



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

October 21, 2019

Weather Study

METEOROLOGY

ERA19FA240

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A. ACCIDENT

Location: Hatboro, Pennsylvania
Date: August 8, 2019
Time: about 0615 eastern daylight time (about 1015 UTC¹)
Aircraft: Type: Beech F33; Registration: N4082S

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 eastern daylight time (EDT) for August 8, 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: 40.172459° north latitude, 75.079868° west longitude, at an elevation of about 230 feet.

D. WEATHER INFORMATION

1.0 Weather Radar

WSR-88D Level-II weather radar imagery from central New Jersey (KDIX), is presented in figure 1. KDIX was located approximately 34 miles east-southeast of the accident site with an antenna elevation of about 230 feet. Assuming standard refraction and considering the 0.95° beam width for the WSR-88D radar beam, the KDIX 0.484° tilt angle would have "seen" altitudes above the accident location of between about 1,000 and 4,500 feet msl. Figure 1 depicts light values of reflectivity around the accident location at the accident time.

¹ UTC – abbreviation for Coordinated Universal Time

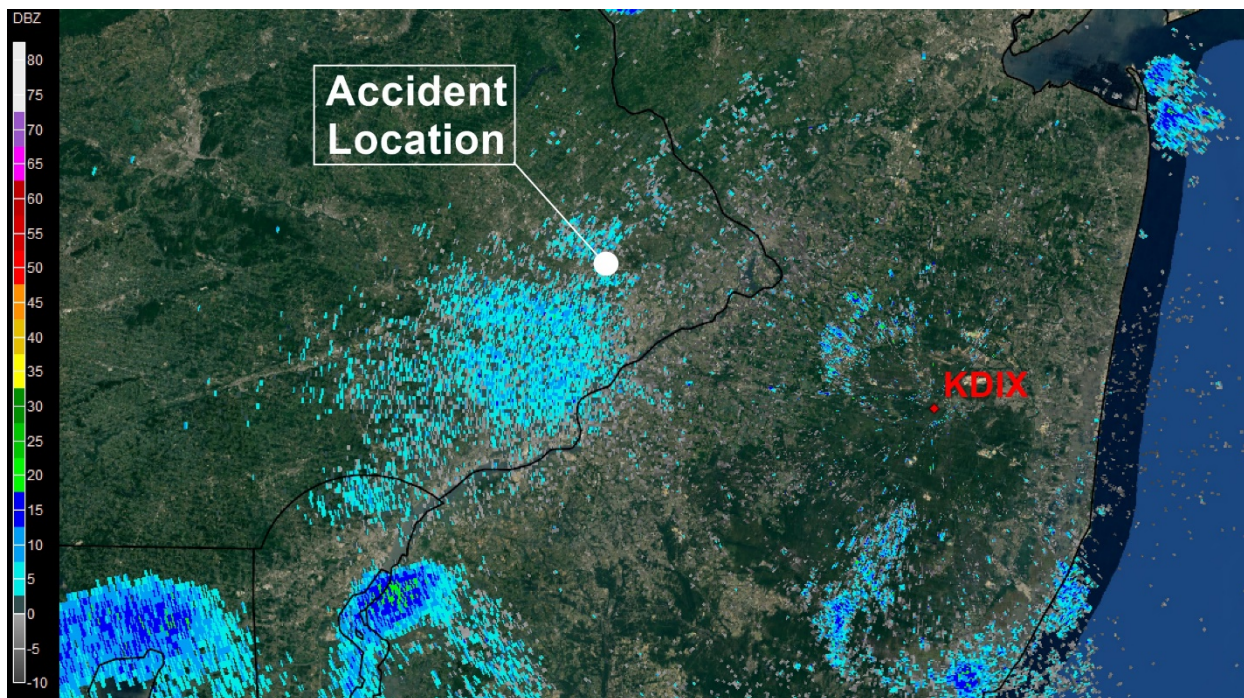


Figure 1 – KDIX WSR-88D Level-II 0.484° base reflectivity imagery from a sweep that began at 1014 EDT.

2.0 Surface Observations

The closest station to the accident site with ceiling and visibility reporting was an Automated Surface Observing System (ASOS) located at Northeast Philadelphia Airport (PNE²) in Philadelphia, Pennsylvania, which was located about 6 miles south-southeast of the accident location at an elevation of about 120 feet. Automated reports from KPNE during the times surrounding the accident time are presented here.

[0454 EDT] METAR KPNE 080854Z AUTO 27004KT 6SM BR OVC010 22/20 A2976
RMK AO2 CIG 007V012 SLP077 T02220200 56012=

[0521 EDT] SPECI KPNE 080921Z AUTO 24003KT 6SM HZ OVC008 22/19 A2976
RMK AO2 CIG 007V012 T02220194=

**[0554 EDT] METAR KPNE 080954Z AUTO 00000KT 5SM HZ OVC008 22/19
A2977 RMK AO2 SLP080 T02220194=**

[0654 EDT] METAR KPNE 081054Z 00000KT 5SM HZ OVC008 23/19 A2978 RMK
AO2 SLP084 T02280194=

² This report uses the 3-digit International Air Transport Association format for airport identification, which does not use the geographic designating digit (e.g., “K” for stations in the continental U.S. and “P” for U.S. stations in Alaska and the Pacific region) as found in the 4-digit International Civil Aviation Organization (ICAO) identifier format. Weather observations from airports in this report are referenced by their reporting station’s identifier (using ICAO format that includes the geographic designating digit), not by the airport at which the reporting station is located.

At 0554 EDT, KPNE reported a calm wind, visibility of 5 statute miles, haze, ceiling overcast at 800 feet above ground level (agl), temperature of 22° Celsius (C) and a dew point temperature of 19°C, altimeter setting of 29.77 inches of mercury; remarks: station with a precipitation discriminator, sea level pressure of 1008.0 hectopascals (hPa), temperature of 22.2°C and dew point temperature of 19.4°C.

An Automated Weather Observing System was located at Wings Field Airport (LOM) in Philadelphia, Pennsylvania, which was located about 9 miles west-southwest of the accident location at an elevation of about 300 feet. Automated reports from KLOM during the times surrounding the accident time are presented here.

[0535 EDT] METAR KLOM 080935Z AUTO 00000KT 4SM BR OVC008 20/20 A2977
RMK AO2 T02040200=

[0555 EDT] METAR KLOM 080955Z AUTO 00000KT 4SM BR OVC008 20/20 A2976
RMK AO2 T02040200=

**[0615 EDT] METAR KLOM 081015Z AUTO 00000KT 2 1/2SM BR BKN008 20/20
A2977 RMK AO2 T02020199=**

[0635 EDT] METAR KLOM 081035Z AUTO 25003KT 3SM BR OVC008 20/20 A2977
RMK AO2 T02040201=

At 0615 EDT, KLOM reported a calm wind, visibility of two and one-half statute miles, mist, ceiling broken at 800 feet agl, temperature of 20°C and a dew point temperature of 20°C, altimeter setting of 29.77 inches of mercury; remarks: station with a precipitation discriminator, temperature of 20.2°C and dew point temperature of 19.9°C.

An ASOS was located at Doylestown Airport (DYL) in Doylestown, Pennsylvania, which was located about 10 miles north of the accident location at an elevation of about 400 feet. Automated reports from KDYL during the times surrounding the accident time are presented here.

[0454 EDT] METAR KDYL 080854Z AUTO 23003KT 9SM OVC005 21/19 A2976
RMK AO2 CIG 004V008 SLP072 T02110194 55009=

[0554 EDT] METAR KDYL 080954Z AUTO VRB03KT 10SM OVC009 21/19 A2976
RMK AO2 CIG 006V013 SLP072 T02110194=

**[0607 EDT] SPECI KDYL 081007Z AUTO 00000KT 10SM OVC011 21/19 A2976
RMK AO2 T02110194=**

[0654 EDT] METAR KDYL 081054Z AUTO 00000KT 8SM SCT012 21/19 A2976
RMK AO2 SLP073 T02110194=

At 0607 EDT, KDYL reported a calm wind, visibility of 10 statute miles or greater, ceiling overcast at 1,100 feet agl, temperature of 21°C and a dew point temperature of 19°C, altimeter setting of 29.76 inches of mercury; remarks: station with a precipitation discriminator, temperature of 21.1°C and dew point temperature of 19.4°C.

3.0 Upper Air Data

A High-Resolution Rapid Refresh (HRRR) model³ sounding for the accident site at 0600 EDT (Figure 2) was retrieved from the National Oceanic and Atmospheric Administration's Air Resources Laboratory. Relative humidity was 99 percent or greater between about 600 and 1,900 feet and according to the Rawinsonde OBservation Program (RAOB) the potential for cloudy conditions existed between about 900 and 1,900 feet.

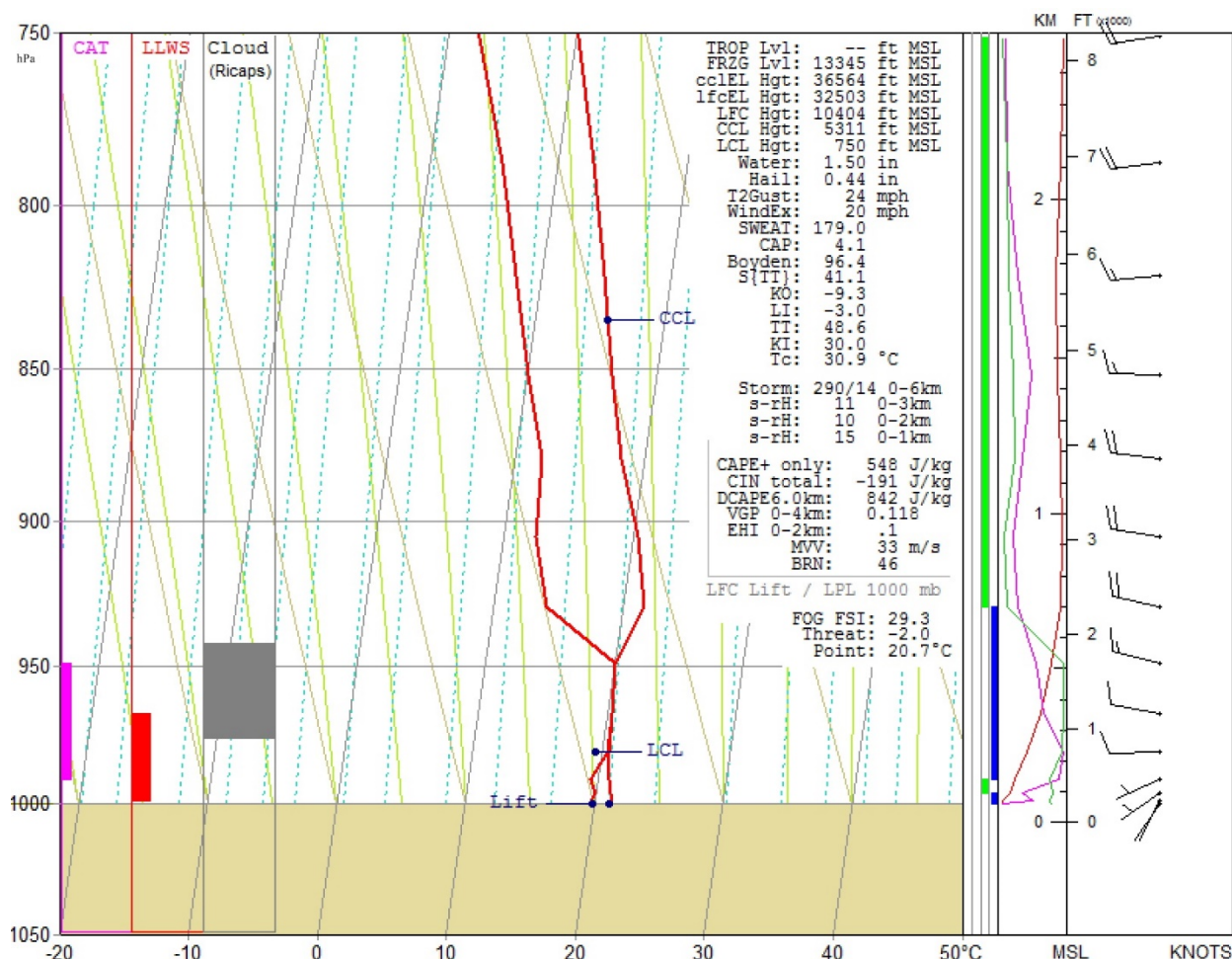


Figure 2 – HRRR model sounding data in SkewT/LogP format for 0600 EDT at the accident site, surface to 750 hPa.

³ 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.

4.0 Satellite Imagery

Geostationary Operational Environmental Satellite (GOES)-16 visible ($0.64\mu\text{m}$) and infrared ($10.3\mu\text{m}$) data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison. Imagery from 0616 EDT is presented in figures 3 and 4. The visible imagery identified cloudy conditions over the accident site and across much of the accident region. Infrared imagery depicted minimum brightness temperatures immediately above the accident location of about 16°C , which, when considering the HRRR sounding, corresponded to cloud top heights at about 5,000 feet. However, given the relative humidity profile in the HRRR sounding, it is likely that cloud tops were closer to about 1,800 feet.

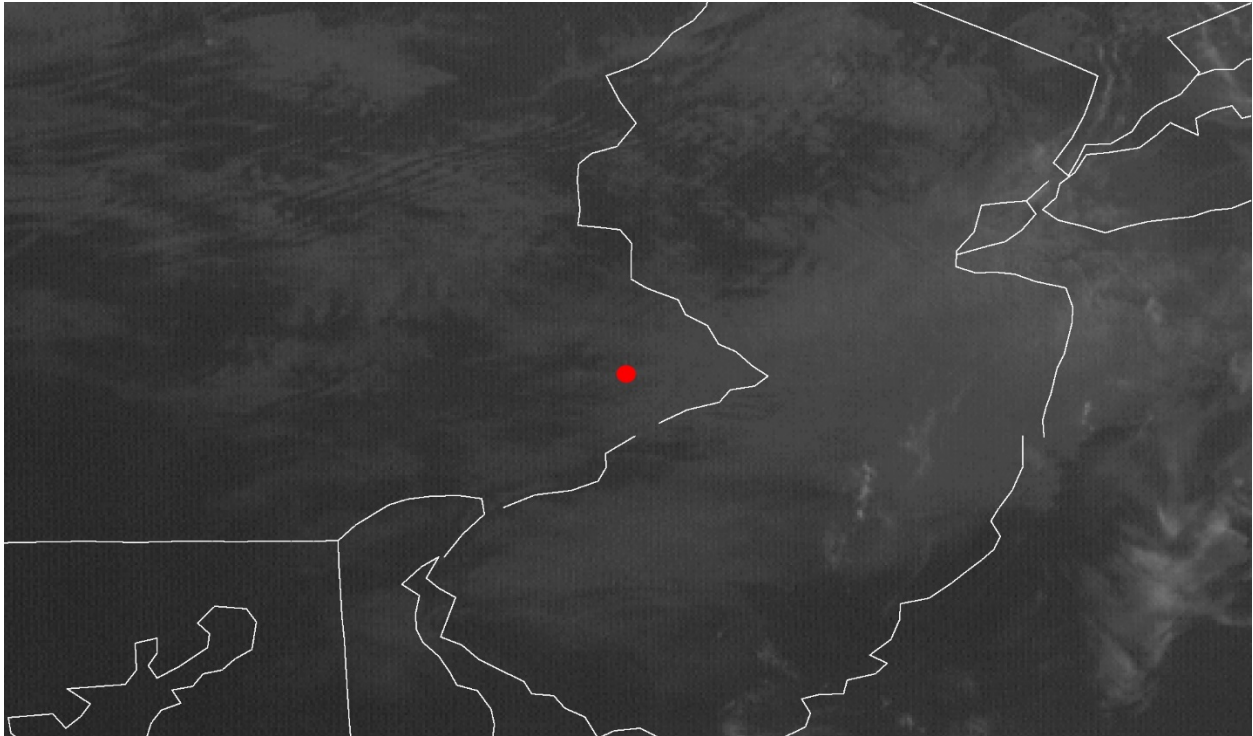


Figure 3 – GOES-16 visible imagery from 0616 EDT. Accident location denoted by red dot. This image has not been corrected for any parallax error but has been contrast-enhanced.

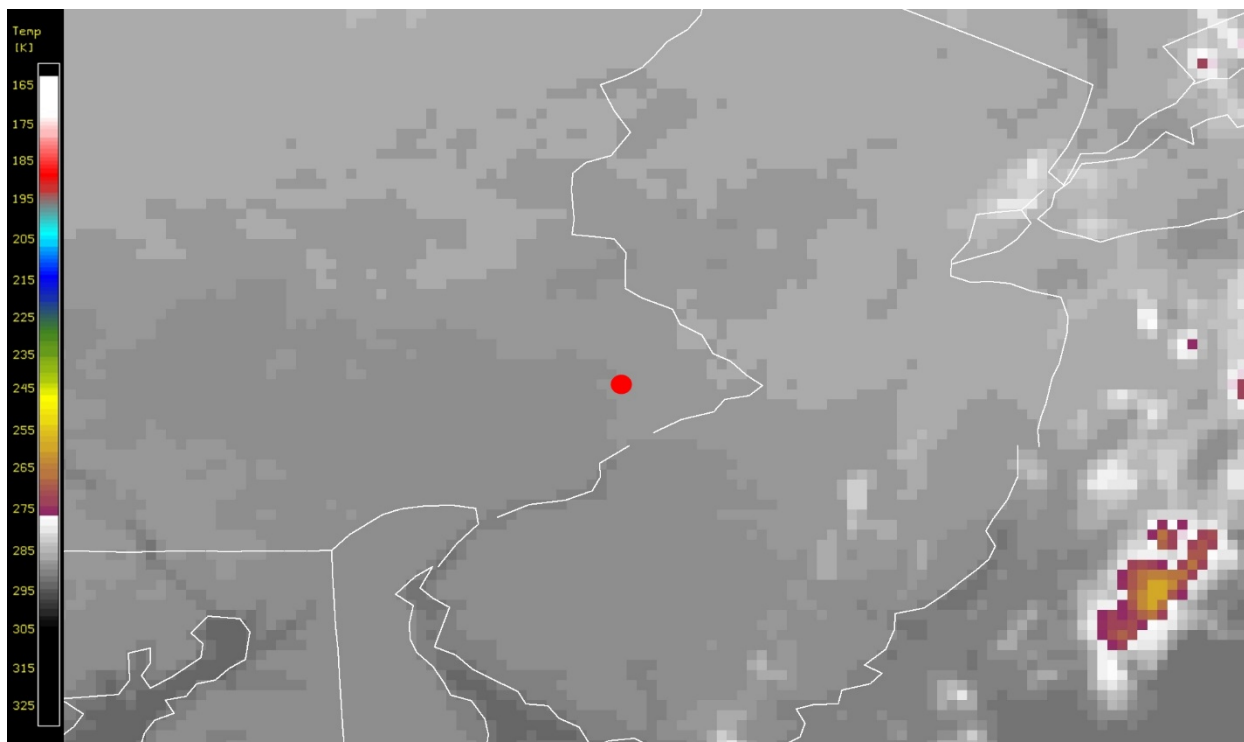


Figure 4 – GOES-16 infrared imagery from 0616 EDT. Accident location denoted by red dot. This image has not been corrected for any parallax error.

5.0 Terminal Aerodrome Forecasts

The Terminal Aerodrome Forecast (TAF) issued at 0425 EDT for PNE forecasted for the accident time: a variable wind at 3 knots, visibility of greater than 6 statute miles and scattered clouds at 1,000 feet agl, with temporary conditions⁴ of visibility of 4 statute miles, mist and a broken ceiling of 1,000 feet.

KPNE 080825Z 0808/0906 **VRB03KT P6SM SCT010**
TEMPO 0808/0812 4SM BR BKN010
 FM081400 26008KT P6SM SCT050
 FM090200 VRB04KT P6SM FEW100=

6.0 Pilot Reports

The only publicly disseminated pilot reports⁵ (PIREP) made within about 40 miles of the accident location within an hour of the accident time was at 0634 EDT from a Boeing 757 aircraft over

⁴ Temporary conditions - fluctuations to forecast conditions which are expected to last less than one hour in each instance and, in the aggregate, to cover less than half of the indicated period.

⁵ Pilot reports publicly disseminated only over radio were not captured. Only PIREPs with World Meteorological Organization headers that contained UBPA**, UBNJ** and UBDE** were considered.

Lehigh Valley International Airport in Allentown, Pennsylvania, who reported overcast conditions at 1,400 feet with a wind from 290°⁶ at 20 knots at 3,000 feet.

ABE UA /OV ABE/T 1034/FL030/TP B757/SK OVC014/WV 29020KT=

7.0 AIRMETs

An Airmen's Meteorological Information (AIRMET) advisory for IFR conditions⁷ issued by the National Weather Service's (NWS) Aviation Weather Center (AWC) at 0445 EDT and was active for the accident location at the accident time.

WAUS41 KPCI 080845

WA1S

-BOSS WA 080845

AIRMET SIERRA UPDT 2 FOR IFR AND MTN OBSCN VALID UNTIL 081500

*AIRMET IFR...VT MA CT NY NJ PA WV MD DC DE VA AND CSTL WTRS
FROM 40NNE ALB TO BDL TO 30SSE CYN TO 20NE ECG TO 60SSW RIC TO
50WSW CSN TO 20WNW EMI TO 20W HNK TO 40NNE ALB
CIG BLW 010/VIS BLW 3SM BR. CONDS ENDG 12-15Z.*

8.0 SIGMETs

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

9.0 CWSU Products

There were no Center Weather Advisories or Meteorological Impact Statement issued by the Center Weather Service Unit (CWSU) at the New York Air Route Traffic Control Center that were active for the accident location at the accident time.

Submitted by:

Mike Richards
Senior Meteorologist

⁶ It is not known if this wind direction is referenced to true or magnetic north.

⁷ Instrument Flight Rule (IFR) conditions - ceilings less than 1,000 feet agl and/or visibility less than three statute miles.

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