



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

October 20, 2020

Specialist's Factual Report

METEOROLOGY

ERA20LA338

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A. ACCIDENT

Location: Pottstown, Pennsylvania
Date: September 22, 2020
Time: 1218 eastern daylight time (1618 UTC)¹
Airplane: Type – Cessna 170; Registration – N2772D

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 eastern daylight time (EDT) for September 22, 2020 (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). The accident site was located at about: 40.23992° north latitude, 75.556002° west longitude, at an elevation of about 300 feet.

This report provides information on the wind condition present at the accident site around the accident time and includes weather radar information.

D. FACTUAL INFORMATION

1.0 Surface Observations

An Automated Surface Observing System (ASOS) was located at Heritage Field Airport (PTW²) in Pottstown, Pennsylvania, at an elevation of 45 feet and had a magnetic variation of about 12° west. The accident occurred at PTW. Augmented longline³ reports from the PTW ASOS 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 observations is the primary vehicle through which the general global public has access to surface weather observations, particularly outside of the aviation community.

[0954 EDT] METAR KPTW 221354Z AUTO VRB03KT 10SM CLR 12/05 A3024 RMK
AO2 SLP238 T01220050=

[1054 EDT] METAR KPTW 221454Z AUTO VRB03KT 9SM CLR 16/06 A3021 RMK
AO2 SLP227 T01560061 58021=

**[1154 EDT] METAR KPTW 221554Z AUTO 31009G14KT 10SM CLR 19/03 A3017
RMK AO2 SLP213 T01890033=**

[1254 EDT] METAR KPTW 221654Z AUTO 32012KT 10SM CLR 20/03 A3012 RMK
AO2 SLP198 T02000028=

At 1154 EDT, the PTW ASOS reported a wind from 310° at 9 knots with gusts to 14 knots, visibility of 10 statute miles or greater, sky clear below 12,000 feet above ground level (agl), temperature of 19° Celsius (C) and a dew point temperature of 3°C, altimeter setting of 30.17 inches of mercury; remarks: automated station with a precipitation discriminator, sea level pressure of 1021.3 hectopascals (hPa), temperature of 18.9°C and a dew point temperature of 3.3°C.

Five-minute data from the PTW ASOS for times surrounding the accident are presented here. At 1220 EDT, the PTW ASOS five-minute observation indicated a variable wind direction⁴ between 310° and 030°.

[1200 EDT] 5-MIN KPTW 221600Z AUTO 32008G14KT 10SM CLR 19/03 A3016 90
35 600 330/08G14 RMK AO2 T01890033

[1205 EDT] 5-MIN KPTW 221605Z AUTO 31009G14KT 10SM CLR 19/04 A3016 90
36 600 330/09G14 RMK AO2 T01890039

[1210 EDT] 5-MIN KPTW 221610Z AUTO 32010G15KT 280V350 10SM CLR 19/03
A3016 90 34 600 330/10G15 290V360 RMK AO2 T01890028

[1215 EDT] 5-MIN KPTW 221615Z AUTO 36008KT 10SM CLR 19/03 A3015 100 33
700 020/08 RMK AO2 T01940028

**[1220 EDT] 5-MIN KPTW 221620Z AUTO 35007KT 310V030 10SM CLR 19/04
A3015 100 35 700 360/07 320V040 RMK AO2 T01940039**

[1225 EDT] 5-MIN KPTW 221625Z AUTO VRB06KT 10SM CLR 19/03 A3014 100 33
700 VRB/06 RMK AO2 T01940028

[1230 EDT] 5-MIN KPTW 221630Z AUTO VRB06KT 10SM CLR 19/03 A3014 110 34
700 VRB/06 RMK AO2 T01940033

⁴ According to the ASOS User's Guide: "...a variable wind is reported when the wind direction varies by 60 degrees or more during the 2-minute evaluation period before the observation. If the 2-minute wind speed is 6 knots or less, than a variable wind direction indicator (VRB) is included in the basic wind group; if the 2-minute wind speed is greater than 6 knots, then a variable wind direction group is appended to the basic wind group in the body of the METAR/SPECI report." <https://www.weather.gov/media/asos/aum-toc.pdf>

One-minute wind data from the PTW ASOS for time surrounding the accident time were obtained from the National Oceanic and Atmospheric Administration (NOAA)⁵ and are presented here.⁶ It should be noted these one-minute wind reports were not public and would have been different than the two-minute-averaged (and-rounded) wind values disseminated from the ASOS publicly (e.g., via very high frequency broadcast or telephone). However, these data should accurately reflect variation in the field at the PTW ASOS at times surrounding the accident time. At 1217 EDT the gust wind direction was 309° and two minutes later the gust wind direction was 015° (a 66-degree difference).

<u>Time</u>	<u>W Dir</u>	<u>W Mag</u>	<u>G Dir</u>	<u>G Mag</u>
1210	321°	10	339°	14
1211	338°	10	325°	11
1212	335°	9	326°	13
1213	337°	8	329°	11
1214	356°	8	007°	11
1215	004°	8	004°	11
1216	349°	6	346°	8
1217	328°	6	309°	8
1218	327°	5	353°	8
1219	344°	5	015°	11
1220	348°	7	352°	10
1221	348°	8	335°	9
1222	331°	6	294°	8

2.0 Weather Radar

The WSR-88D⁷ Level-II base reflectivity weather radar imagery from the Mt. Holly, New Jersey, site (KDIX) is presented in figure 1. KDIX was located approximately 55 miles east-southeast of the accident location at an elevation of about 230 feet. Assuming standard refraction and considering the 0.95° beam width⁸ for the WSR-88D radar beam, the KDIX 0.483° tilt would have “seen” altitudes above the accident location of between about 2,300 and 7,800 feet above msl. The image revealed no pertinent meteorological targets around the accident location.

⁵ <ftp://ftp.ncdc.noaa.gov/pub/data/asos-onemin/>

⁶ W_Dir = Direction of two-minute averaged wind (true); W_Mag = Magnitude of two-minute averaged wind (knots); G_Dir = Direction of five-second averaged wind (true); G_Mag = Magnitude of five-second averaged wind (knots)

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.

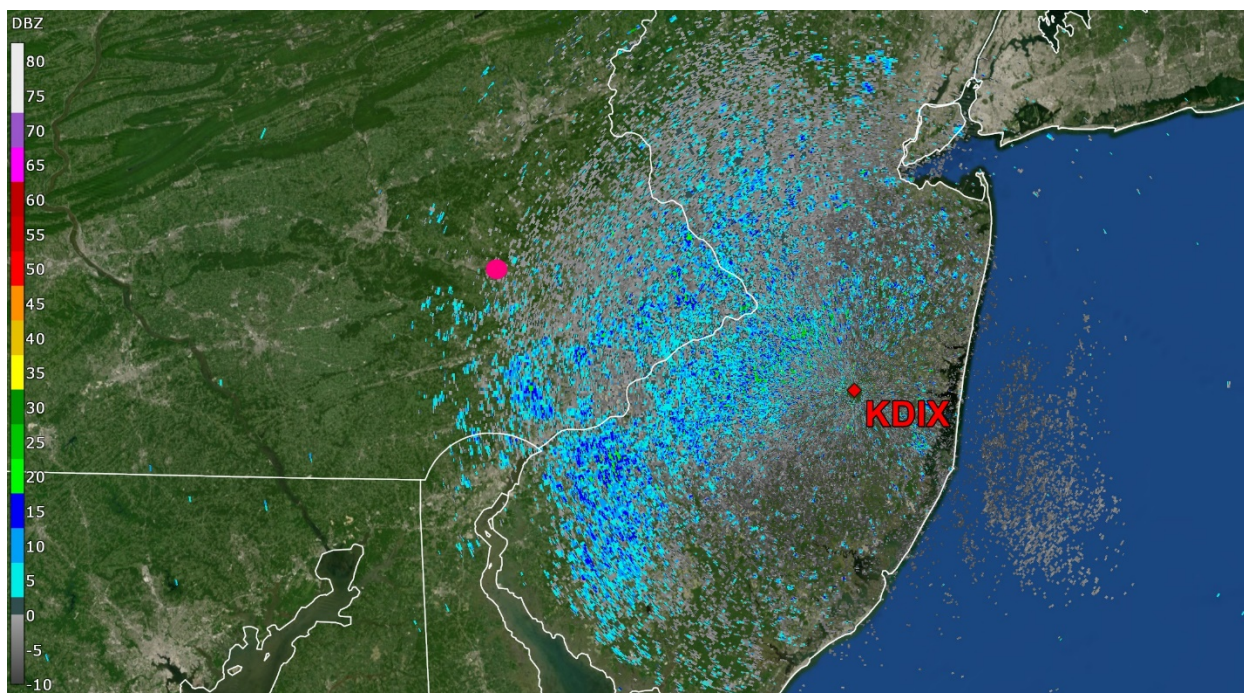


Figure 1 – KDIX 0.483° Level-II base reflectivity product from a sweep initiated at 1216:01 EDT. Accident location marked by purple circle.

3.0 Upper Air Data

A High-Resolution Rapid Refresh (HRRR) model⁹ sounding (figure 2) for the accident site at 1200 EDT was retrieved from NOAA’s Air Resources Laboratory. At 300 feet above msl the wind was from the northwest at 8 knots and did not change significantly in the column (i.e., vertically) in the lowest 1,500 feet above msl. Calculations made by the Rawinsonde OBservation Program (RAOB) identified “light” low level wind shear (LLWS) at 327 feet above msl.

⁹ 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.

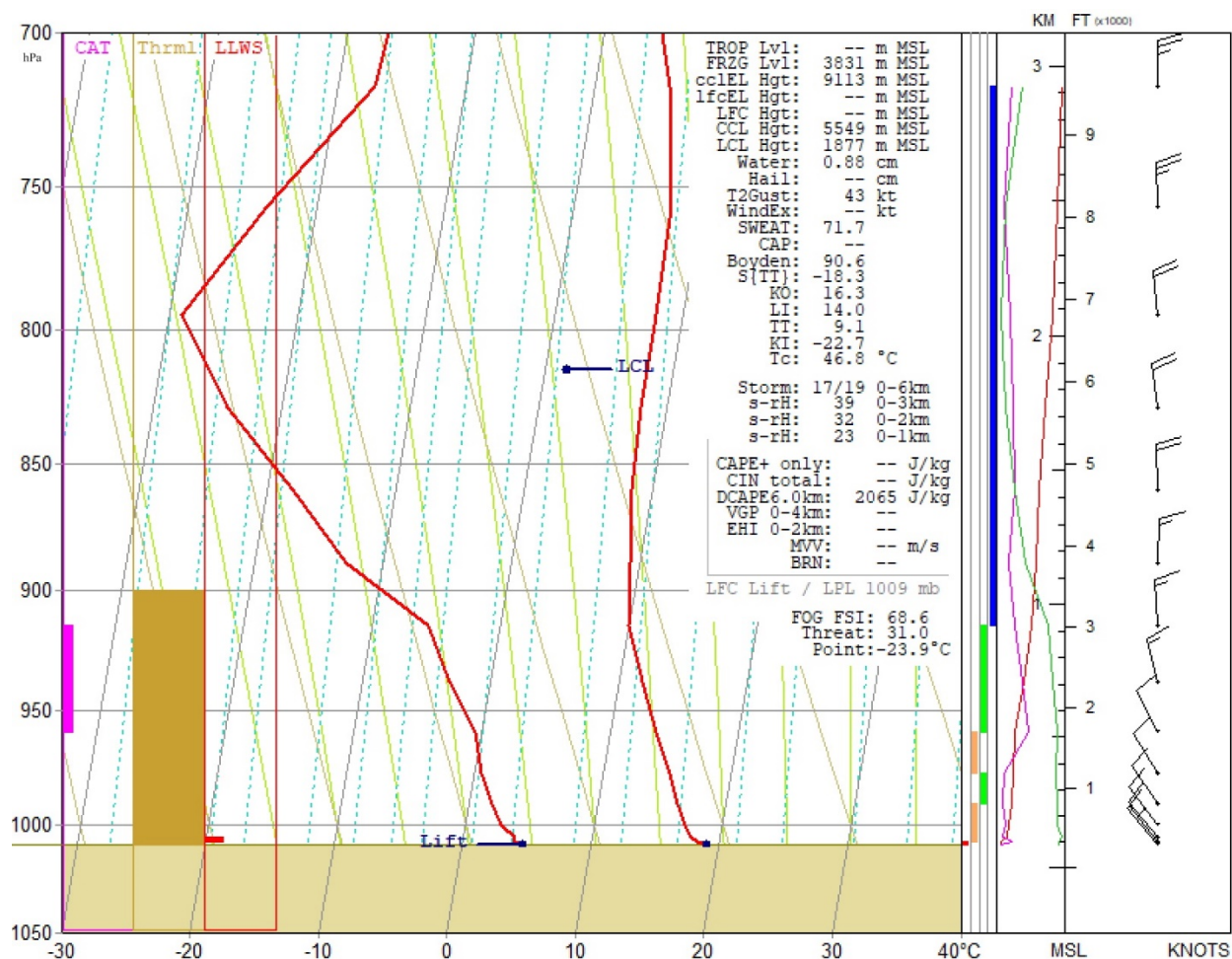


Figure 2 – HRRR model sounding data in SkewT/LogP format for 1200 EDT at the accident site, surface to 700 hPa.

Submitted by:

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