



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

April 25, 2019

Weather Study

METEOROLOGY

WPR18FA084

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A. ACCIDENT

Location: Santee, California
Date: February 6, 2018
Time: 0654 Pacific standard time (1454 UTC)¹
Airplane: Type: C-182T; Registration: N3525T

B. METEOROLOGIST

Mike Richards
Senior Meteorologist
Operational Factors Division (AS-30)
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C. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's meteorological specialist did not travel in support of this accident investigation and gathered all weather data remotely. Unless otherwise noted, all times are in Pacific standard time (PST) for February 6, 2018 (based upon the 24-hour clock), directions are referenced to true north, distances are in nautical miles and heights are above mean sea level (msl).

Coordinates used for the accident location: 32.816667° north latitude, 116.983333° west longitude, at an elevation of about 475 feet.

D. WEATHER INFORMATION

1.0 Surface Observations

An Automated Weather Observing System was located at Gillespie Field Airport (SEE)² near San Diego, California, and was located within 1 mile of the accident location at an elevation of about 390 feet. Automated and augmented reports from SEE during the times surrounding the accident time are presented here.

[0455 PST] METAR KSEE 061255Z AUTO 03005KT 3SM BR OVC005 12/10 A2997
RMK AO2=

¹ UTC – abbreviation for Coordinated Universal Time

² The National Weather Service uses the 4-digit International Civil Aviation Organization (ICAO) format for station identifiers (as seen in the body of some formatted weather observations). This report uses the 3-digit International Air Transport Association format for station identification, which does not use the geographic designating digit ("K" for stations in the continental U.S. and "P" for U.S. stations in Alaska and the Pacific region) as found in the ICAO format.

[0515 PST] METAR KSEE 061315Z AUTO 04005KT 3SM BR OVC004 11/10 A2998
RMK AO2=
[0535 PST] METAR KSEE 061335Z AUTO 04003KT 3SM BR 11/10 A2998 RMK
AO2=
[0647 PST] METAR KSEE 061447Z 00000KT 2SM BR OVC004 10/09 A3001=
[0747 PST] METAR KSEE 061547Z 00000KT 2SM BR OVC003 10/09 A3002=

At 0535 PST, SEE (automated) reported a wind from 040° at 3 knots, visibility of 3 statute miles, mist, temperature of 11° Celsius (C) and a dew point temperature of 10°C, altimeter setting of 29.98 inches of mercury; remarks: station with a precipitation discriminator. It should be noted that this report did not include a sky condition.

At 0647 PST, SEE (augmented) reported a calm wind, prevailing visibility³ of 2 miles, mist, ceiling overcast at 400 feet above ground level (agl), temperature of 10°C and a dew point temperature of 9°C, altimeter setting of 30.01 inches of mercury.

Email communication with the Federal Aviation Administration (FAA) regarding sky condition reporting at SEE is documented in Attachment 1. According to the FAA, during the period January 1, 2018 through October 1, 2018, there were 7,870 automated observations from SEE that contained at least one weather parameter. Of those 7,780 observations, 725 observations (9.21 percent) were missing sky condition. This information was compared with other sites in the US west coast region that had the same AWOS model and ceilometer as SEE. The FAA stated "...it appears the ceilometer at KSEE is experiencing significantly more conditions causing the sky condition to go missing than ceilometers at the other sites." According to the FAA's data, the rate of missing sky condition at SEE was about 25 times higher than the missing sky condition rate (0.37 percent) for the same type of observations compiled from the comparison sites.

2.0 Pilot Reports

The following are publicly disseminated pilot reports⁴ that reported cloud tops in the San Diego, California, area within about one hour of the accident time.

SAN UA /OV SAN095006/TM 1437/FL020/TP B737/SK /SK OVC011-
TOP020/SKC=

At 0637 PST, a Boeing 737 type aircraft located 6 miles on the 095° radial from San Diego International Airport (SAN; elevation 17 feet) at 2,000 feet, reported overcast clouds at 1,100 feet with clouds tops at 2,000 feet and sky clear.

CRQ UA /OV CRQ/TM 1513/FL013/TP PA24/SK /SK OVC008-TOP013/SKC=

³ Prevailing visibility - the greatest distance visible throughout at least half of the horizon, but not necessarily continuously.

⁴ Only pilot reports with the World Meteorological Organization header UBCA** were considered.

At 0713 PST, a Piper PA-24 type aircraft located over McClellan-Palomar Airport (elevation 330 feet) at 1,300 feet, reported overcast clouds at 800 feet with clouds tops at 1,300 feet and sky clear.

SAN UA /OV SAN/TM 1525/FL015/TP B737/SK /SK OVC010-TOP015/SKC=

At 0725 PST, a Boeing 737 type aircraft located over SAN at 1,500 feet, reported overcast clouds at 1,000 feet with clouds tops at 1,500 feet and sky clear.

SEE UA /OV SEE320005/TM 1542/FL030/TP BE35/SK OVC002 - TOPS 011/RM
DURC=

At 0742 PST, a Beechcraft 35 type aircraft located 5 miles on the 320° radial from SEE at 3,000 feet, reported overcast clouds at 200 feet with clouds tops at 1,100 feet during climb.

3.0 Upper Air Data

A High-Resolution Rapid Refresh (HRRR) model⁵ sounding (figure 1) valid for the accident location at 0700 PST was retrieved from the NOAA Air Resources Laboratory. The wind in the lowest 1,000 feet agl was light and variable. Above this layer the wind was generally from the south at a magnitude of about 10 knots through 2,500 feet agl. The relative humidity was greater than 90 percent between about 250 feet and 1,650 feet agl. The freezing level was at about 13,500 feet.

⁵ The HRRR is a National Oceanic and Atmospheric Administration (NOAA) real-time three-kilometer resolution, hourly-updated, cloud-resolving, convection-allowing atmospheric model, initialized by three-kilometer grids with three-kilometer radar assimilation. Radar data is assimilated in the HRRR every 15 minutes over a one-hour period.

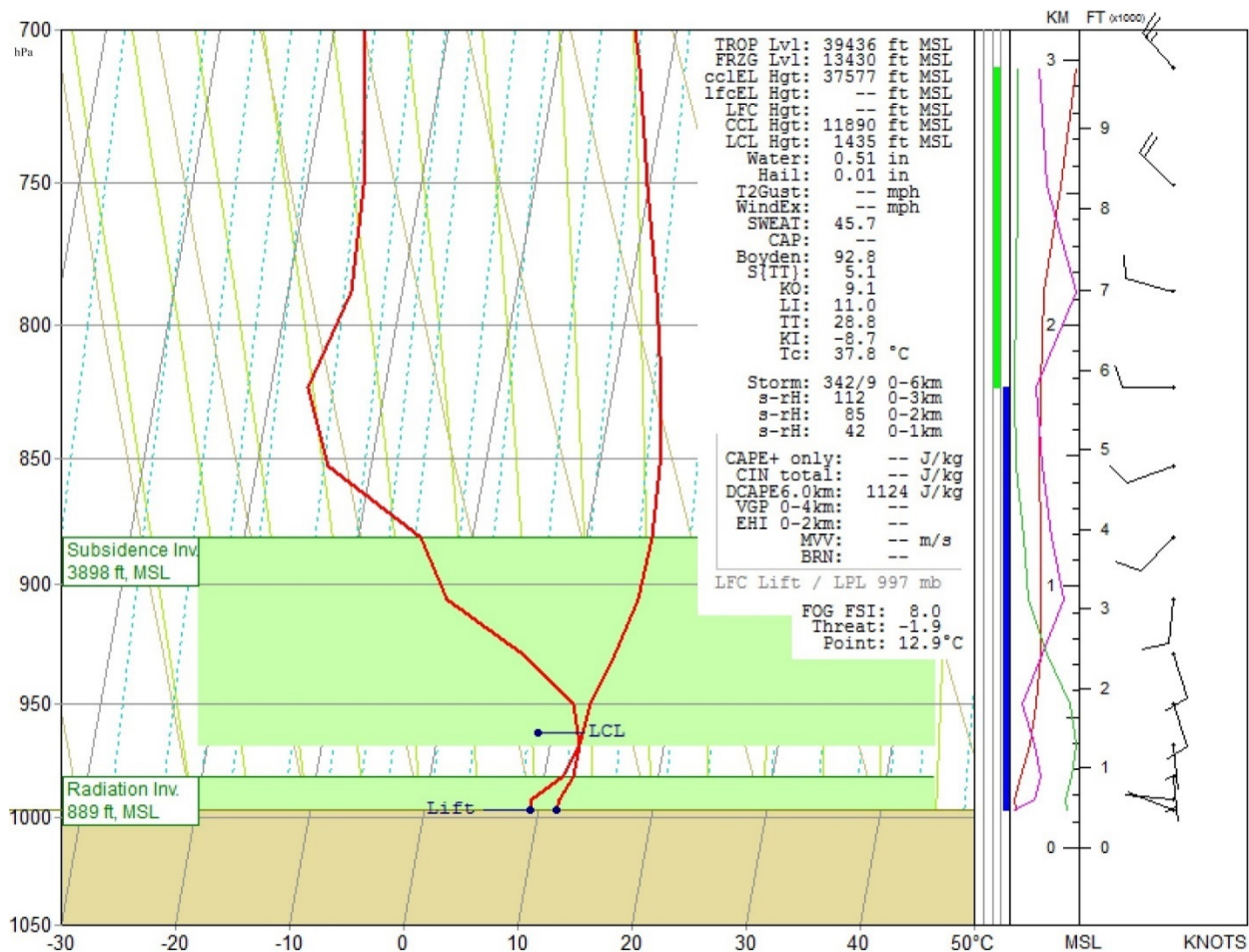


Figure 1 – HRRR model sounding data in SkewT/LogP format for 0700 PST at the accident site, surface to 700 hectopascals.

4.0 Satellite Imagery

Advanced Very-High-Resolution Radiometer (AVHRR) infrared (10.8 μ m) data from the NOAA-15 platform were obtained from NOAA. An image from 0700 PST is presented in figure 2. These AVHRR data retrieved a brightness temperature over the accident location of 10°C. According to the HRRR sounding, 10°C corresponds to a height of about 8,000 feet. However, given the HRRR moisture profile, clouds are not believed to be present at or close to this altitude. Because the SEE surface observation about the time of the accident reported a temperature of 10°C, and portions of the lower levels of the HRRR sounding are near-isothermal and close to 10°C, it is not possible to retrieve a cloud top height using this technique.

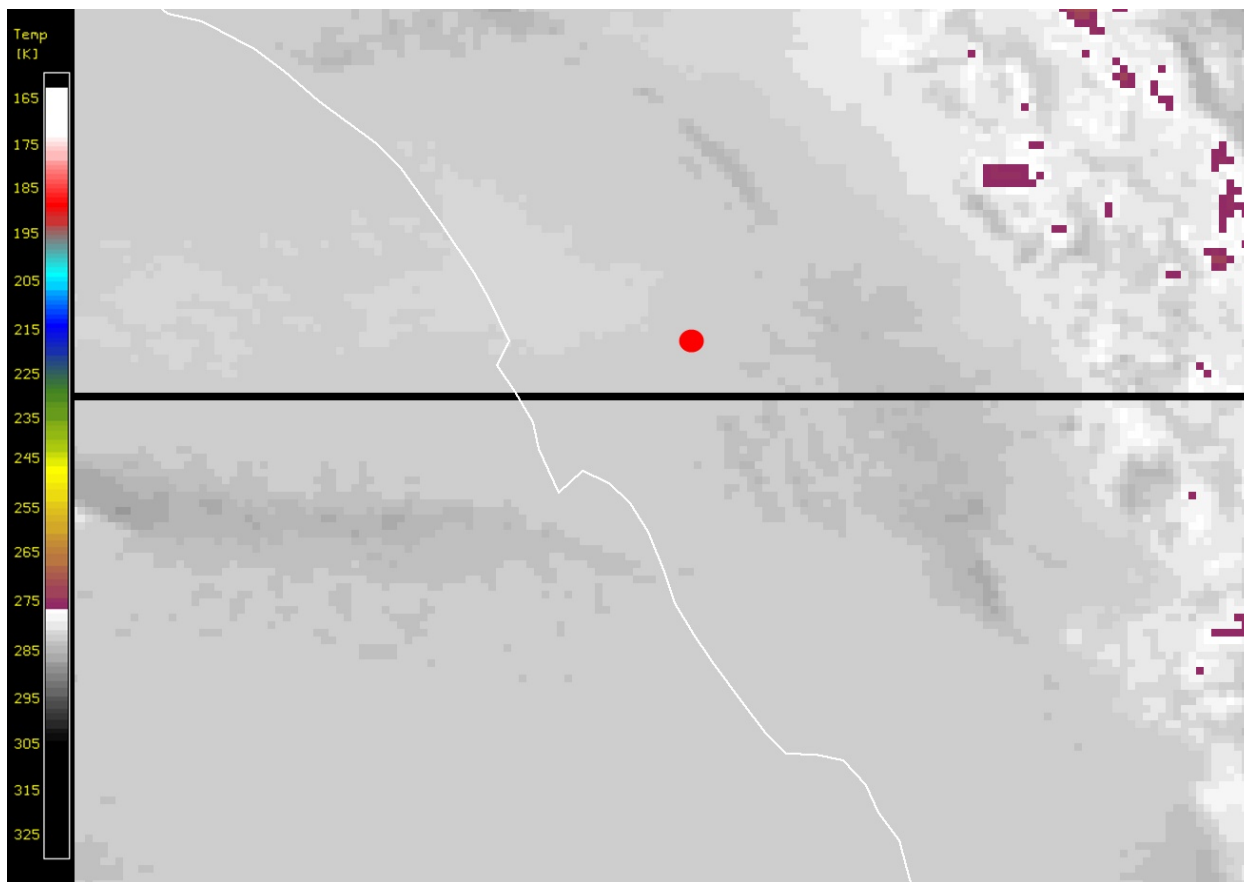


Figure 2 – AVHRR infrared imagery from 0700 PST. Accident location denoted by red dot.

5.0 Terminal Aerodrome Forecasts

The closest Terminal Aerodrome Forecast (TAF) site to the accident location was Miramar MCAS (Joe Foss Field) Airport (NKS) in San Diego, California, which was located about 9 miles west-northwest of the accident location at an elevation of about 475 feet. The following TAF was the most recently issued NKX TAF that included a forecast for the accident time.

TAF KNKX 0609/0709 VRB05KT 4800 BR OVC002 QNH2992INS
TEMPO 0609/0615 1600 BR BKN010
 BECMG 0615/0617 28008KT 9999 NSW FEW010 FEW250 QNH2995INS
 FM070330 VRB05KT 9999 FEW250 QNH3002INS T10/0614Z T24/0621Z=

This NKX TAF forecasted for the accident time: a variable wind at 5 knots, visibility of 4,800 meters, mist, ceiling overcast at 200 feet agl, minimum altimeter setting 29.92 inches of mercury; temporary conditions: visibility of 1,600 meters, mist, ceiling broken at 1,000 feet agl.

6.0 Area Forecast Discussion

An Area Forecast Discussion (AFD) was issued at 0428 PST by the NWS Weather Forecast Office in San Diego, California. The Aviation section of that AFD is presented here.

FXUS66 KSGX 061228
AFDSGX

Area Forecast Discussion
National Weather Service San Diego CA
428 AM PST Tue Feb 6 2018

.AVIATION...

061000Z...Coastal areas: low clouds with bases 500-1000 feet MSL and areas of vis in fog 2-5SM prevailing along the coast and lower on the coastal mesas and in the far western valleys through about 17Z. Clouds and fog gradually clear to the coast 16-19Z, although a few beaches may remain BKN-OVC through the afternoon. Areas of intermittent low clouds may briefly impact the coastal airports after 02Z tonight. Away from the coast: mostly clear with unrestricted vis today and tonight.

7.0 AIRMETs for IFR conditions

The following AIRMET for IFR conditions was issued at 0045 PST and was active for the accident location. It advised of ceilings below 1,000 feet and visibilities below 3 statute miles with mist.

WAUS46 KPCI 060845
WA6S
-SFOS WA 060845
AIRMET SIERRA UPDT 1 FOR IFR AND MTN OBSCN VALID UNTIL 061500
.
AIRMET IFR...CA AND CSTL WTRS
FROM RZS TO 30ENE LAX TO 30ESE MZB TO 220SW MZB TO 180SSW RZS
TO 60WSW RZS TO RZS
CIG BLW 010/VIS BLW 3SM BR. CONDS CONTG BYD 15Z THRU 21Z.

The following AIRMET for IFR conditions was issued at 0645 PST and was active for the accident location at the accident time. It advised of ceilings below 1,000 feet and visibilities below 3 statute miles with mist.

WAUS46 KPCI 061445
WA6S
-SFOS WA 061445
AIRMET SIERRA UPDT 2 FOR IFR AND MTN OBSCN VALID UNTIL 062100
.
AIRMET IFR...CA AND CSTL WTRS
FROM 60WNW RZS TO 40ENE LAX TO 20ESE MZB TO 220SW MZB TO
200SSW RZS TO 120SW RZS TO 100WSW RZS TO 60WNW RZS
CIG BLW 010/VIS BLW 3SM BR. CONDS CONTG BYD 21Z THRU 03Z

8.0 SIGMETs

There were no convective or non-convective Significant Meteorological Information (SIGMET) advisories active for the accident location at the accident time.

9.0 Center Weather Service Unit products

There were no Center Weather Advisories or Meteorological Impact Statements issued by the Center Weather Service Unit at the Los Angeles Air Route Traffic Control Center that were active for the accident location at the accident time.

10.0 Astronomical

The astronomical data obtained from the United States Naval Observatory for 32° 49' north latitude and 116° 59' west longitude, for the accident location, indicated the following:

SUN

Begin Civil Twilight	0613 PST
Sunrise	0639 PST

MOON

Moonrise	2307 PST (February 5, 2018)
Moonset	1045 PST

The phase of the moon on February 6, 2018, was: Waning Gibbous with 58% of the Moon's visible disk illuminated.

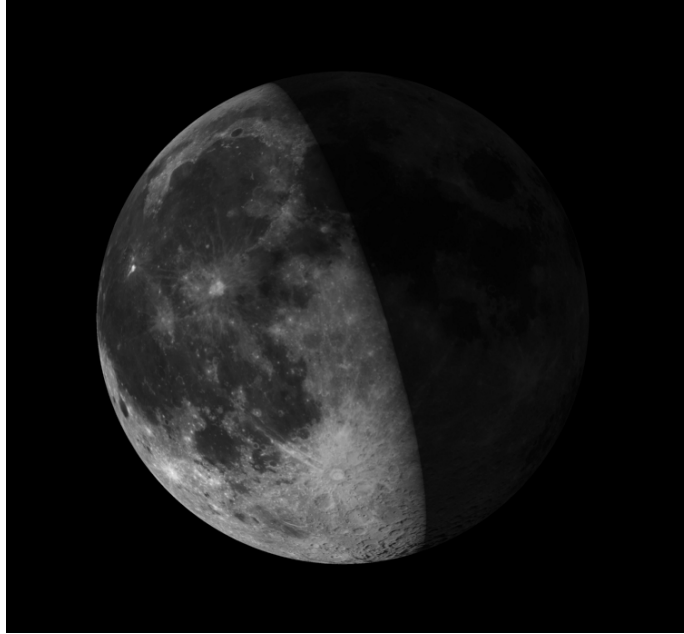


Figure 3 – Phase of the moon on the accident day

11.0 Preflight Weather Briefing

A preflight weather briefing was provided for N3525T by Leidos Flight Service at 0502 PST. The briefer provided the AIRMET for the San Diego area current at the time of the briefing, as well as other information pertinent to the proposed route of flight. During the briefing, the briefer stated that the Area Forecast for southern California for the coastal sections indicated “...tops are expected around 1,500 feet...”

E. LIST OF ATTACHMENTS

Attachment 1 - Email communication with the Federal Aviation Administration regarding sky condition reporting at SEE.

Submitted by:

Mike Richards
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