 hPa, temperature 32.8° C, dew point temperature 3.3° C, 6-hourly maximum temperature 32.8° C, 6-hourly minimum temperature 12.2° C, 3-hourly pressure decrease of 0.8 hPa, lightning detection system not operating.

At 1156 PDT, KBIH reported wind from 160° at 15 knots with gusts to 21 knots, 10 miles visibility, clear skies below 12,000 feet, temperature of 36° C, dew point temperature of 1° C, and an altimeter setting of 29.93 inches of mercury. Remarks: station with a precipitation discriminator, sea-level pressure of 1007.4 hPa, temperature 36.1° C, dew point temperature 1.1° C, lightning detection system not operating.

At 1256 PDT, KBIH reported wind from 160° at 15 knots with gusts to 23 knots, 10 miles visibility, clear skies below 12,000 feet, temperature of 37° C, dew point temperature of -1° C, and an altimeter setting of 29.92 inches of mercury. Remarks: station with a precipitation discriminator, sea-level pressure of 1007.4 hPa, temperature 37.2° C, dew point temperature -1.1° C, lightning detection system not operating.

Observations from KNID and KBIH indicated clear skies and warming surface temperatures. Wind magnitudes increased dramatically at the surface from 1056 to 1156 PDT at KBIH due to the warming surface temperatures and the developing valley breeze circulation[6].

3.0 Satellite Data

Visible imagery data from the Geostationary Operational Environmental Satellite number 11 (GOES-11) was obtained from the NCDC and processed with the NTSB's Man-computer Interactive Data Access System (McIDAS) workstation. Visible imagery (GOES-11, band 1), at a wavelength of 0.65 microns (μm), retrieved brightness temperatures for the scene. Satellite imagery surrounding the time of the accident, from 1000 PDT through 1400 PDT, at approximately 15-minute intervals, were reviewed and the closest image to the time of the accident are documented here.

Figure 6 presents the GOES-11 visible imagery from 1215 PDT at 2X magnification with the accident site highlighted with a red square. The visible image shows no cloud cover over the accident site at the accident time.

[6] Valley breeze circulation – The valley air warms rapidly and rises along the mountain slope to form the valley breeze. Surface winds also increase flowing in an up valley direction. In this case the winds flowed up valley from KNID to KBIH.

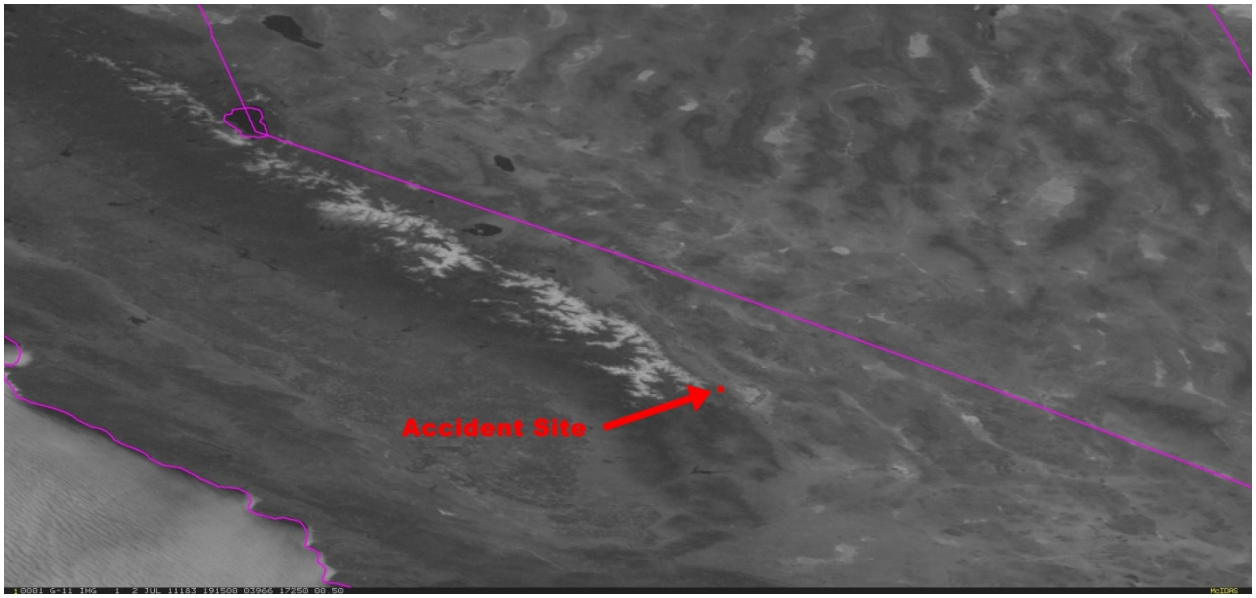

Figure 6 – GOES-11 visible image at 1215 PDT

4.0 Upper Air Sounding Data

The closest upper air sounding to the accident site was from Las Vegas, Nevada (KVEF) (figure 5), site number 72388, located 143 miles east-southeast of the accident site with a station elevation of 2,470 feet. The 1700 PDT sounding from KVEF was plotted on a standard Skew-T log P diagram[7] with the derived stability parameters included in figure 7 (with data from the surface to 400-hPa, or 25,000 feet). These data were analyzed utilizing the RAOB[8] software package. The sounding depicted a Lifted Condensation Level (LCL)[9] at 20,419 feet and a Convective Condensation Level (CCL)[10] at 27,951 feet. The freezing level was identified at about 17,500 feet. The precipitable water value was 0.27 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, Matamopras, 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.

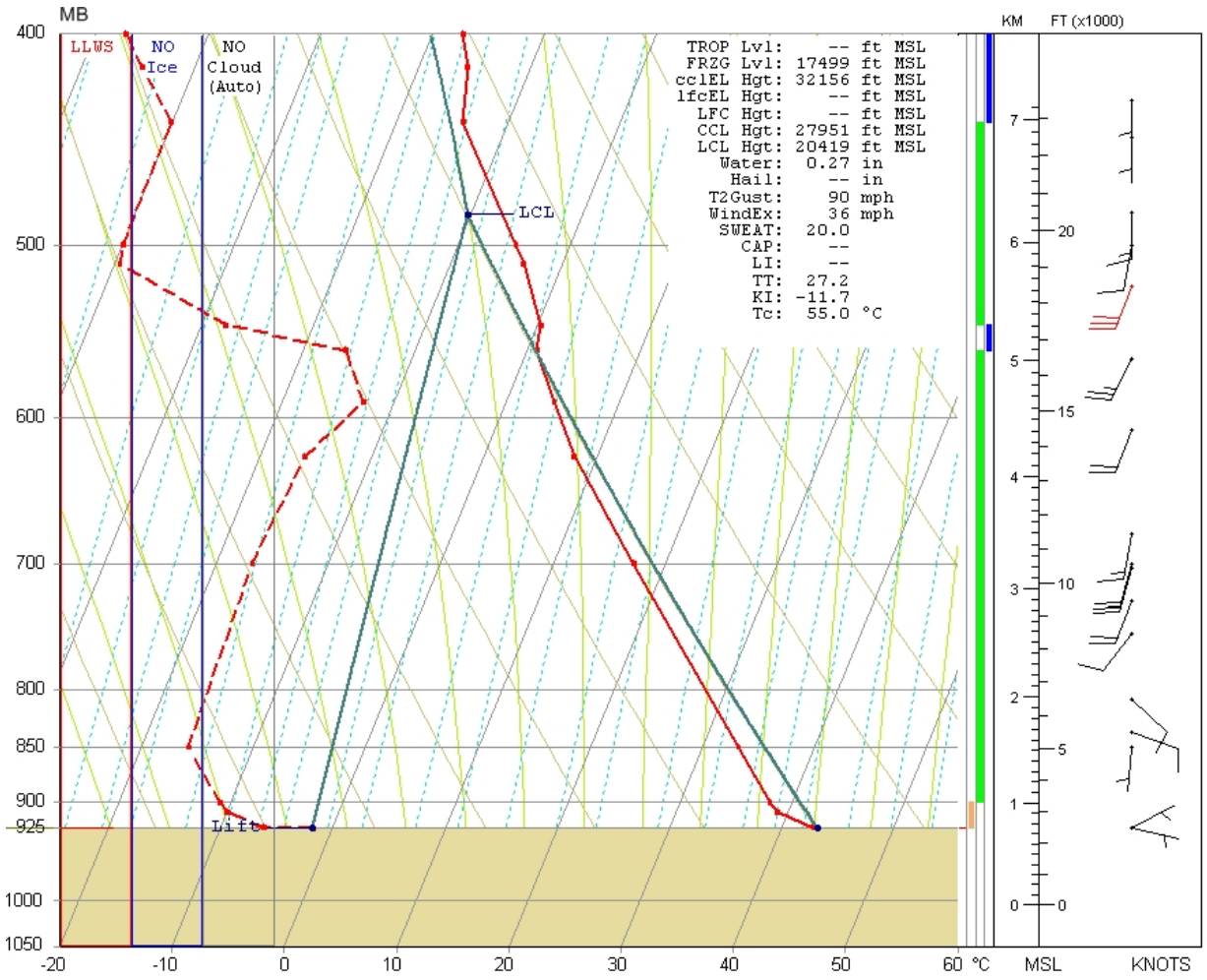

Figure 7 – KVEF 1700 PDT sounding

The KVEF sounding indicated a dry environment from the surface to 25,000 feet msl, which would not support any clouds. No layers of clouds or icing conditions were identified by RAOB.

The sounding wind profile indicated a surface wind from 060° at 5 knots with the wind remaining light and variable from the surface to 7,000 feet. From 7,000 feet through 18,000 feet the wind became southwesterly and increased to 30 knots at 18,000 feet. No Low-level wind shear (LLWS) was identified by RAOB. The KVEF sounding was conditionally unstable from the surface through 17,000 feet. These conditions would have been conducive for the strong surface wind indicated at KBIH (Section 2.0) to mix vertically in the atmosphere to 17,000 feet near mountainous terrain. Such a situation could be supportive for enhanced orographic turbulence and the formation of thermals.

5.0 Pilot Reports

Pilot reports (PIREPs) were reviewed from two hours before the accident time to two hours after the accident time and the PIREPs closest to the accident site are provided:

BIH UA /OV BIH /TM 1728 /FL125 /TP BE35 /TB NEG /RM SMOOTH=

NLC UA /OV NLC /TM 1734 /FL095 /TP C72R /SK SKC /WX HZ /TB NEG=

VIS UA /OV VIS /TM 2004 /FL125 /TP C210 /WX FV99SM /WV 07808KT /TB NEG /RM LGT HZ=

FAT UA /OV CMA-FAT /TM 2015 /FL085 /TP C177 /WX FV99SM /TA 15 /WV 13510KT /TB NEG /RM LGT HZ BLO 065=

Routine pilot report (UA); Over – Bishop, CA (BIH); Time – 1028 PDT (1728Z); Altitude – 12,500 feet; Type aircraft – Beech Bonanza Model 35 (BE35); Turbulence – Negative; Remarks – Smooth.

Routine pilot report (UA); Over – Lemoore, CA (NLC); Time – 1034 PDT (1734Z); Altitude – 9,500 feet; Type aircraft – Cessna 172 (C72R); Sky – Clear; Weather – Hazy; Turbulence – Negative.

Routine pilot report (UA); Over – Visalia, CA (VIS); Time – 1304 PDT (2004Z); Altitude – 12,500 feet; Type aircraft – Cessna 210 (C210); Visibility – Unrestricted; Wind – From 078° at 8 knots; Turbulence – Negative; Remarks – Light haze.

Routine pilot report (UA); From Camarillo, CA to Fresno, CA; Time – 1315 PDT (2015Z); Altitude – 8,500 feet; Type aircraft – Cessna 177 (C177); Visibility – Unrestricted; Temperature – 15° C; Wind – From 135° at 10 knots; Turbulence – Negative; Remarks – Light haze below 6,500 feet.

6.0 AIRMETs

No SIGMETs were active for California at the time of the accident.

No AIRMETs were active for the accident site at the accident time.

7.0 Terminal Aerodrome Forecast

The closest Terminal Aerodrome Forecast (TAF) reporting location to the accident was KBIH. The TAF obtained for the accident time was issued at 1020 PDT and valid for a 24-hour period beginning at 1100 PDT. The TAF[11] forecast for KBIH was as follows:

KBIH 021720Z 0218/0318 VRB05KT P6SM SKC
FM021900 16012G29KT P6SM SKC
FM030400 15009KT P6SM SKC
FM030700 29004KT P6SM SKC=

[11] Terminal Aerodrome Forecast (TAF) – TAFs apply to a five statute mile radius from the center of the airport runway complex.

The forecast valid at 1200 PDT expected wind from 160° at 12 knots with gusts to 29 knots, visibility greater than 6 miles, and clear skies.

8.0 Area Forecast

At 0345 PDT the following Area Forecast was issued and discussed expected flying weather conditions across California, Oregon, and Washington. The Area Forecast for southern Sierra Nevada Mountain Range, including the accident site, forecasted clear skies through 1300 PDT with occasional clouds at 15,000 feet after 1300 PDT:

FAUS46 KKCI 021045
FA6W
_SFOC FA 021045
SYNOPSIS AND VFR CLDS/WX
SYNOPSIS VALID UNTIL 030500
CLDS/WX VALID UNTIL 022300...OTLK VALID 022300-030500
WA OR CA AND CSTL WTRS
.
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..LRG HI PRES OVR NERN AZ THRU 05Z. BY 05Z TROF WL MOV OVR WA/OR WTRS. SFC..TROF OVR CNTRL WA/OR THRU 05Z. BY 00Z CDFNT WL MOV SLOLY OVR WA/NRN OR OFFSHORE WTRS.
.
WA CASCDS WWD
CSTL SXNS...SCT015 SCT CI. 13Z BKN010 TOP 025. 15Z SCT-BKN020 TOP 040. 20Z SCT025 SCT CI. OTLK...VFR 02Z MVFR CIG 04Z IFR.
PUGET SOUND-INTR VLY...SKC OR SCT CI. TIL 15Z SRN PTN OCNL VIS 3-5SM BR. OTLK...VFR.
OLYMPICS-CASCDS...SCT CI. 20Z SCT080-100 SCT CI. OTLK...VFR 03Z OLYMPICS MVFR CIG.
.
WA E OF CASCDS
SCT CI. SRN PTN OCNL SKC. OTLK...VFR.
.
OR CASCDS WWD
CSTL SXNS...BKN010-020 TOP 030. OCNL VIS 3-5SM BR. BECMG 1517 SCT CI. OTLK...VFR 04Z IFR CIG BR.
WILLAMETTE VLY...SKC. TIL 13Z NRN PTN OCNL SCT100. TIL 16Z XTRM SRN OCNL VIS 3-5SM BR. 20Z SCT CI. OTLK...VFR.
SWRN INTR...SCT-BKN030 TOP 050. OCNL VIS 3-5SM BR. BECMG 1618 SKC. OTLK...VFR.
CASCDS...SKC. 20Z SCT CI. OTLK...VFR.

.
OR E OF CASCDS
SKC. 22Z OCNL SCT120. OTLK...VFR.
.
NRN CA...STS-SAC-TVL LN NWD
CSTL SXNS...
NRN HLF CSTLN..BKN010 TOP 025. OCNL VIS 3-5SM BR. 18Z SCT015.
OTLK...VFR.
RMNDR..SKC. TIL 17Z NRN INTR OCNL VIS 3-5SM BR. OTLK...VFR.
SAC VLY...SKC. OTLK...VFR.
SHASTA-SISKIYOUS-NERN CA...SKC. 22Z SCT100-120. OTLK...VFR.
NRN SIERNEV...SKC. OTLK...VFR.
.
CNTRL CA
CSTL SXNS...SKC. TIL 17Z OCNL SCT010. TIL 16Z XTRM SRN CSTLN OCNL
BKN010 TOP 020 VIS 3SM BR. OTLK...VFR.
SAN JOAQUIN VLY...SKC. OTLK...VFR.
SRN SIERNEV...SKC. 20Z OCNL SCT150. OTLK...VFR.
.
SRN CA..VBG-NID-60NNW BIH LN SWD
CSTL SXNS...
XTRM SRN CSTLN..BKN010 TOP 020. VIS 3-5SM BR. 14Z SCT010.
18Z SKC. OTLK...VFR.
RMNDR..SKC. OTLK...VFR.
INTR MTNS-DESERTS-VLYS...SKC. OTLK...VFR.
.
CSTL WTRS
WA...BKN010 BKN040 TOP 080. OTLK...IFR CIG.
OR...BKN010 TOP 025. OCNL VIS 3SM BR. OTLK...IFR CIG BR.
NRN CA...BKN010 TOP 025. OFFSHORE WND NW 30KT. OTLK...IFR CIG
OFFSHORE WND.
CNTRL CA...SKC. OFFSHORE OCNL SCT015 WND NW G25KT. 15Z OFFSHORE
BKN010 TOP 020 WND NW G25KT. OTLK...NRSHORE VFR OFFSHORE IFR CIG
WND.
SRN CA...BKN-OVC010 TOP 020. NRN NRSHORE OCNL SCT010. 18Z NRSHORE
SKC OCNL SCT010. OTLK...NRSHORE VFR OFFSHORE IFR CIG.
....

9.0 National Weather Service Discussion

At 0932 PDT, the NWS forecast office in Las Vegas, Nevada, issued the following Area Forecast Discussion for the Nevada, southeast California, and northwest Arizona, which discussed the light morning wind following the local diurnal cycle under mostly clear skies:

FXUS65 KVEF 021632
AFDVEF

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE LAS VEGAS NV
932 AM PDT SAT JUL 2 2011
.SYNOPSIS...TODAY WILL BE VERY HOT UNDER MOSTLY CLEAR SKIES AS HIGH PRESSURE BUILDS OVER THE AREA. A CHANGE IS IN STORE BEGINNING SUNDAY AS SUBTROPICAL MOISTURE PUSHES INTO THE DESERT SOUTHWEST...BRINGING CHANCES FOR THUNDERSTORMS THROUGH MUCH OF NEXT WEEK. TEMPERATURES WILL COME DOWN SEVERAL DEGREES...BUT INCREASED HUMIDITY WILL MAKE IT FEEL MORE UNCOMFORTABLE.
&&
.UPDATE...SATELLITE LOOP SHOWS A PATCH OF MID LEVEL CLOUDS OVER SOUTH CENTRAL ARIZONA RIDING EAST SOUTHEAST FLOW ALOFT TOWARDS OUR CWFA. THIS IS ACCOUNTED FOR IN THE AFTERNOON SKY GRIDS...AND ALL ELSE LOOKS ON TRACK. NO UPDATE PLANNED THIS MORNING.
&&
.PREV DISCUSSION...
340 AM PDT SAT JUL 2 2011
.SHORT TERM...MODELS SIMILAR DEVELOPING H5 HIGH CENTER NEAR THE FOUR CORNERS TODAY...THEN CIRCULATION REMAINS NEAR THE FOUR CORNERS THROUGH THE REMAINDER OF THE HOLIDAY WEEKEND. CONCERN TODAY WILL BE THE HOT TEMPERATURES AS HEIGHTS RISE UNDER EXPANDING RIDGE. H85/H7 TEMPERATURES BASED ON LOCAL STUDY AND BIAS CORRECTED GUIDANCE GIVES 111F FOR LAS VEGAS TODAY...WHICH FALLS ONE DEGREE SHY OF LOCAL EXCESSIVE HEAT CRITERIA. SINCE MORE PEOPLE WILL BE OUT AND ABOUT ON THIS HOLIDAY WEEKEND...PLEASE TAKE THE NECESSARY PRECAUTIONS TO AVOID HEAT EXHAUSTION OR EVEN WORSE HEAT STROKE. FOR SUNDAY AND THE 4TH...CONCERN IS HOW QUICKLY AND HOW MUCH MOISTURE WILL ADVECT NORTHWARD INTO THE AREA FOR THUNDERSTORMS. GFS REMAINS MORE AGGRESSIVE THEN OTHER MODELS INDICATING A DEEPER MOISTURE SURGE WHICH BRINGS THE 1.5 INCH PRECIP WATER LINE AS FAR NORTH AS LAUGHLIN-BULLHEAD CITY MONDAY. 06Z NAM WAS DEFINITELY WETTER THEN THE 00Z RUN SO LEANED THIS PACKAGE TOWARD THE GFS. DEPENDING ON HOW FAST MOISTURE RAMPS UP...TIME HEIGHT SECTIONS FROM LAS VEGAS NORTHWARD INDICATE WEDGE OF DRIER AIR /INVERTED-V SOUNDINGS/ FOR POTENTIAL OF DRY LIGHTNING AND GUSTY WINDS WITH ANY STORMS SUNDAY SOUTH OF LAS VEGAS STORMS WOULD BE WETTER DUE TO THE DEEPER MOISTURE. DID NOT CHANGE POPS ON MONDAY BUT DID LOWER THE HIGH TEMPERATURES DUE TO THE INCREASE IN CLOUD COVER AND MOISTURE.
.LONG TERM...OVERALL THE MODELS ARE IN DECENT AGREEMENT THROUGH NEXT WEEKEND WITH RESPECT TO THE BIG PICTURE. HIGH PRESSURE REMAINS SET UP NEAR THE FOUR CORNERS FOR THE PERIOD FROM LATE TUESDAY MORNING INTO WEDNESDAY AFTERNOON. MAINLY MID-LEVEL MOISTURE IS EXPECTED TO BE IN PLACE ACROSS OUR AREA AND WITH THE HEATING OF THE DAY THIS SHOULD TRIGGER HIT AND MISS THUNDERSTORMS ACROSS THE AREA. AT THIS POINT WE LOOK TO BE WORKING WITH WHATEVER MOISTURE

GETS ADVECTED IN EARLIER IN THE WEEK AND WITH NO REAL FOCUS SHOWING UP FOR NOW...I HAVE GENERALLY KEPT IN HIGHER POPS OVER THE MOUNTAINS WITH LOWER POPS IN THE VALLEYS.
BY THURSDAY INTO NEXT WEEKEND THE MAIN FEATURE TO WATCH WILL BE AN UPPER LEVEL TROUGH FORECAST TO MOVE THROUGH THE PAC NW. THIS FEATURE MAY HELP TO ORGANIZE OR BETTER FOCUS CONVECTION ESPECIALLY ACROSS THE NORTHERN CWFA AS IT MOVES BY. AS A RESULT...ACTIVITY MAY HAVE A HARDER TIME WINDING DOWN AT NIGHT...ESPECIALLY ON THURSDAY. ALTHOUGH SOME DRYING MAY TRY TO TAKE PLACE ACROSS THE SOUTHWEST CWFA BY FRIDAY IT APPEARS THAT ANY REAL DOWNWARD TREND IN CONVECTION LOOKS TO HOLD OFF UNTIL NEXT SATURDAY WHEN THE TROUGH MOVES INLAND AND WESTERLY FLOW BECOMES MORE PRONOUNCED ACROSS OUR AREA BRINGING IN DRIER AND MORE STABLE AIR. WITH THE STEERING FLOW TURNING MORE SOUTHWEST IN THIS PERIOD...CONVECTION THAT DOES DEVELOP OVER THE SOUTHERN SIERRA AND WHITE MTNS WOULD GET PUSHED EASTWARD ACROSS OUR AREA.
OVERALL TEMPS WERE KEPT CLOSE TO NORMAL...WITH VARIATIONS UP AND DOWN DRIVEN BY CLOUD COVER AND THE AMOUNT OF MOISTURE AROUND FROM DAY TO DAY. THE MAIN THREATS WITH STORMS WILL INCLUDE GUSTY WINDS AS WELL AS LOCALLY HEAVY DOWNPOURS.
.AVIATION...FOR MCCARRAN...MAINLY LIGHT WINDS THROUGH SATURDAY EVENING WITH A SLIGHT INCREASE IN THE LATE AFTERNOON AND EVENING FROM THE SOUTHEAST AND EVENTUALLY FROM THE SOUTH-SOUTHWEST. LITTLE IN THE WAY OF CLOUD COVER EXPECTED THROUGH SATURDAY EVENING. SUNDAY WILL SEE CUMULUS CLOUDS FORM AS MONSOON MOISTURE MAKES ITS WAY INTO THE AREA. THERE WILL BE A SLIGHT CHANCE FOR HIGH BASED THUNDERSTORMS IN THE VALLEY SUNDAY WITH A BETTER CHANCE OVER LOCAL MOUNTAINS. THE PEACH SPRINGS AND MORMON MESA CORRIDORS WILL BE AFFECTED BY THUNDERSTORMS SUNDAY.
FOR THE REST OF SOUTHERN NEVADA...NORTHWEST ARIZONA...AND SOUTHEAST CALIFORNIA...LIGHT WINDS FOLLOWING LOCAL DIURNAL PATTERNS TO OCCUR AREAWIDE THROUGH SATURDAY AFTERNOON ALONG WITH MOSTLY CLEAR SKIES. SUNDAY WILL SEE CUMULUS CLOUDS FORM AS MONSOON MOISTURE MAKES ITS WAY INTO THE AREA. AREAS EAST OF THE COLORADO RIVER WILL SEE A DECENT CHANCE FOR AFTERNOON THUNDERSTORMS SUNDAY WHILE AREAS WEST OF IT IN CLARK AND LINCOLN COUNTIES WILL SEE A LOWER CHANCE OF THUNDERSTORMS AND THOSE THAT DO FORM WILL BE HIGH BASED AND LIKELY TO PRODUCE STRONGER OUTFLOW WINDS.
.FIRE WEATHER...THERE WILL BE A SLIGHT CHANCE OF DRY LIGHTNING OVER SOUTHERN PORTIONS OF AZ ZONE 102 EARLY SUNDAY MORNING...WITH CHANCES SPREADING NORTH AND WEST TO CA ZONES 228...NV ZONES 461 465 AND 466 SUNDAY AND SUNDAY NIGHT. THERE IS STILL CONSIDERABLE UNCERTAINTY ABOUT HOW MUCH COVERAGE OF DRY LIGHTNING MAY BE SEEN...WITH THE HIGHER ELEVATIONS BIASED TOWARD WET STORMS AND THE LOWER ELEVATIONS BIASED TOWARD DRY STORMS. WILL HOLD OFF ON THE

ISSUANCE OF A FIRE WEATHER WATCH FOR NOW...BUT THIS NEEDS TO BE MONITORED CLOSELY.
&&
.VEF WATCHES/WARNINGS/ADVISORIES...
NV...NONE.
AZ...NONE.
CA...NONE.
&&
$$
MORGAN/PIERCE/STACHELSKI
HTTP://WEATHER.GOV/LASVEGAS

10.0 Astronomical Data

The astronomical data obtained from the United States Naval Observatory for coordinates 36.48° N, 118.09° W on July 2, 2011, indicated the following for the accident location:

SUN	
Begin civil twilight	0508 PDT
Sunrise	0539 PDT
Sun transit	1256 PDT
Sunset	2014 PDT
End civil twilight	2044 PDT

Paul Suffern
NTSB Meteorologist