

Data Requested

Synoptic conditions - The NWS southwest section of the Surface Analysis Chart for 1600 PST (0000Z November 21, 2021) is included as figure 1 with the approximate accident site marked by a red star. The chart depicted a stationary front to the northeast of the accident site over eastern California into southern Nevada, and northern Arizona where the front was identified as a cold front. A thermal low-pressure system was depicted over southern Arizona to the east-southeast of the accident site with a trough of low pressure extending west-northwestward into California and southern Nevada. The station models surrounding the accident site depicted variable winds at 10 knots or less, with scattered to clear skies over the area, with temperatures in the 60's degrees Fahrenheit, and dew point temperatures near 20° F. Numerous stations southwest through west, and north-northwest of the accident site reported visibility restrictions in haze.

A review of the National Composite Radar Mosaic depicted no meteorological echoes over southwestern California at the time of the accident.

Observations - the closest weather reporting station to the accident site was from Big Bear City Airport (KL35), Big Bear City, California, at an elevation of 6,752 ft. The airport had an Automated Weather Observation Station (AWOS) which was not augmented by any human observers. The following conditions were reported at the approximate time of the accident.

Routine weather observation for KL35 at 1655 PST, automated, wind calm, visibility 10 statute miles or more, sky clear below 12,000 ft agl, temperature 7° Celsius (C) (45° F), dew point temperature -7° C (19° F), altimeter setting 30.26 inches of mercury. Remarks: automated station with a precipitation discriminator.

The general flight conditions and raw METAR observations surrounding the period were as follows.

VFR METAR KL35 202355Z AUTO 08010KT 10SM CLR 10/M07 A3024 RMK AO2
VFR METAR KL35 210015Z AUTO 08008KT 10SM CLR 09/M07 A3025 RMK AO2
VFR METAR KL35 210035Z AUTO 09006KT 10SM CLR 08/M07 A3025 RMK AO2
VFR **METAR KL35 210055Z AUTO 00000KT 10SM CLR 07/M07 A3026 RMK AO2**
Accident 0057Z
VFR METAR KL35 210115Z AUTO 00000KT 10SM CLR 06/M07 A3026 RMK AO2
VFR METAR KL35 210135Z AUTO 00000KT 10SM CLR 05/M07 A3026 RMK AO2
VFR METAR KL35 210155Z AUTO 00000KT 10SM CLR 05/M07 A3026 RMK AO2

Sounding - A High-Resolution Rapid Refresh (HRRR) numerical model over the approximate accident site coordinates as obtained from the NOAA Air Resource Laboratory. The HRRR model data was then plotted on a standard skew T log P diagram using the RAOB Analysis software for 1700 PST and is included as figure 2. The sounding depicted an elevation of 7,605 ft over the grid point, with a near surface temperature of 7°C (44° F), with a dew point temperature of -9°C (16° F), a relative humidity of 32%, with a density altitude of 8,046 ft. A surface based temperature inversion was noted to approximately 200 ft agl (7,800 ft msl) where temperature increased with altitude. The freezing level was identified at 12,270 ft msl (blue line across sounding). The lifted condensation level was identified immediately above the freezing level at approximately 6,410 ft agl, with the convective condensation level at 14,870 ft agl. The precipitable water content was 0.13 inches. The RAOB Analysis program supported a few to scattered clouds at between 17,000 and 18,000 ft agl, with the atmosphere characterized as conditionally unstable below 18,000 ft.

The HRRR wind profile indicated a near surface wind from the northeast or from 040° at 7 knots with winds backing or changing counterclockwise with height to the north and then to the west above 18,000 ft. The wind at the accident airplanes cruising level of 8,000 ft was from 035° at 11 knots. The mean 0 to 6 kilometer (or 18,000 ft) wind was from 275° at 23 knots. The maximum wind was identified at 39,950 ft from 260° at 120 knots, with the tropopause at about 43,300 ft.

A table of the HRRR parameters of height, pressure, temperature (T), dew point temperature (Td), relative humidity (RH),

wind, and potential Clear Air Turbulence (CAT), Low-Level Wind Shear (LLWS), icing, and mountain wave activity below 12,000 ft is included below.

Height (ft-msl)	Pres (hPa)	T (C)	Td (C)	RH (%)	Wind (deg/kts)	CAT (FAA)	LLWS (FAA)	Icing (AFGWS)	Mountain Wave (nm-fpm-max)
7605	773	6.5	-9.1	32	040/ 7				
7640	772	7.8	-7.9	32	041/ 6	LGT	LIGHT		
7675	771	7.9	-8.0	31	043/ 9		LIGHT		
7886	765	7.8	-8.8	30	041/ 11				
8099	759	7.7	-10.0	27	034/ 11				
8457	749	7.2	-11.4	25	024/ 10				
8965	735	6.4	-13.0	23	015/ 8				
9518	720	5.3	-15.0	21	002/ 7				
10118	704	4.0	-18.0	18	352/ 7				
10768	687	2.8	-21.6	15	353/ 9				
11471	669	1.5	-26.5	10	356/ 11	LGT			
12270	649	0.0	-32.5	7	356/ 14				2.05 155 LIGHT

The RAOB Analysis software did not depict any significant turbulence or mountain wave conditions below 12,000 ft.

Satellite Imagery - The Geostationary Operational Environmental Satellite number 16 (GOES-16) data were obtained from an archive at the Space Science Engineering Center (SSEC) at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System (McIDAS) software. The GOES-17 infrared satellite image for 1656 PST is included as figure 3. The image depicted some high cirriform clouds over the accident site with tops near 20,000 ft. Due to the low Sun angle the visible image at the time of the accident was not available.

Pilot Reports - the following pilot reports or PIREPs were recorded within 100 miles from 1000 through 1900 PST, below 18,000 ft over the region. The reports are in standard format and code, with time referenced to UTC and altitude to msl heights.

NFG UA /OV L18 /TM 1802 /FL007 /TP KP5 /SK SKC /RM NEG FG
 SEE UA /OV SEE /TM 1810 /FL075 /TP P28A /SK SKC /WX HZ
 SEE UA /OV SEE /TM 1814 /FL004 /TP P28A /SK SKC
 SMO UA /OV 080003 /TM 1823 /FL023 /TP BE9L /SK TOP019 /WX HZ
 CNO UA /OV KCNO /TM 1854 /FL013 /TP M20P /SK BKN002-TOP012 /WX 1/2SM /RM INBOUND CNO RY26R DURD
 BASE011
 SMO UA /OV SMO030003 /TM 1905 /FL013 /TP C172 /SK BKN014-TOP023 /WX HZ /RM "SEVERE HAZE" DURD RWY21
 KSMO
 CNO UA /OV CNO260004 /TM 1937 /FL015 /TP RV6 /RM FV99SM ABOVE 015 TO THE WEST
 SMO UA /OV SMO180002 /TM 2029 /FL020 /TP C172 /SK SCT-TOP018 /RM CLOUD LAYER AT SHORELINE S-W TOP018
 EMT UA /OV 2 SE EMT /TM 2109 /FL022 /TP C172 /WX 6 SM /RM ABOVE 020 VIS IS GREATER THAN 10 SM BELOW VIS
 IS 6 SM
 LAX UA /OV LAX010015 /TM 2140 /FL015 /TP B738 /SK CLR /WX 4SM HZ /RM HAZY ALONG SHORELINE
 PMD UA /OV L70 /TM 2156 /FL080 /TP P28R /TB MOD
 LAX UA /OV LAX070006 /TM 2323 /FL010 /TP A321 /SK CLR HZ /WX 2SM /RM VERY HAZY LOW LEVEL CLEAR ABOVE
 CNO UA /OV KCNO /TM 2333 /FL025 /TP C172 /WX 3SM /RM 3NM SE OF CNO
 SNA UA /OV SNA /TM 0015 /FL025 /TP P28A /SK TOPS 020
 BYS UA /OV DAG040009 /TM 0022 /FL095 /TP SR22 /TA 02 /WV 01609KT /TB NEG
 KLAX UA /OV LAX070010 /TM 0108 /FL025 /TP E75L /WX 7SM HZ
 LAX UA /OV 8 MI EAST OF LAX /TM 0111 /FL020 /TP E75L /WX VIS 8SM HZ

Numerous PIREPs reported visibility restrictions in haze over the area with flight visibility ranging from 2 miles and 8 miles over the region.

NWS Graphic Forecast for Aviation (GFA) - the southwest sections of the GFA Surface and Cloud forecasts 3-hour forecast issued around 1400 PST and valid for the period 1600 through 1900 PST are included as figures 4 and 5.

NWS Area Forecast Discussion (AFD) -the NWS Los Angeles Weather Forecast Office (WFO) issued the Area Forecast

FXUS66 KLOX 202351
AFDLOX

Area Forecast Discussion
National Weather Service Los Angeles/Oxnard CA
351 PM PST Sat Nov 20 2021

.SYNOPSIS...20/137 PM.

Offshore flow across the area will bring a warming and drying trend through Monday, with gusty offshore winds likely for most of Ventura and Los Angeles Counties beginning this evening. Cooler conditions are expected on Tuesday and Wednesday as a weak weather system moves over the region. Another Santa Ana is possible beginning as early as Wednesday.

.SHORT TERM (TDY-TUE)...20/208 PM.

Synoptically, there is an upper level trough extending to the southwest from Montana through SoCal, with an extended area of lower heights bulging to the SW that looks like it wants to become a cutoff low. By Sunday the lower offshore pressure will anchor the pressure gradient force winds that will be our first Santa Ana event of the week. By Tuesday another upper level trough will be moving through Oregon and extends to the SW over our area.

There is no moisture with this system as a big rain producer, but enough ensemble members are suggesting that there is a possibility of more than a hundredth of an inch beginning Monday night and slight chance PoPs remain in the forecast. There is a chance of another quick Santa Event beginning Wednesday as this system moves off to the east. For the later part of the week, a ridge of higher heights moves overhead from the southwest driving heights to 586 dam by Thursday.

The morning started with plenty of fog, and low stratus, but conditions have cleared with the exception of the Malibu area. Skies are mostly clear aside from a few mid to high clouds streaming in from the southwest. Expecting the stratus to return overnight along the LA coast, but the offshore flow to dissipate it before morning. Paso Robles should be the only area with fog by morning. Northeast low-level flow will drive the weather pattern through the weekend. Gusty winds will develop as the offshore push takes a firmer hold across Los Angeles and Ventura Counties tonight. Wind advisories were added for gusty Santa Lucia winds from late this morning through Sunday morning, and for gusty Santa Ana winds from late tonight through Monday afternoon. See the Fire weather section of the AFD for details on this wind event.

Temperatures remain on the warm side of forecast guidance for Sunday and Monday and toward the higher end of EPS members. Temperatures across most of the coastal and valley locations will likely range between the upper 70s and upper 80s on Sunday, with no record high temperatures in the forecast. Some cooling is possible on Monday under falling heights and increasing high-level cloudiness, but it will largely depend much upon how quickly the offshore winds subside.

Local knowledge suggests that the forecast models struggle with the synoptic conditions expected by late Monday, with essentially a cutoff low to our southwest. While the ensemble means remain dry, enough members are showing precipitation that there is about a 10-20% chance for greater than a hundredth of an inch falling beginning Monday evening - with the best chances over the Ventura County mountains and eastern San Gabriels. This is a pretty low confidence forecast and will bear watching.

.AVIATION...20/1906Z.

At 1752Z at KLAX, the marine layer was 1700 feet deep. The top of the inversion was around 4000 feet with a temperature of 16C.

Low confidence in the 18z TAF package, specifically in the timing of the transition from onshore flow to offshore flow and clearing of the marine clouds from the coastal sections either tonight or tomorrow morning. Conds were mostly IFR to low MVFR across coastal sections of L.A. and VTU Counties. Valley locations and the central coast were becoming VFR, but clouds could linger once again at some south coast beaches into the afternoon. Low clouds may return to some coastal TAFs this evening, with generally IFR to LIFR conds, but might clear overnight as flow turns offshore. Gusty NE winds will begin to affect the mtns and valleys of L.A. and VTU Counties by late evening with mdt to stg UDDF and some LLWS.

KLAX...Low confidence in the 18Z TAF. There is a 40 percent chance that the clearing of marine clouds will not clear at the forecasted times. There is a 30 percent chance that the area will remain MVFR through much of the afternoon.

KBUR...Moderate confidence in the 18Z TAF. There is a 30 percent chance of VFR conditions through the period.

.FIRE WEATHER...20/350 PM.

A Red Flag Warning remains in effect for Sunday/Monday time period across much of LA/Ventura counties due to high confidence of Red Flag conditions for these areas. The Fire Weather Watch was canceled for Sunday across the mountains of Santa Barbara and San Luis Obispo counties as Red Flag conditions are not expected to meet duration thresholds for Red Flag. However, there will be elevated to brief critical fire weather conditions across San Luis Obispo and Santa Barbara counties Sunday into early Monday.

Northeast to east Santa Ana winds are still on track to increase late tonight into Sunday, with the peak winds expected Sunday morning and afternoon. During this peak, offshore wind gusts of 35 to 55 mph are expected across Los Angeles and Ventura Counties, except isolated gusts up to 60 mph in favored mountains and foothills. In addition, wind gusts of 20 to 40 mph are expected across San Luis Obispo and Santa Barbara counties. Gusty Santa Ana winds are expected to continue into Monday morning, however wind gust speeds are expected to be 10 to 15 mph less than Sunday. Humidities are expected to fall to around 15 to 20 percent by mid morning Sunday, potentially lowering to between 7 and 15 percent by Sunday afternoon and evening, and again on Monday. Very poor humidity recoveries expected across most windy locations on Sunday night, generally remaining in the 10 to 20 percent range. Temperatures generally look to peak between 75 and 85 degrees on Sunday and Monday. The potential for Red Flag conditions is above 80 percent for Los Angeles and Ventura Counties, resulting in the Red Flag Warning for those areas. There will be an increased risk of wildfire ignitions on Sunday and Monday across the region. Areas in a Red Flag Warning will have an increased risk for fires with rapid spread, long range spotting, and extreme fire behavior, especially considering the dry fuels in place across the region.

Conditions are expected to improve Monday night into Tuesday. There is the potential for another round of weak to moderate offshore winds and low humidities Wednesday through Friday. The focus of this event will once again be Los Angeles and Ventura counties, with a chance of Red Flag conditions.

.LOX WATCHES/WARNINGS/ADVISORIES...

CA...Wind Advisory in effect until 8 AM PST Sunday for zone 34. (See LAXNPWLOX).

Wind Advisory in effect from 3 AM Sunday to noon PST Monday for zones 40-41. (See LAXNPWLOX).

*Wind Advisory in effect from 9 PM this evening to 3 PM PST Monday for zones 44>46-53-54-88-547.
(See LAXNPWLOX).*

*Red Flag Warning in effect from 9 AM Sunday to 3 PM PST Monday for zones 240-241-244>246-253-254-
288-547-548. (See LAXRFWLOX).*

*PZ...Small Craft Advisory in effect from 3 AM Sunday to noon PST Monday for zones 650-655.
(See LAXMWWLOX).*

.HAZARD POTENTIAL OUTLOOK (TUE-SAT).

Critical fire weather conditions and gusty Santa Ana winds are likely into Monday. Another Santa Ana wind event is possible beginning on Wednesday.

NWS Inflight Weather advisories - The NWS Aviation Weather Center had no SIGMETs or Convective SIGMETs active for the area but had several AIRMETs Sierra current for IFR conditions along the Pacific coast and for AIRMET Tango for turbulence below 12,000 ft immediately north of the accident site. A review of the Los Angeles (KLZA) Center Weather Service Unit (CWSU) indicated that they issued no Center Weather Advisories or Meteorological Impact Statements (MIS) for the Los Angeles airspace during the period. No advisories were current over the accident site at the time.

WAUS46 KKCI 202045

WA6S

_SFOS WA 202045

AIRMET SIERRA UPDT 4 FOR IFR AND MTN OBSCN VALID UNTIL 210300

.

AIRMET IFR...CA AND CSTL WTRS

FROM 130WSW SNS TO 80SW SNS TO 100W RZS TO 60SSW RZS TO 20SSW

LAX TO 30NNW MZB TO 20SE MZB TO 220SW MZB TO 130WSW SNS

CIG BLW 010/VIS BLW 3SM BR. CONDS DVLPG 00-03Z. CONDS CONTG BYD

03Z THRU 09Z.

WAUS46 KKCI 202045

WA6T

_SFOT WA 202045

AIRMET TANGO UPDT 3 FOR TURB VALID UNTIL 210300

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AIRMET TURB...CA NV UT AZ AND CSTL WTRS
FROM 80S LKV TO OAL TO ILC TO BCE TO TBC TO 40SSE EED TO EHF TO
20S PYE TO 20NNE FOT TO 80S LKV
MOD TURB BLW 120. CONDS CONTG BYD 03Z THRU 09Z.
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Astronomical Conditions - the United States Naval Observatory astronomical conditions over Big Bear City, CA indicated the following conditions. The time of the accident has been included for reference in bold italic type.

Sun	Time
Begin civil twilight	0558 PST
Sunrise	0625 PST
Culminative	1133 PST
Sunset	1640 PST
<i>Accident</i>	<i>1657 PST</i>
End civil twilight	1707 PST

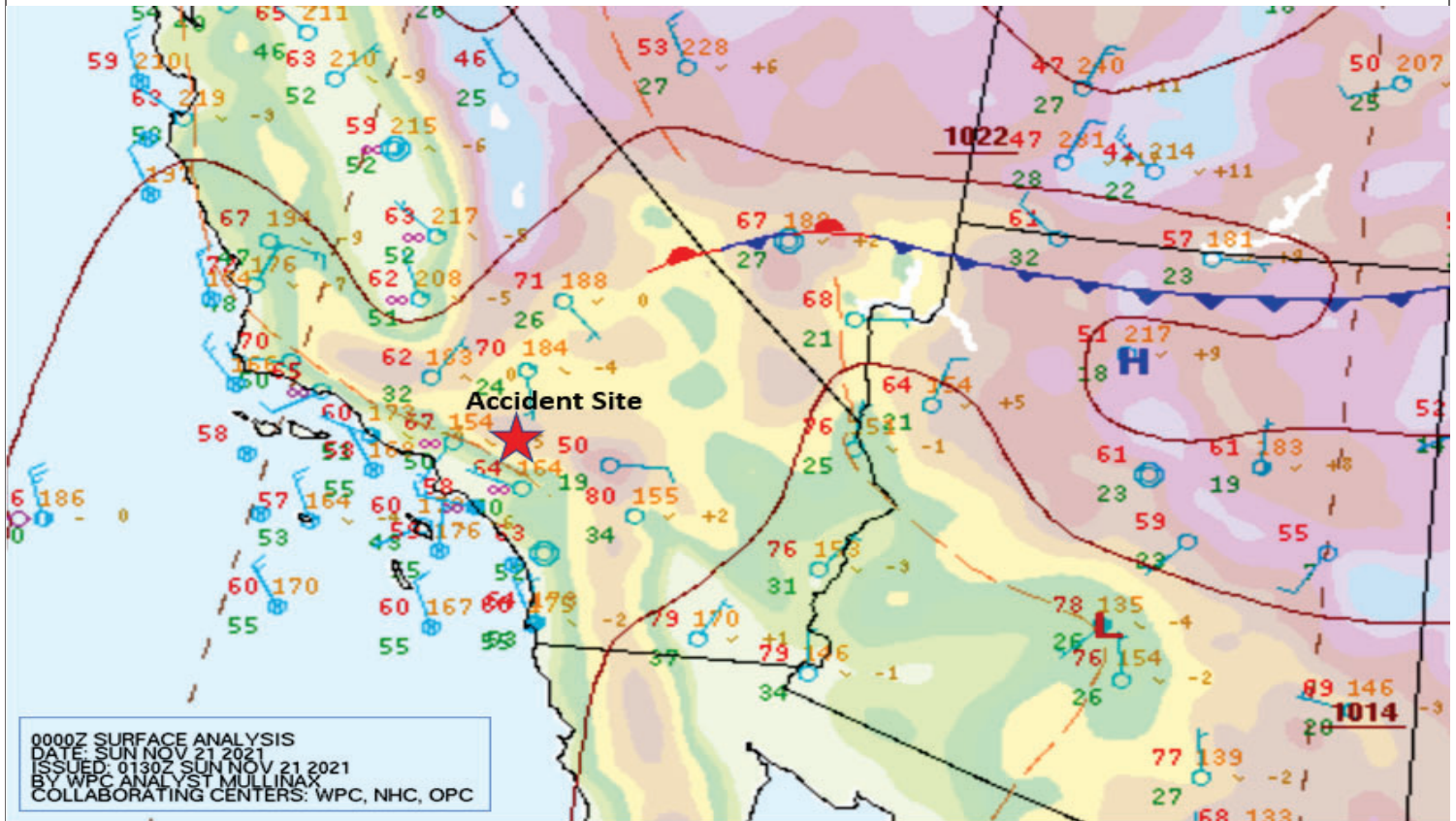
Moon	
<i>Accident</i>	<i>1657 PST</i>
Moonrise	1739 PST
Moon culmination	0017 PST
Moonset	0738 PST

At the time of the accident the Sun was 3.8° below the horizon at an azimuth of 248°. The Moon was -9.7° below the horizon at an azimuth of 52° and rising with the phase a waning gibbous with 97% of the disk illuminated.

Preliminary Analysis

Additional Details

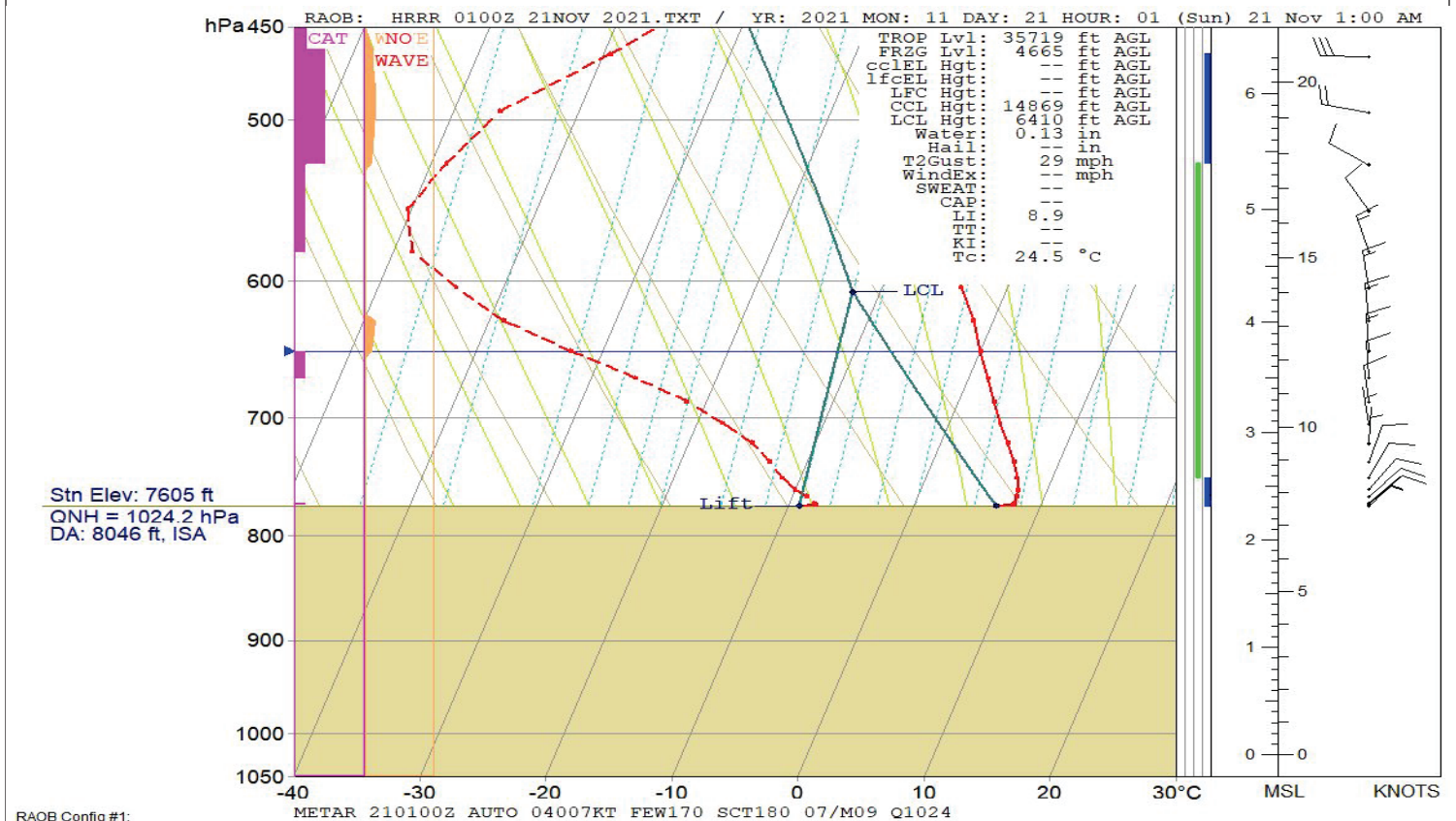
Figure 1



Caption

NWS southwest section of the Surface Analysis Chart for 1600 PST with the accident site marked by red star.

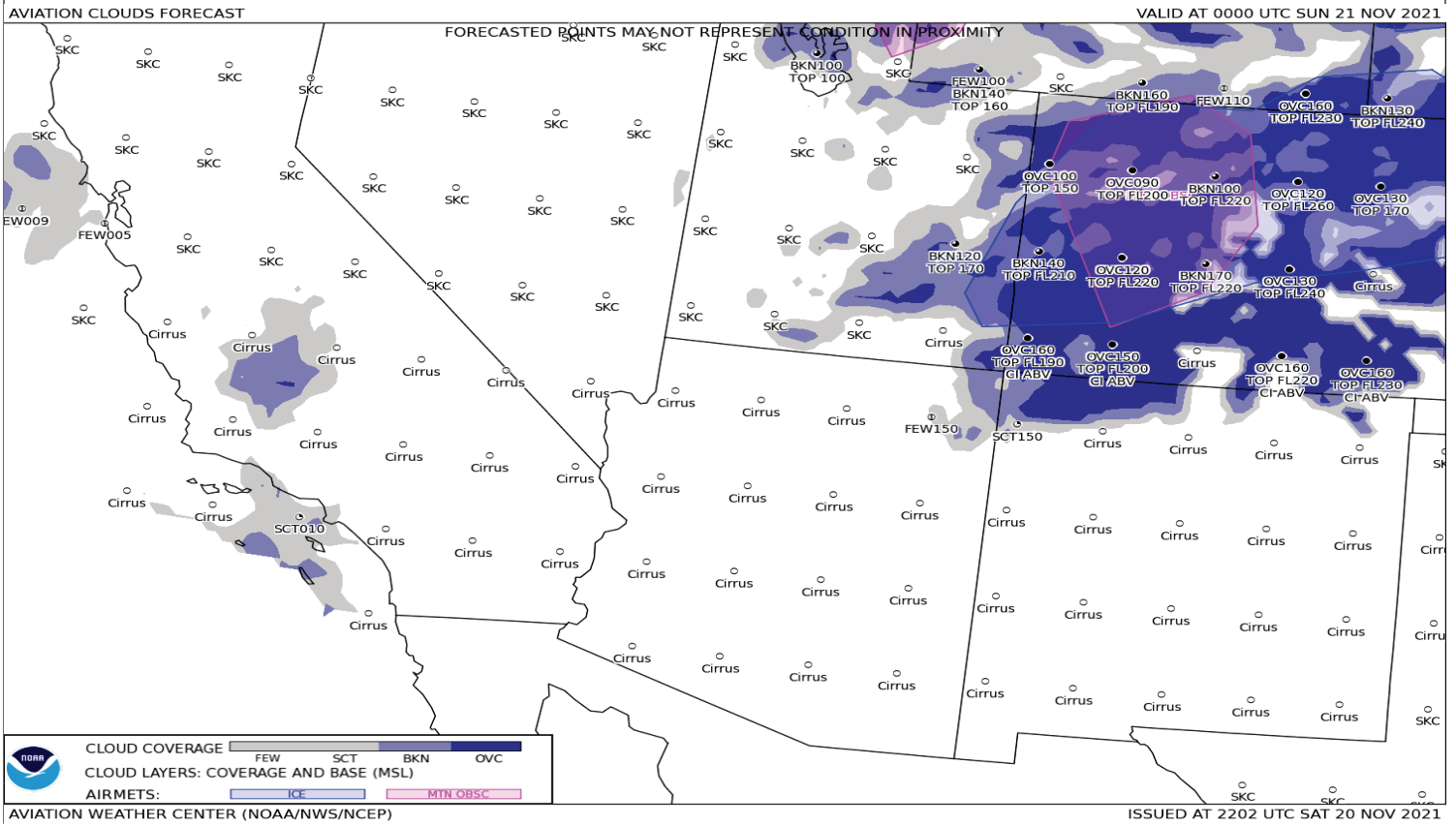
Figure 2



Caption

High-Resolution Rapid Refresh (HRRR) numerical model sounding over the accident site for 1700 PST.

Figure 5



Caption

Graphic Forecast for Aviation Cloud Forecast

Figure 6

Caption