

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety Washington, D.C. 20594

June 11, 2019

Weather Study Report

METEOROLOGY

WPR19FA075

Table	Of	Contents
-------	----	----------

A. AC	CIDENT
B. ME	TEOROLOGIST
C. DE'	TAILS OF THE INVESTIGATION
D. FA	CTUAL INFORMATION
1.0	Synoptic Situation
1.1	Surface Analysis Chart 4
1.2	Upper Air Charts
2.0	SPC Products
3.0	Surface Observations
4.0	Upper Air Data
5.0	Satellite Data
6.0	Regional Radar Imagery Information
7.0	Pilot Reports
8.0	SIGMET
9.0	CWSU Advisories
10.0	AIRMETs17
11.0	Graphical Forecasts for Aviation
12.0	Terminal Aerodrome Forecast
13.0	NWS Area Forecast Discussion
14.0	Winds and Temperature Aloft Forecast
15.0	Pilot Weather Briefing
16.0	Witness Information
17.0	Astronomical Data
E. LIS	T OF ATTACHMENTS

A. ACCIDENT

Location: Oceanside, California
Date: January 28, 2019
Time: 2052 Pacific standard time 0452 Coordinated Universal Time (UTC) January 29, 2019
Aircraft: Piper PA-28-151, Registration: N37RV

B. METEOROLOGIST

Paul Suffern Senior Meteorologist Operational Factors Division (AS-30) National Transportation Safety Board

C. 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 official National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) sources including the National Centers for Environmental Information (NCEI). All times are Pacific standard time (PST) on January 28, 2019, and are based upon the 24-hour clock, where local time is -8 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 site was located at latitude 33.2106° N, longitude 117.3692° W, at an approximate elevation of 150 feet (ft).

D. 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 and the Weather Prediction Center, 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 00-45H.¹

¹

https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/1030 235

1.1 Surface Analysis Chart

The southwestern United States section of the NWS Surface Analysis Chart for 2200 PST is provided as figure 1 with the approximate location of the accident site marked within a red circle. The chart indicated a stationary front stretching from southern Nevada southeastward into Arizona, southwestern New Mexico, and northern Mexico, northeast of the accident site. A low pressure center was located along the stationary front in southeast Arizona with a pressure of 1015hectopascals (hPa). A surface trough² was also depicted stretching from near San Francisco, California southward to San Diego, California, along the coast and was in the immediate vicinity of the accident site. Troughs can act as lifting mechanisms to help produce clouds and precipitation if sufficient moisture is present.

The station models around the accident site depicted air temperatures in the upper 40's to mid 50's degrees Fahrenheit (°F), dew point temperatures in the upper 40's °F with no temperaturedew point spread near the accident site, calm winds, mostly clear skies reported along the coast and overcast skies reported northeast of the accident site inland.



Figure 1 – NWS Surface Analysis Chart for 2200 PST

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

1.2 Upper Air Charts

The NWS Storm Prediction Center (SPC) Constant Pressure Charts for 1600 PST at 925-, 850-, 700-, 500-, and 300-hPa are presented in figures 2 through 6. There were mid- and upper-level ridges³ above the accident site at 500- and 300-hPa (figures 5 and 6) with the surface and low-level environment conducive for California marine stratus conditions.⁴ The wind was from the west at 5 knots at 925-hPa with the wind becoming northwesterly at 10 knots by 700-hPa (figure 4). At 300-hPa, the wind was from the northwest at 40 knots (figure 6).



Figure 2 – 925-hPa Constant Pressure Chart for 1600 PST

³ Ridge – An elongated area of relatively high atmospheric pressure or heights.

⁴ https://www.meted.ucar.edu/training_module.php?id=165&tab=01#.XHWda-hKiUk https://ams.confex.com/ams/97Annual/webprogram/Paper307002.html



Figure 3 – 850-hPa Constant Pressure Chart for 1600 PST



Figure 4 – 700-hPa Constant Pressure Chart for 1600 PST



Figure 5 – 500-hPa Constant Pressure Chart for 1600 PST



Figure 6 – 300-hPa Constant Pressure Chart for 1600 PST

2.0 SPC Products

No thunderstorms were forecast by SPC for the accident site at the accident time.

3.0 Surface Observations

The area surrounding the accident site was documented using official Meteorological Aerodrome Reports (METARs) and Specials (SPECIs). Figure 7 is a sectional chart with the accident site and the closest weather reporting locations to the accident site marked.



Figure 7 – Sectional chart of accident area with the location of the accident site and the closest surface observation sites

The closest official weather reporting facility was from Bob Maxwell Memorial Airfield (KOKB), Oceanside, California, at an elevation of 28 ft, and was 1 mile east-north of the accident site. KOKB had an Automated Surface Observing System (ASOS⁵) whose reports were not supplemented and had a 12° easterly magnetic variation⁶ (figure 7). The following observations were taken and disseminated during the times surrounding the accident:⁷

- [1752 PST] METAR KOKB 290152Z AUTO 00000KT 7SM CLR 15/14 A2996 RMK AO2 SLP143 T01500144=
- [1852 PST] METAR KOKB 290252Z AUTO 00000KT 6SM BR CLR 13/13 A2997 RMK AO2 SLP147 T01330133 53010=
- [1952 PST] METAR KOKB 290352Z AUTO 02003KT 3SM BR FEW004 10/10 A2997 RMK AO2 SLP149 T01000100=
- [1957 PST] SPECI KOKB 290357Z AUTO 00000KT 1 1/2SM BR FEW004 10/10 A2997 RMK AO2 T01000100=

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

⁶ Magnetic variation – The angle (at a particular location) between magnetic north and true north. Latest measurement taken from https://skyvector.com/

⁷ Bolded sections in this report highlight information that directly reference the weather conditions that affected the accident location around the accident time.

- [2003 PST] SPECI KOKB 290403Z AUTO 00000KT 3/4SM BR VV003 10/10 A2997 RMK AO2 VIS 1/4V4 T01000100=
- [2052 PST] METAR KOKB 290452Z AUTO 04003KT 1/4SM FG VV002 12/12 A2997 RMK AO2 SLP147 T01170117=

ACCIDENT TIME 2052 PST

- [2152 PST] METAR KOKB 290552Z AUTO 00000KT 1/4SM FG VV002 11/11 A2996 RMK AO2 SLP145 T01110111 10178 20089 58002=
- [2246 PST] SPECI KOKB 290646Z AUTO 06003KT 1 1/2SM BR FEW003 11/11 A2996 RMK AO2=
- [2252 PST] METAR KOKB 290652Z AUTO 06004KT 1 1/2SM BR FEW003 11/11 A2996 RMK AO2 SLP143 T01060106=

KOKB weather at 2003 PST, automated, wind calm, three quarters of a mile visibility in mist, vertical visibility 300 ft above ground level (agl), temperature of 10° Celsius (C), dew point temperature of 10° C, and an altimeter setting of 29.97 inches of mercury (Hg). Remarks: automated station with a precipitation discriminator, visibility varying between a quarter of a mile and 4 miles, temperature 10.0° C, dew point temperature 10.0° C.

KOKB weather at 2052 PST, automated, wind from 040° at 3 knots, a quarter mile visibility in fog, vertical visibility of 200 ft agl, temperature of 12° C, dew point temperature of 12° C, and an altimeter setting of 29.97 inches of Hg. Remarks: automated station with a precipitation discriminator, sea level pressure 1014.7-hPa, temperature 11.7° C, dew point temperature 11.7° C.

KOKB weather at 2152 PST, automated, wind calm, a quarter mile visibility in fog, vertical visibility of 200 ft agl, temperature of 11° C, dew point temperature of 11° C, and an altimeter setting of 29.96 inches of Hg. Remarks: automated station with a precipitation discriminator, sea level pressure 1014.5-hPa, temperature 11.1° C, dew point temperature 11.1° C, 6-hourly maximum temperature of 17.8° C, 6-hourly minimum temperature of 8.9° C, 3-hourly pressure decrease of 0.2 hPa.

KOKB weather at 2246 PST, automated, wind from 060° at 3 knots, a one and a half miles visibility in mist, few clouds at 300 ft agl, temperature of 11° C, dew point temperature of 11° C, and an altimeter setting of 29.96 inches of Hg. Remarks: automated station with a precipitation discriminator.

Camp Pendleton MCAS (Munn Field) Airport (KNFG) was the next closest official weather observation point to the accident site. KNFG reported official observations every hour and observations were supplemented by military observers. KNFG was located 5 miles north of the accident site at an elevation of 78 ft (figure 7). The following observations were taken and disseminated during the times surrounding the accident:

- [1455 PST] METAR KNFG 282255Z 18004KT 10SM SCT150 BKN200 20/07 A2993 RMK AO2 SLP135 T02000072 \$=
- [1555 PST] METAR KNFG 282355Z AUTO 19005KT 10SM SCT150 BKN200 19/11 A2994 RMK AO2 SLP137 T01940106 10206 20172 55003 \$=
- [1655 PST] METAR KNFG 290055Z VRB03KT 10SM SCT150 BKN200 17/10 A2994 RMK AO2 SLP138 T01720100 \$=
- [1755 PST] METAR KNFG 290155Z 14003KT 10SM SCT150 BKN200 13/11 A2996 RMK AO2 SLP144 T01330111 \$=
- [1855 PST] METAR KNFG 290255Z 00000KT 10SM SCT150 BKN200 12/10 A2998 RMK AO2 SLP151 T01170100 53013 \$=
- [1955 PST] METAR KNFG 290355Z 00000KT 2SM BR BKN007 09/09 A2998 RMK AO2 SLP152 T00940089 \$=

ACCIDENT TIME 2052 PST

- [2055 PST] METAR KNFG 290455Z 00000KT 2SM BR BKN006 09/09 A2998 RMK AO2 SLP150 T00890089 \$=
- [2155 PST] METAR KNFG 290555Z 00000KT 9SM FEW005 BKN200 09/09 A2997 RMK AO2 SLP147 T00940094 10194 20089 58003 \$=
- [2255 PST] METAR KNFG 290655Z 00000KT 10SM FEW005 SCT200 09/09 A2996 RMK AO2 SLP145 T00890089 \$=
- [2355 PST] METAR KNFG 290755Z AUTO 27003KT 10SM CLR 08/08 A2995 RMK AO2 SLP142 T00830083 402060017 \$=

KNFG weather at 1855 PST, wind calm, 10 miles or greater visibility, scattered clouds at 15,000 ft agl, broken ceiling at 20,000 ft agl, temperature of 12° C, dew point temperature of 10° C, and an altimeter setting of 29.98 inches of Hg. Remarks: automated station with a precipitation discriminator, sea level pressure 1015.1 hPa, temperature 11.7° C, dew point temperature 10.0° C, 3-hourly pressure increase of 1.3 hPa, maintenance is needed on the system.

KNFG weather at 1955 PST, wind calm, 2 miles visibility in mist, broken ceiling at 700 ft agl, temperature of 9° C, dew point temperature of 9° C, and an altimeter setting of 29.98 inches of Hg. Remarks: automated station with a precipitation discriminator, sea level pressure 1015.2 hPa, temperature 9.4° C, dew point temperature 8.9° C, maintenance is needed on the system.

KNFG weather at 2055 PST, wind calm, 2 miles visibility in mist, broken ceiling at 600 ft agl, temperature of 9° C, dew point temperature of 9° C, and an altimeter setting of 29.98 inches of

Hg. Remarks: automated station with a precipitation discriminator, sea level pressure 1015.0 hPa, temperature 8.9° C, dew point temperature 8.9° C, maintenance is needed on the system.

KNFG weather at 2155 PST, wind calm, 9 miles visibility, few clouds at 500 ft agl, broken ceiling at 20,000 ft agl, temperature of 9° C, dew point temperature of 9° C, and an altimeter setting of 29.97 inches of Hg. Remarks: automated station with a precipitation discriminator, sea level pressure 1014.7 hPa, temperature 9.4° C, dew point temperature 9.4° C, 6-hourly maximum temperature of 19.4° C, 6-hourly minimum temperature of 8.9° C, 3-hourly pressure decrease of 0.3 hPa, maintenance is needed on the system.

The observations from KOKB and KNFG surrounding the accident time indicated LIFR⁸ and IFR⁹ conditions with light winds. The LIFR conditions at KOKB began by 2003 PST, but visibility began to decrease as earlier as 1752 PST.

4.0 Upper Air Data

A High-Resolution Rapid Refresh (HRRR)¹⁰ model sounding was created for the accident site for 2200 PST¹¹ with station elevation of 131 ft.¹² The 2200 PST HRRR sounding was plotted on a standard Skew-T Log P diagram¹³ with the derived stability parameters included in figure 8 with data from the surface to 700-hPa (or approximately 10,000 ft msl). This data was analyzed using the RAOB¹⁴ software package. The sounding depicted the lifted condensation level (LCL)¹⁵ at 716 ft agl (847 ft msl) and the convective condensation level (CCL)¹⁶ at 13,384 ft agl (13,515 ft msl). The sounding had a greater than 90% relative humidity from the surface through 700 ft msl. The freezing level was located at 12,892 ft msl. Based on the accident aircraft's flight altitudes there were no icing issues in this accident. The precipitable water value was 0.60 inches.

⁸ Low Instrument Flight Rules (LIFR) – Refers to the general weather conditions pilots can expect at the surface. LIFR criteria means a ceiling below 500 ft agl and/or less than 1-mile visibility.

⁹ Instrument Flight Rules (IFR) – Refers to the general weather conditions pilots can expect at the surface. IFR criteria means a ceiling below 1,000 ft agl and/or less than 3 miles visibility.

¹⁰ The HRRR is a 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.

¹¹ Closest time available.

¹² HRRR sounding was created using NOAA Air Resource Laboratory: https://ready.arl.noaa.gov/READYamet.php

¹³ 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.

¹⁴ RAOB – (The complete Rawinsonde Observation program) is an interactive sounding analysis program developed by Environmental Research Services, Matamoras, Pennsylvania.

¹⁵ LCL - The height at which a parcel of moist air becomes saturated when it is lifted dry adiabatically.

¹⁶ 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 8 – 2200 PST HRRR sounding for the accident site

The 2200 PST HRRR sounding for the accident site indicated stable environment from the surface through 3,000 ft. RAOB did not identify the possibility of clouds between the surface and 10,000 ft msl. An inversion¹⁷ due to radiational cooling was noted at 408 ft msl and a subsidence inversion was noted at 2,235 ft msl. An inversion near the surface with close temperature and dew point, lights winds, and no other large scale weather factors, creates an environment favorable for fog or low stratiform cloud formation.

The 2200 PST HRRR sounding wind profile indicated a surface wind from 095° at 2 knots with the wind remaining variable and less than 10 knots through 10,000 ft. RAOB did not indicate the possibility of low-level wind shear (LLWS). RAOB indicated a small chance of clear-air turbulence existed between 5,000 ft msl and 10,000 ft msl.

¹⁷ Inversion – A departure from the usual decrease or increase with altitude of the value of an atmospheric property; also, the layer through which this departure occurs (the "inversion layer"), or the lowest altitude at which the departure is found (the "base of the inversion").

5.0 Satellite Data

Data from the Geostationary Operational Environmental Satellite number 17 (GOES-17) data was obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison in Madison, Wisconsin, and processed using the Man-computer Interactive Data Access System software. Visible and infrared (bands 2 and 13) imagery at wavelengths of 0.64 microns (μ m) and 10.3 μ m were retrieved for the period. Satellite imagery surrounding the time of the accident, from 1600 PST through 2300 PST at approximately 5-minute intervals were reviewed, and the closest images to the time of the accident are documented here. Due to low light conditions the GOES-17 visible imagery was too dark to provide imagery at the accident time.

Figures 9, 10, and 11 present the GOES-17 infrared imagery from 2046, 2051, and 2100 PST at 4X magnification and with a temperature enhance curve applied with the accident site highlighted with a red square. Inspection of the infrared imagery indicated abundant cloud cover over the accident site at the accident time, with the cloud cover moving from west to east. The lower brightness temperatures (blue and green colors; higher cloud tops) were located south and west of the accident site at the accident time. Based on the brightness temperatures above the accident site (255° Kelvin) and the vertical temperature profile provided by the 2200 PST HRRR sounding, the approximate cloud-top heights over the accident site were 23,000 ft at 2051 PST. It should be noted these figures have not been corrected for any parallax error.



Figure 9 – GOES-17 infrared image at 2046 PST



Figure 10 – GOES-17 infrared image at 2051 PST



Figure 11 – GOES-17 infrared image at 2100 PST

6.0 Regional Radar Imagery Information

A regional view of the NWS national composite radar mosaic is included as figure 12 for 2050 PST with the approximate accident site marked by a red circle. The image depicted no echoes above the accident site at the accident time.



Figure 12 – Regional Composite Reflectivity image for 2050 PST

7.0 Pilot Reports¹⁸

There were no pilot reports or PIREPs within 100 miles of the accident site from two hours prior to the accident time to two hours after the accident time.

8.0 SIGMET

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

9.0 CWSU Advisories

No Center Weather Service Unit (CWSU) Center Weather Advisories (CWA) or Meteorological Impact Statements (MIS) were valid for the accident site at the accident time.

10.0 AIRMETs

There was only Airmen's Meteorological Information (AIRMET) advisory Tango that was valid for the area that included the accident site.. The 1845 PST AIRMET warned of moderate turbulence below 10,000 ft with conditions ending between 1900 and 2200 PST:

¹⁸ Only pilot reports with the World Meteorological Organization (WMO) header UBCA** and UBAZ** identifier were considered.

WAUS46 KKCI 290245

WA6T -SFOT WA 290245 AIRMET TANGO FOR TURB VALID UNTIL 290900

AIRMET TURB...CA AND CSTL WTRS FROM 50NE EHF TO 30E HEC TO BZA TO 20S MZB TO 50SE LAX TO RZS TO 50NE EHF MOD TURB BLW 100. CONDS ENDG 03-06Z.

AIRMET TURB...WA OR AND CSTL WTRS FROM 50WNW EPH TO 40NNE DSD TO 40SSW BTG TO 70S HQM TO 20WSW SEA TO 50WNW EPH MOD TURB BLW 140. CONDS ENDG 03-06Z.

11.0 Graphical Forecasts for Aviation

The Graphical Forecasts for Aviation (GFA) products made available before the accident flight are shown in attachment 1. The GFA surface forecast products indicated VFR¹⁹ conditions for both 1900 and 2200 PST with areas of fog west of the accident site by 2200 PST. The surface wind was indicated to be calm. The GFA cloud forecast products indicated only cirrus clouds above the accident site at 1900 and 2200 PST. For more information please see attachment 1.

12.0 Terminal Aerodrome Forecast

KNFG was the closest site with a Terminal Aerodrome Forecast (TAF). The forecast valid at the accident time was an amended TAF issued at 2001 PST and was valid for a 23-hour period beginning at 2000 PST. The 2001 PST TAF for KNFG was as follows:

TAF AMD KNFG 2904/3003 **VRB05KT 9999 BKN200 QNH2993INS TEMPO 2904/2910 3200 BR BKN007** BECMG 2917/2919 24007KT 9999 BKN150 QNH2985INS T08/2912Z T20/2921Z AMD 0401=

Between 2000 PST and 0900 PST, the TAF expected a variable wind at 5 knots, greater than 6 miles visibility, a broken ceiling at 20,000 ft agl, and a minimum altimeter setting of 29.93 inches of Hg. Temporary conditions were forecast between 2000 PST and 0200 PST (January 29), with 2 miles (3200 meters) visibility, in mist, with a broken ceiling at 700 ft agl.

¹⁹ Visual Flight Rules – Refers to the general weather conditions pilots can expect at the surface. VFR criteria means a ceiling greater than 3,000 feet agl and greater than 6 miles visibility.

Mc Clellan-Palomar Airport (KCRQ) was the closest site with a NWS Terminal Aerodrome Forecast (TAF). KCRQ was located 7 miles southeast of the accident site (figure 7). The KCRQ TAF valid at the accident time was issued at 1525 PST and was valid for a 24-hour period beginning at 1600 PST. The 1525 PST TAF for KCRQ was as follows:

TAF KCRQ 282325Z 2900/2924 **VRB05KT P6SM BKN200** TEMPO 2912/2915 5SM BR SCT005 BKN200 FM292100 25007KT P6SM BKN150 OVC200=

The TAF expected a variable wind at 5 knots, greater than 6 miles visibility, and a broken ceiling at 20,000 ft agl.

13.0 NWS Area Forecast Discussion

The NWS Office in San Diego, California, issued the following Area Forecast Discussion (AFD) at 1350 PST (closest AFD to the accident time with an aviation section). The aviation section of the AFD discussed mostly broken high clouds through the following day, but patchy low clouds and fog could occur within 10 miles of the coast during the evening hours and early Tuesday with a slight chance of ceilings below 800 ft msl and visibilities below 3 miles at coastal airports:

FXUS66 KSGX 282150 AFDSGX

Area Forecast Discussion National Weather Service San Diego CA 150 PM PST Mon Jan 28 2019

.SYNOPSIS...

High temperatures will lower closer to normal by Wednesday. There will be periods of high clouds with a return of night and morning coastal low clouds and fog by midweek. On Thursday, a cold, compact low pressure system from the northwest will bring cooling, showers, and a slight chance of thunderstorms. Dry and a little warmer on Friday. Another low pressure system will bring more showers on late Friday into Saturday, possibly continuing into early next week.

.DISCUSSION...FOR EXTREME SOUTHWESTERN CALIFORNIA INCLUDING ORANGE... SAN DIEGO...WESTERN RIVERSIDE AND SOUTHWESTERN SAN BERNARDINO COUNTIES...

At 1 PM, water vapor satellite showed a broad upper-level ridge just off the West Coast. The ridge will weaken and onshore will strengthen over the next few days, creating high temperatures just above seasonal normals by Wednesday. Patchy fog will slowly return along the coast each night through mid- week, with areas of dense fog at times.

An upper-level low currently over the Aleutian Islands will dig south over the next few days and move over southern CA on Thursday. This will help lower high temperatures to below normal, and also generate rain, mountain snow and an isolated thunderstorm or two. Precipitation amounts are expected to be around 0.05-0.25 inches in the deserts, 0.30-0.70 inches over the coast and valleys and 0.50-1.00 inches in the mountains. Heavier showers and thunderstorms could create locally higher amounts. Isolated flash flooding is possible over slow-moving heavy showers and thunderstorms. Snow levels will be around 7000 ft as the system moves across the area. Snowfall accumulations of 3-5 inches are possible above 7500 ft, with a trace possible down to 7000 ft. A weak upper-level ridge builds in on Friday, creating dry weather across the area for the day.

A deeper, broader upper-level low then digs south along the West Coast at the end of the week taking aim at the entire state of CA. This system also taps into an atmospheric river, with precipitable water values around 1.20 inches just off our coast early Saturday. Precipitation with this system looks more orographically driven, with highest amounts likely on south-facing mountain slopes ahead of the system Friday night and west-facing slopes Saturday. Precipitation accumulations could be up to a few inches in the mountains. Snow levels will be around 7000 ft late Friday, then lower to 6000 ft Saturday and 5000 ft by Saturday night. The details of the system are still coming together, however several inches of snow are possible above 6000-7000 ft. Showers may last into early next week as an active pattern sets up over the region.

.AVIATION...

282100Z...Mostly BKN high clouds above 20000 feet MSL will prevail through Tue. Patchy low clouds and fog could occur within 10 miles of the coast late tonight and early Tue with a slight chance of a CIG below 800 ft MSL and local VIS below 3 miles at coastal airports. Otherwise, unrestricted VIS will prevail through Tue.

.MARINE...

No hazardous marine weather is expected through Wednesday. A quick storm will move through the coastal waters Thursday with showers and a slight chance of thunderstorms, though no large waves or strong winds are anticipated. A more substantial storm system Saturday could bring stronger winds and larger waves, with combined seas possibly reaching 10 feet due to both a potential 5-foot, 18-second swell from 290 degrees and a 9-foot short-period swell, as well as rain.

.SKYWARN...

Skywarn activation is not requested. However weather spotters are encouraged to report significant weather conditions.

.SGX WATCHES/WARNINGS/ADVISORIES... CA...NONE. PZ...NONE.

14.0 Winds and Temperature Aloft Forecast

The NWS 1759 PST Winds and Temperature Aloft forecast valid for the closest point to the accident site is included below:

FBUS31 KWNO 290159 FD1US1 DATA BASED ON 290000Z VALID 290600Z FOR USE 0200-0900Z. TEMPS NEG ABV 24000 FT 3000 6000 9000 12000 18000 24000 30000 34000 39000 SAN 0905 9900+14 9900+08 2710+02 2822-12 2541-22 253838 244149 264556

The accident site was closest to the San Diego, California, (SAN) forecast point. The 1759 PST SAN forecast for use between 1800 PST and 0100 PST (January 29) indicated a wind from 090° at 5 knots at 3,000 ft, a calm wind at 6,000 ft with a temperature of 14° C, and a calm wind at 9,000 ft with a temperature of 8° C.

15.0 Pilot Weather Briefing

The accident pilot did not request a weather briefing through Leidos, or through ForeFlight, or any other documented weather vendors. It is unknown if the accident pilot checked or received additional weather information before or during the accident flight.

16.0 Witness Information

Two pilots arrived at KOKB between 1935 and 1940 PST to log some approaches between Carlsbad and Oceanside, California. As the pilots were pre-flighting their aircraft they noticed a significant amount of condensation on the aircraft along with low-level fog rolling inland from the west. At that point (approximately 1947 PST), the pilots called the KOKB ASOS for updated weather and the ASOS reported one and three quarter miles visibility. The pilots then noticed another aircraft coming in to land from the east as it was still more clear in that direction. After the aircraft landed, they watched this same aircraft depart with what appeared to be about a half mile visibility, before the departing aircraft was submerged in fog at about 400 to 500 ft agl with the departing plane only visible by their nav lights. Afterwards the fog continued to develop towards the field. Due to the lowering visibility conditions, the pilots decided to cancel their flight and departed KOKB by car at approximately 2005 PST and captured the low visibility conditions via imagery at the intersection of airport road and highway 76 within a quarter mile of the KOKB runway as seen in figure 13. Figure 13 was facing the southeast. For more information please see attachments 2 and 3.



Figure 13 – Witness image taken at 2005 PST driving away from KOKB at the intersection of airport road and highway 76 with the image facing southeast

17.0 Astronomical Data

The astronomical data obtained from the United States Naval Observatory for the accident site on January 28, 2019, indicated the following:

SUN	
Begin civil twilight	0622 PST
Sunrise	0648 PST
Sun transit	1202 PST
Sunset	1717 PST
End civil twilight	1744 PST
Accident	2052 PST ²⁰

²⁰ Inserted accident time for reference and context.

0043 PST
0623 PST
1159 PST
2052 PST ²¹

At the time of the accident both the Sun and the Moon were more than 15° below the horizon and provided no illumination at the time of the accident.

E. LIST OF ATTACHMENTS

Attachment 1 – GFA products available before the accident flight for around the accident time

Attachment 2 – Pilot 1 witness information

Attachment 3 – Pilot 2 witness information

Submitted by:

Paul Suffern Senior Meteorologist

²¹ Inserted accident time for reference and context.

THIS PAGE INTENTIONALLY BLANK