



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

January 3, 2019

Weather Study

METEOROLOGY

WPR20FA008

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A. ACCIDENT

Location: Angel Fire, New Mexico
Date: October 20, 2019
Time: 0845 mountain daylight time (1445 UTC¹)
Aircraft: Type: Piper PA24; Registration: N7742P

B. METEOROLOGIST

Mike Richards
Senior Meteorologist
Operational Factors Division (AS-30)
National Transportation Safety Board

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 mountain daylight time (MDT) for October 20, 2019 (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: 36.393056° north latitude, 105.286944° west longitude, at an elevation of about 8,445 feet.

D. WEATHER INFORMATION

1.0 Surface Observations

An Automated Weather Observing System (AWOS) was located at Angel Fire Airport (AXX²) in Angel Fire, New Mexico, which was located within 2 miles of the accident location at an elevation of about 8,380 feet and a magnetic variation of about 12° east. Automated longline³ reports from KAXX during the times surrounding the accident time are presented here.

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.

³ "Longline" refers to the dissemination of weather observations with the intent that they are available in near-real time to national databases (effectively, the whole world) and accessible to the general global public from a large number of vendors. This does not include public accessibility to observations from a reporting station's Very High Frequency (VHF; line-of-site) or telephone broadcast, where applicable. Longline-dissemination of weather

[0815 MDT] METAR KAXX 201415Z AUTO 26014G22KT 10SM OVC070 06/M13
A2985 RMK AO2 T00551129=

**[0835 MDT] METAR KAXX 201435Z AUTO 28014G25KT 10SM OVC070 05/M13
A2986 RMK AO2 T00531135=**

**[0855 MDT] METAR KAXX 201455Z AUTO 25013G19KT 10SM OVC070 05/M13
A2987 RMK AO2 T00521133=**

[0915 MDT] METAR KAXX 201515Z AUTO 25018G26KT 10SM OVC070 05/M13
A2988 RMK AO2 T00531132=

At 0835 MDT, KAXX reported a wind from 280° at 14 knots with gusts to 25 knots, visibility of 10 statute miles or greater, ceiling overcast at 7,000 feet above ground level (agl), temperature of 5° Celsius (C) and a dew point temperature of -13°C, altimeter setting of 29.86 inches of mercury; remarks: automated station with a precipitation discriminator, temperature of 5.3°C and dew point temperature of -13.5°C.

At 0855 MDT, KAXX reported a wind from 250° at 13 knots with gusts to 19 knots, visibility of 10 statute miles or greater, ceiling overcast at 7,000 feet agl, temperature of 5°C and a dew point temperature of -13°C, altimeter setting of 29.87 inches of mercury; remarks: automated station with a precipitation discriminator, temperature of 5.2°C and dew point temperature of -13.3°C.

Five-minute data from KAXX for times surrounding the accident time are provided here.

[0830 MDT] METAR KAXX 201430Z AUTO 27011G21KT 10SM OVC070 05/M13
A2986 RMK AO2 T00531135

[0835 MDT] METAR KAXX 201435Z AUTO 28014G25KT 10SM OVC070 05/M13
A2986 RMK AO2 T00531135

[0840 MDT] METAR KAXX 201440Z AUTO 27010G25KT 10SM OVC070 05/M13
A2986 RMK AO2 T00531134

**[0845 MDT] METAR KAXX 201445Z AUTO 27009G21KT 10SM OVC070 05/M13
A2987 RMK AO2 T00531133**

[0850 MDT] METAR KAXX 201450Z AUTO 26009G15KT 10SM OVC070 05/M13
A2987 RMK AO2 T00521132

[0855 MDT] METAR KAXX 201455Z AUTO 25013G19KT 10SM OVC070 05/M13
A2987 RMK AO2 T00521133

[0900 MDT] METAR KAXX 201500Z AUTO 26018G26KT 10SM OVC070 05/M13
A2988 RMK AO2 T00521131

observations is the primary vehicle through which the general global public has access to surface weather observations, particularly outside of the aviation community.

At 0845 MDT, the KAXX five-minute observation reported a wind from 270° at 9 knots with gusts to 21 knots, visibility of 10 statute miles or greater, ceiling overcast at 7,000 feet agl, temperature of 5°C and a dew point temperature of -13°C, altimeter setting of 29.87 inches of mercury; remarks: station with a precipitation discriminator, temperature of 5.3°C and dew point temperature of -13.3°C.

Using the approximate airport elevation, and temperature (remarked), dew point temperature (remarked) and altimeter setting from the KAXX 0845 MDT five-minute observation, density altitude at 0845 MDT at the surface was calculated to be 9,360 feet. According to one of the maintainers of the AXX AWOS (see Attachment 1), KAXX reports new observations via very high frequency (VHF) broadcasts every minute⁴, which will include density altitude if the density altitude is 1,000 feet or more above the highest point of the runway at AXX.

2.0 Upper Air Data

High-Resolution Rapid Refresh (HRRR) model⁵ soundings for the accident site at 0900 MDT was retrieved from the National Oceanic and Atmospheric Administration's Air Resources Laboratory. It indicated the potential for light and moderate low level wind shear below about 8,500 feet, with a west-southwest wind very near the surface increasing in magnitude from 15 knots to 20 knots with an altitude increase of about 70 feet.

3.0 Pilot Reports

There were no publicly disseminated pilot reports⁶ (PIREPs) made within 30 miles of the accident location between 0600 and 1100 MDT below 10,000 feet.

⁴ These one-minute data were not available.

⁵ 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.

⁶ Pilot reports publicly disseminated only over radio were not captured. Only PIREPs with World Meteorological Organization headers that contained UBNM** were considered.

4.0 Satellite Imagery

Geostationary Operational Environmental Satellite (GOES)-16 visible ($0.64\mu\text{m}$) data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison. Imagery from 0846 MDT is presented in Figure 1. The imagery depicted an area of cloud over the accident site.

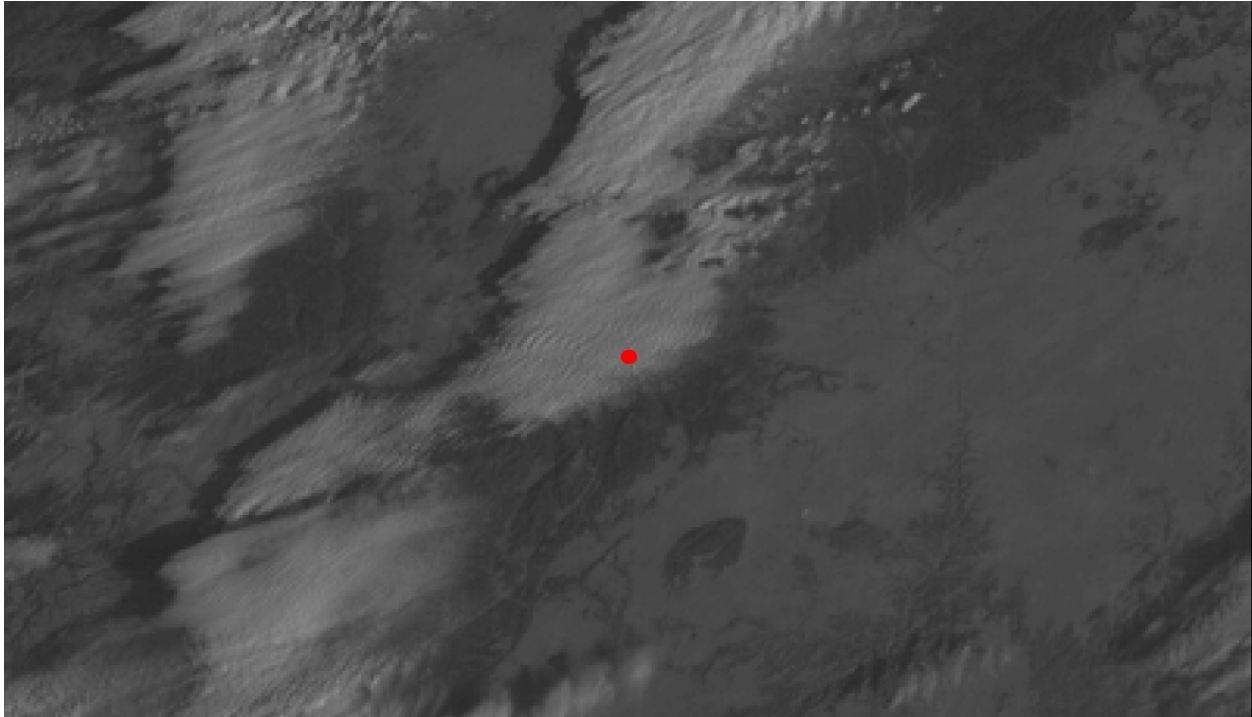


Figure 1 – GOES-16 visible imagery from 0846 MDT. Accident location denoted by red dot. This image has not been corrected for any parallax error.

5.0 Weather Radar

The WSR-88D⁷ Level-II weather radar imagery from the KABX site is presented in Figure 2. KABX was located approximately 105 miles southwest of the accident location at an elevation of about 5,865 feet. Assuming standard refraction and considering the 0.95° beam width⁸ for the WSR-88D radar beam, the KABX 0.5° tilt would have “seen” altitudes above the accident location of between about 14,255 and 24,615 feet. According to Figure 2, no meteorological targets were present around the accident site.

⁷ Weather Surveillance Radar 88 Doppler (WSR-88D)

⁸ Here we define the angular width of the radar beam as the region of transmitted energy that is bounded by one-half the maximum power. The maximum power lies along the beam centerline and decreases outward from the radar antenna.

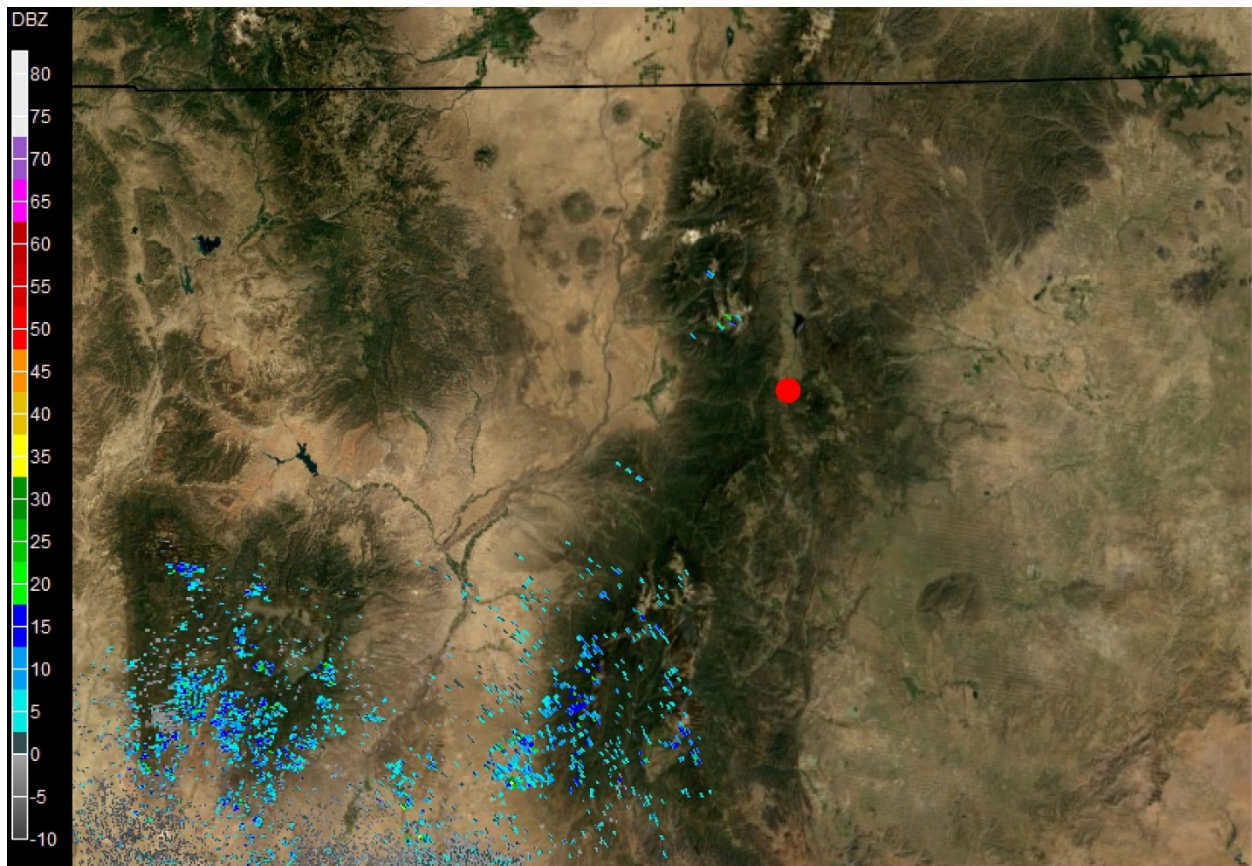


Figure 2 – KABX ~0.5° Level-II reflectivity product from 0849 MDT. Accident location marked by red circle.

6.0 Area Forecast Discussion

An Area Forecast Discussion (AFD) was issued by the Albuquerque National Weather Service (NWS) Weather Forecast Office (WFO) at 0525 MDT. Presented here is the “Aviation” section of that AFD.

*FXUS65 KABQ 201125 AAA
AFDABQ
Area Forecast Discussion...UPDATED
National Weather Service Albuquerque NM
525 AM MDT Sun Oct 20 2019*

.AVIATION...

12Z TAF CYCLE

Strong W/NW winds will ramp up through the morning peaking in the afternoon as a Pacific cold front passes through the area from west to east. Gusts of 25-35kts will be common for the northern half of the state while peak gusts of 35-45kts will be possible through portions of the east-central plains along the I-40 corridor. Areas of bldu are possible, but confidence is not high enough to include any vis reductions at any one TAF location. Winds will taper off after sunset.

7.0 AIRMETs TANGO

Airmen's Meteorological Information (AIRMET) TANGO advisories for moderate turbulence below FL180⁹ and low level wind shear (LLWS) potential were issued at 0245 MDT and were valid for the accident site at the accident time.

WAUS45 KPCI 200845

WA5T

-SLCT WA 200845

AIRMET TANGO UPDT 1 FOR TURB STG WNDS AND LLWS VALID UNTIL 201500

.

AIRMET TURB...ID MT WY NV UT CO AZ NM WA OR

*FROM 20NNW GEG TO 70NNW LKT TO 60NE BIL TO 70SW RAP TO GLD TO 30ENE
TCC TO 60W INK TO 50SSW DMN TO 50SE BCE TO 60ESE BAM TO 90SW BKE TO
20NE EPH TO 20NNW GEG*

MOD TURB BLW FL180. CONDS CONTG BYD 15Z THRU 21Z.

.

LLWS POTENTIAL...ID MT WY NV UT CO AZ NM

*BOUNDED BY 50ESE BIL-70E SHR-20SE BFF-60S CME-40ENE ELP-40WSW ABQ-
40W DBL-40S MTU-60ENE BAM-60SW LKT-20S DBS-50ESE BIL*

LLWS EXP. CONDS CONTG BYD 15Z THRU 21Z.

At 0845 MDT, about the time of the accident, new AIRMET TANGO advisories were issued for moderate turbulence below FL180, strong surface winds and LLWS potential for areas that included the accident site.

WAUS45 KPCI 201445

WA5T

-SLCT WA 201445

AIRMET TANGO UPDT 2 FOR TURB STG WNDS AND LLWS VALID UNTIL 202100

.

AIRMET TURB...ID MT WY NV UT CO AZ NM

*FROM 60WSW DIK TO 70SW RAP TO BFF TO GLD TO 50W LBL TO 30ESE TBE TO
INK TO ELP TO 60SE SSO TO 50S SSO TO 30W SJN TO 60S BCE TO 20NE ELY TO
40S TWF TO 40WSW JAC TO 80SE HLN TO 60WSW DIK*

MOD TURB BLW FL180. CONDS CONTG BYD 21Z THRU 03Z.

.

AIRMET STG SFC WNDS...CO NM

*FROM 40ESE ALS TO 40E CIM TO 30SSE TCC TO 50SE ABQ TO 40NE ABQ TO 30SW
ALS TO 40ESE ALS*

SUSTAINED SURFACE WINDS GTR THAN 30KT EXP. CONDS DVLPG 15-18Z.

CONDS CONTG BYD 21Z ENDG 00-03Z.

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⁹ Flight Level (FL) - a standard nominal altitude of an aircraft, in hundreds of feet. This altitude is calculated from the international standard pressure datum of 1013.25 hPa (29.92 inches of mercury), the average sea-level pressure, and therefore is not necessarily the same as the aircraft's true altitude either above msl or agl.

*LLWS POTENTIAL...MT WY CO NM
BOUNDED BY 60WSW DIK-60NNW BFF-BFF-50SSE CYS-30SE DEN-30ESE FTI-
40ENE ABQ-40E HBU-50NNE OCS-50S BIL-40ESE BIL-50SSW MLS-60WSW DIK
LLWS EXP. CONDS CONTG BYD 21Z ENDG 00-03Z.*

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 CWSU Products

The investigation was not able to locate any Center Weather Advisories or Meteorological Impact Statements issued by the Center Weather Service Unit (CWSU) at the Albuquerque Air Route Traffic Control Center that were active for the accident location at the accident time.

10.0 Flight Service

Neither Leidos nor ForeFlight had any contact with the accident aircraft on the day of the accident or the day prior to the accident.

E. LIST OF ATTACHMENTS

Attachment 1 - Correspondence with a maintainer of the Automated Weather Observing System at Angel Fire Airport.

Submitted by:

Mike Richards
Senior Meteorologist

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