NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

August 14, 2018

Weather Study

METEOROLOGY

ERA18FA167

Table Of Contents

A. ACCIDENT

Location: Springfield Township, New Jersey
Date: June 13, 2018
Time: 0908 eastern daylight time
1308 universal coordinated time (UTC)
Airplane: Beech 58; registration: N218BL

B. METEOROLOGIST

Don Eick
Senior Meteorologist
Operational Factors Division (AS-30)
National Transportation Safety Board

C. SUMMARY

On June 13, 2018, about 0908 eastern daylight time, a Beech 58, N218BL, impacted a field near Springfield Township, New Jersey. The private pilot and pilot-rated passenger were fatally injured, and the airplane was destroyed by impact forces. The airplane was privately owned and operated under the provisions of Title 14 *Code of Federal Regulations (CFR)* Part 91. Day instrument meteorological conditions (IMC) prevailed, and an instrument flight rules (IFR) flight plan was filed for the positioning flight, which originated from South Jersey Regional Airport (VAY), Mount Holly, New Jersey, about 0904, and was destined for Barnstable Municipal Airport-Boardman/Polando Field (HYA), Hyannis, Massachusetts.

D. DETAILS OF THE INVESTIGATION

The National Transportation Safety Board's (NTSB) Senior Meteorologist was not on scene for this investigation and conducted the meteorology phase of the investigation from the Washington D.C. office, collecting data from official National Weather Service (NWS) sources including the Weather Prediction Center and the National Center for Environmental Information. All times are eastern daylight time (EDT) based upon the 24-hour clock, local time is +4 hours to UTC, and UTC=Z. NWS airport and station identifiers use the standard International Civil Aviation Organization 4-letter station identifiers versus the International Air Transport Association 3-letter identifiers, which deletes the initial country code designator "K" for U.S. airports. Directions are referenced to true north and distances in nautical miles. Heights are in feet (ft) 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 40.026111° N and longitude 74.755556° W, at an elevation of approximately 36 ft.

E. WEATHER INFORMATION

1.0 Synoptic Conditions

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 located in College Park, Maryland. These are the base products used in describing weather features and in the creation of forecasts and warnings. 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 Surface Analysis Chart

The NWS northeast section of the Surface Analysis Chart for 0800 EDT on June 13, 2018 is included in figure 1 with the accident site located within the red circle over central New Jersey. The chart depicted a low-pressure system over Canada at 1001-hectopascals (hPa)[1] associated with an occluded frontal system, with a warm front extending east-southeast from the system across New York into northern New Jersey. The accident site was located south of the warm front and in the warm air sector of the front.

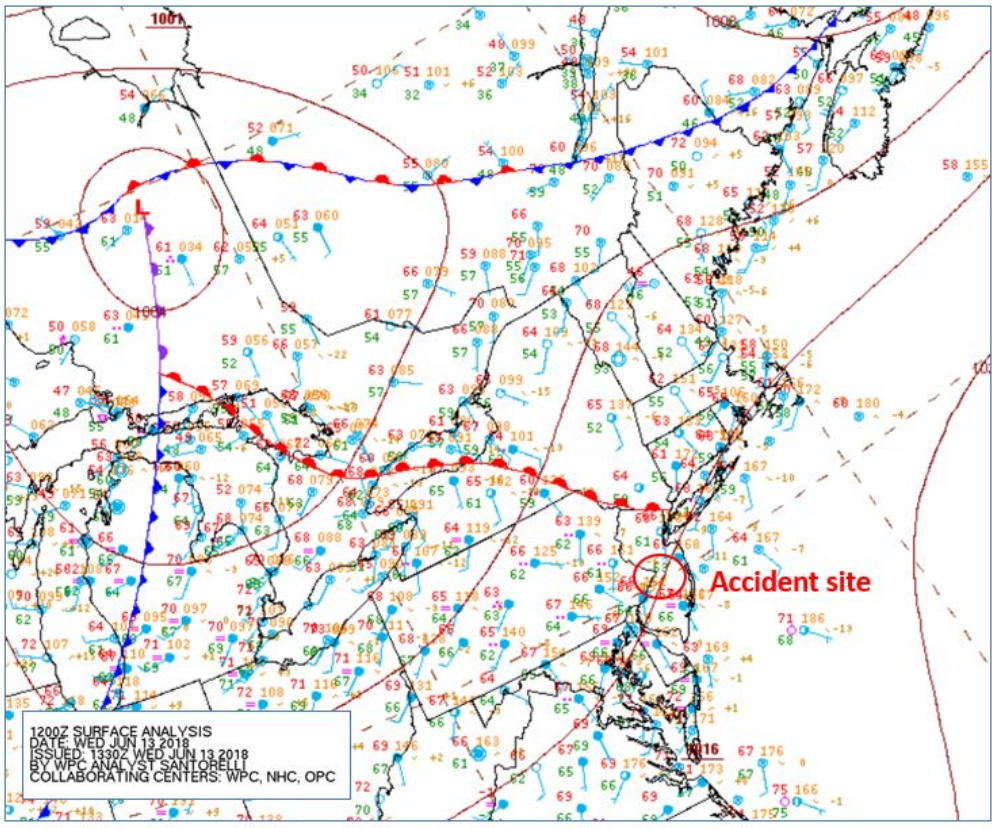

Figure 1 - NWS Surface Analysis Chart for 0800 EDT

[1]Hectopascals (hPa) is the standard term for reporting sea level pressure and is interchangeable with the former term millibar (mb) with he same units. Standard sea level pressure is 1013.25-hPa at 15° Celsius (C) or 59° Fahrenheit (F).

The station models surrounding the accident site depicted light southerly winds of approximately 5 knots, obscured to overcast clouds, with visibility restricted in fog or mist, temperatures in the mid 60's Fahrenheit (°F) with dew point temperatures spreads of 2° F or less. Multiple stations in Pennsylvania to the west and northwest of the accident site reported light to moderate rain. The destination area was ahead of the warm front and depicted winds from the southeast at 10 to 15 knots, clear skies, with temperatures in the mid 50's °F.

1.2 Weather Depiction Chart

The eastern half of the NWS Weather Depiction Chart issued by NCEP for 0900 EDT is included as figure 2 depicting the frontal systems and the observed general flight categories conditions[2]. The approximate accident site location is within the marked red circle. The chart depicted Instrument Flight Rule (IFR) conditions by a shaded contour, Marginal Visual Flight Rule (MVFR) conditions with an unshaded contour, and Visual Flight Rule (VFR) conditions outside of the contours. The station models immediately surrounding the accident site depicted IFR conditions due to low ceilings and visibility restricted in fog or mist.

[2] As defined by the NWS and the FAA Aeronautical Information Manual (AIM) section 7-1-7 defines the following general flight categories:

- Low Instrument Flight Rules (LIFR*) – ceiling below 500 ft agl and/or visibility less than 1 statute mile.
- Instrument Flight Rules (IFR) – ceiling between 500 to below 1,000 feet agl and/or visibility 1 to less than 3 miles.
- Marginal Visual Flight Rules (MVFR**) – ceiling from 1,000 to 3,000 ft agl and/or visibility 3 to 5 miles.
- Visual Flight Rules (VFR) – ceiling greater 3,000 ft agl and visibility greater than 5 miles.

* By definition, IFR is a ceiling less than 1,000 ft agl and/or visibility less than 3 miles while LIFR is a sub-category of IFR.

**By definition, VFR is a ceiling greater than or equal to 3,000 ft agl and visibility greater than 5 miles while MVFR is a sub-category of VFR.

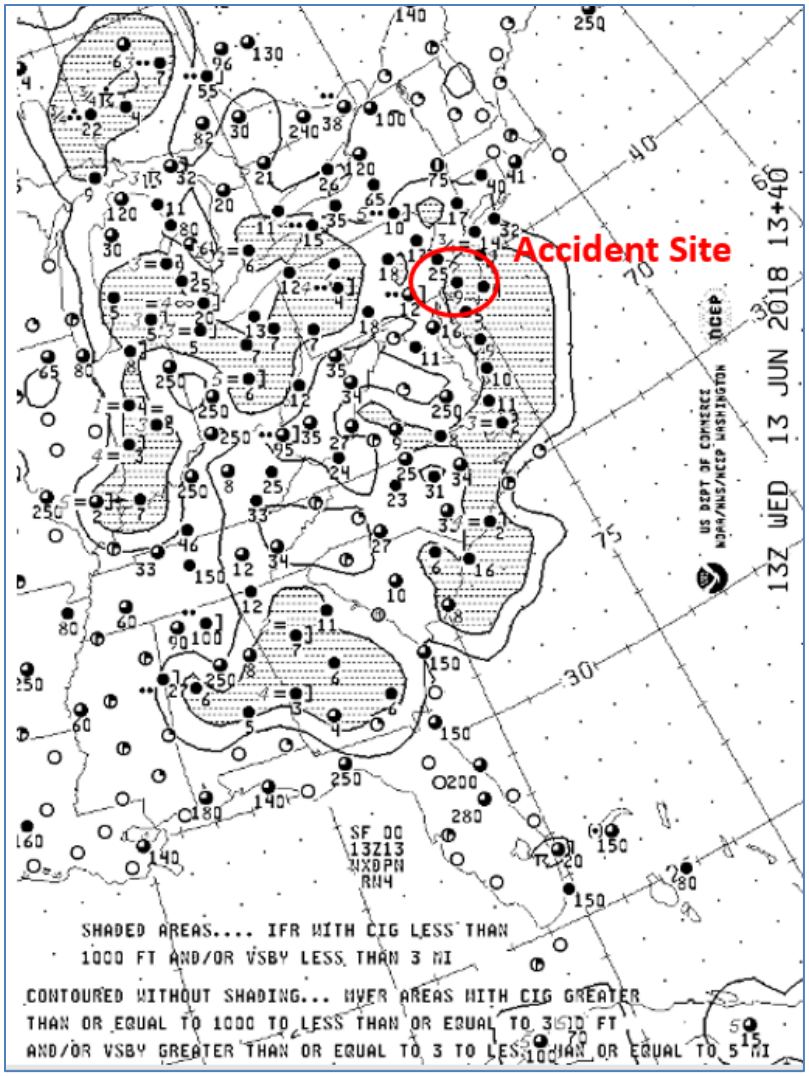

Figure 2 - Weather Depiction Chart for 0900 EDT

2.0 Observations

The surrounding area was documented using official Meteorological Aerodrome Reports (METARs) and special reports (SPECI). Cloud heights are reported in height above ground level (agl) in the following section.

2.1 Mount Holly, New Jersey

The accident airplane departed from South Jersey Regional Airport (KVAY), Mount Holly, New Jersey, which was located approximately 6 miles south at an elevation of 53 ft. The airport had an Automated Surface Observation System (ASOS) and had a magnetic variation of 12° W. The following weather observation was current at the time of departure and the accident:

KVAY special weather observation at 0901 EDT (1301Z), automated, wind from 180° at 3 knots, visibility 1 3/4 miles in mist, ceiling overcast at 400 feet agl, temperature 19° Celsius (C), dew point 19° C, altimeter 29.99 inches of mercury.

The raw observations between 0500 through 1100 EDT (0900Z through 1500Z) are included below with the general flight categories indicated and were as follows:

MVFR SPECI KVAY 130949Z AUTO 15005KT 10SM OVC014 16/16 A3001 RMK AO2=

MVFR METAR KVAY 130954Z AUTO 15004KT 7SM OVC014 17/16 A3001 RMK AO2 SLP163 T01670161=

IFR SPECI KVAY 131020Z AUTO 00000KT 1 3/4SM BR BKN010 OVC016 17/17 A3001 RMK AO2 CIG 008V014 T01670167=

IFR SPECI KVAY 131037Z AUTO 00000KT 1SM BR BKN007 OVC012 17/17 A3001 RMK AO2 T01670167=

IFR SPECI KVAY 131048Z AUTO 00000KT 1 1/4SM BR SCT007 OVC012 17/17 A3001 RMK AO2=

IFR METAR KVAY 131054Z AUTO 00000KT 1 1/4SM BR SCT005 BKN014 OVC019 17/17 A3001 RMK AO2 SLP160 T01720172=

MVFR SPECI KVAY 131120Z AUTO 00000KT 3SM BR FEW004 BKN010 OVC016 18/18 A3000 RMK AO2 T01780178=

IFR SPECI KVAY 131140Z AUTO VRB03KT 7SM FEW004 OVC008 18/18 A3000 RMK AO2 T01780178=

IFR METAR KVAY 131154Z AUTO 00000KT 10SM BKN005 OVC008 18/18 A2999 RMK AO2 CIG 003V008 SLP156 T01780178 10178 20161 58007=

IFR SPECI KVAY 131237Z AUTO VRB03KT 2 1/2SM BR OVC005 18/18 A2999 RMK AO2 T01830183=

IFR SPECI KVAY 131244Z AUTO VRB03KT 4SM BR OVC005 19/19 A3000 RMK AO2 T01890189=

IFR METAR KVAY 131254Z AUTO 00000KT 2 1/2SM BR OVC005 19/19 A3000 RMK AO2 SLP157 T01890189

LIFR SPECI KVAY 131301Z AUTO 18003KT 1 3/4SM BR OVC004 19/19 A2999 RMK AO2 T01890189=

Accident 1308Z

LIFR SPECI KVAY 131315Z AUTO VRB03KT 2 1/2SM BR OVC004 19/19 A2999 RMK AO2 T01890189=

LIFR SPECI KVAY 131332Z AUTO 00000KT 3SM BR OVC004 19/19 A2998 RMK AO2 T01890189=

LIFR METAR KVAY 131354Z AUTO 18003KT 3SM BR OVC004 19/19 A2997 RMK AO2 SLP147 T01940194=

IFR SPECI KVAY 131441Z AUTO VRB03KT 10SM OVC007 21/19 A2995 RMK AO2 CIG 003V011 T02060194=

IFR METAR KVAY 131454Z AUTO VRB03KT 10SM BKN007 OVC014 21/19 A2995 RMK AO2 CIG 005V009 SLP141 T02060194 58015=

MVFR SPECI KVAY 131512Z AUTO VRB03KT 10SM BKN010 OVC017 22/21 A2994 RMK AO2 T02220206=

MVFR METAR KVAY 131554Z AUTO VRB04KT 10SM BKN015 OVC021 23/21 A2993 RMK AO2 SLP135 T02280206=

2.2 Wrightstown, New Jersey

The next closest weather reporting location to the accident site was from Joint Base McGuire (KWRI), located in Wrightstown, approximately 8 miles east of the accident site, at an elevation of 141 feet. The airport had an automated weather observation system and was augmented by a weather observers and/or tower personnel. KWRI reported the following conditions at the time of the accident:

> *KWRI special weather observation at 0906 EDT (1306Z), wind from 210° at 3 knots, visibility 3 miles in mist, ceiling overcast at 500 feet agl, temperature 19° C, dew point 18° C, altimeter 29.97 inches of mercury. Remarks; automated observation system, tower visibility 1 1/2 miles, ceiling 300 feet over runway 06, ceiling 200 feet agl over runway 18, sea level pressure 1014.8 hPa, maintenance required on system.*

The raw observations and general flight categories surrounding the period were as follows:

IFR *METAR KWRI 131156Z 18003KT 4SM BR OVC006 18/17 A2998 RMK AO2A TWR VIS 1 1/2 VIS 2 RWY18 DZE01 CIG 004 RWY06 CIG 002 RWY18 SLP151 P0000 60000 T01750172 10175 20158 57010 $*

IFR *SPECI KWRI 131201Z 17004KT 2 3/4SM BR OVC006 18/17 A2998 RMK AO2A TWR VIS 1 1/2 VIS 2 3/4V4 VIS 2 1/4 RWY18 CIG 004 RWY06 CIG 003 RWY18 SLP151 $=*

IFR *SPECI KWRI 131214Z 19003KT 2 1/2SM BR OVC006 18/18 A2998 RMK AO2A TWR VIS 1 VIS 1 1/2 RWY18 CIG 003 RWY06 CIG 002 RWY18 SLP151 $=*

IFR *SPECI KWRI 131226Z 17006KT 3SM BR OVC006 18/18 A2998 RMK AO2A TWR VIS 1 CIG 004 RWY06 CIG 002 RWY18 SLP151 $=*

IFR *SPECI KWRI 131231Z 18006KT 4SM BR OVC007 18/18 A2997 RMK AO2A TWR VIS 2 CIG 004 RWY06 CIG 002 RWY18 SLP148 $=*

IFR *SPECI KWRI 131251Z 20004KT 6SM BR OVC005 18/18 A2998 RMK AO2A TWR VIS 2 CIG 005V007 CIG 003 RWY06 CIG 002 RWY18 SLP152 $=*

IFR *METAR KWRI 131256Z 21004KT 4SM BR OVC005 19/18 A2998 RMK AO2A TWR VIS 1 1/2 CIG 005V007 CIG 003 RWY06 CIG 002 RWY18 SLP151 T01850182 $=*

IFR *SPECI KWRI 131301Z 18005KT 2 3/4SM BR OVC005 19/18 A2997 RMK AO2A TWR VIS 1 1/2 VIS 2 3/4V6 CIG 003 RWY06 CIG 002 RWY18 SLP148 $=*

IFR SPECI KWRI 131306Z 21003KT 3SM BR OVC005 19/18 A2997 RMK AO2A TWR VIS 1 1/2 CIG 003 RWY06 CIG 002 RWY18 SLP148 $=

Accident 1308Z

LIFR *SPECI KWRI 131321Z 20004KT 3SM BR OVC004 19/18 A2997 RMK AO2A TWR VIS 1 1/2 CIG 003 RWY06 CIG 002 RWY18 SLP148 $=*

IFR *SPECI KWRI 131336Z 21005KT 4SM BR OVC005 19/19 A2996 RMK AO2A TWR VIS 1 1/2 CIG 003 RWY06 CIG 002 RWY18 SLP145 $=*

2.3 METAR Display

A display of the observations or METARs from the NWS Aviation Weather Center's (AWC) website[3] provided a quick reference of the observations in a station model type display with the current weather radar display for 0900 EDT is included as figure 3. The majority of all the reporting stations over southern and central New Jersey reported IFR to LIFR conditions, with the northern portion of the state and southeast New York reporting MVFR conditions. The observation for KVAY and KWRI are included and indicated IFR conditions with ceilings at 500 ft agl, visibility 2 ½ miles in mist with temperature and dew points at 66° F at KVAY and 65° F at KWRI. No significant precipitation was noted in the immediate area of the accident site, but was identified in areas west through north of the accident location with another area to the east off the New Jersey and Long Island coasts.

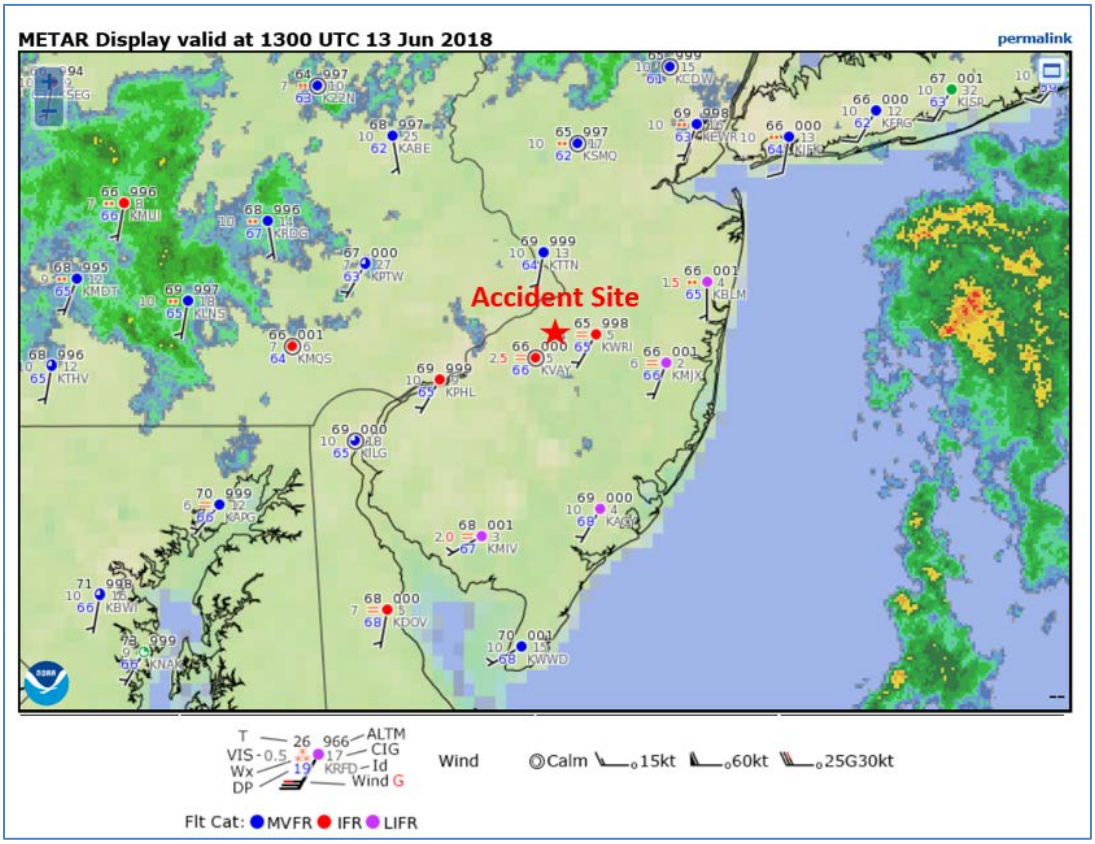

Figure 3 - METAR display from the AWC for 0900 EDT

[3] https://www.aviationweather.gov/metar

3.0 Sounding Observation

A High Resolution Rapid Refresh (HRRR) numerical model[4] was run for 0900 EDT over the approximate accident site and plotted on a skew T log P diagram[5] using the complete Rawinsonde Observation (RAOB) program software[6] from the surface to 500-hPa (approximately 18,000 ft).

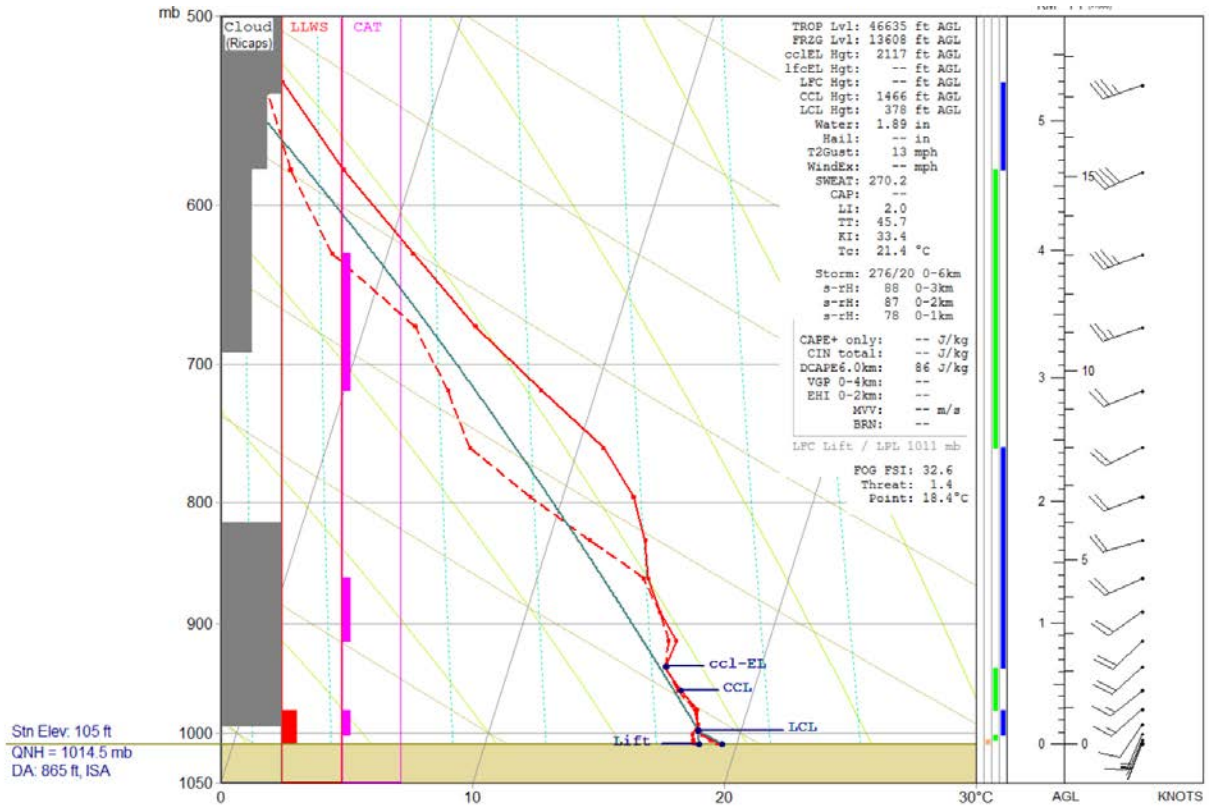

Figure 4 - HRRR numerical model sounding over the accident site for 0900 EDT

Figure 4 is the HRRR sounding for 0900 EDT which depicted a lifted condensation level (LCL), or the approximate base of the clouds at 378 ft agl, with saturated conditions (100% relative humidity) to 6,000 feet, and clouds above 10,000 ft. The precipitable water content was 1.89 inches and the freezing level was at 13,600 ft. The sounding indicated a stable atmosphere with a Lifted Index[7] of +2 and was supportive of nimbostratus type clouds capable of producing drizzle or light rain and fog.

[4] 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.
[5] Skew T log P diagram – is a standard meteorological plot or thermodynamic diagram 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.

[6] RAOB software – The complete RAwinsonde OBservation program is an interactive sounding analysis program developed by Environmental Research Services, Matamopras, Pennsylvania, for plotting and analyzing upper air data.
[7] Lifted Index (LI) is the temperature difference between the environmental temperature and an air parcel lifted adiabatically to 500-hPa. Negative values generally represent unstable conditions where the parcel continued to rise,

The HRRR wind profile indicated light southerly winds veering to the west-southwest with height. The mean wind was from 250° at 27 knots. The sounding did not depict any significant low-level wind shear or turbulence below 10,000 feet.

Figure 5 is a table of the HRRR parameters of height, pressure, temperature (T), dewpoint (Td), relative humidity (RH), wind direction and wind speed (DD/FF), clear air turbulence (CAT), low-level wind shear (LLWS), and icing potential through 13,000 ft.

Height (ft-MSL)	Pres (mb)	T (C)	Td (C)	RH (%)	DD / FF (deg / kts)	CAT (FAA)	LLWS	Icing - Type (AFGWC method)
105	1011	19.4	18.5	95	201 / 5			
133	1010	19.2	18.3	95	201 / 5		LIGHT	
217	1007	18.9	18.2	96	202 / 6		LIGHT	
358	1002	18.5	18.1	98	202 / 8	LGT	LIGHT	
641	992	18.2	18.2	100	212 / 12	LGT	LIGHT	
1042	978	18.0	17.9	99	227 / 16			
1565	960	17.1	17.0	99	229 / 17			
2186	939	16.2	16.2	100	226 / 19			
2911	915	16.3	16.0	98	224 / 21	LGT		
3686	890	15.3	15.3	100	233 / 21	LGT		
4609	861	14.4	14.2	99	244 / 20			
5628	830	13.8	11.6	87	252 / 21			
6786	796	12.8	8.7	76	248 / 22			
8096	759	11.0	5.7	70	242 / 20			
9611	718	7.8	4.1	77	247 / 21	LGT		
11275	675	4.4	2.0	84	250 / 27	LGT		
13153	629	1.0	-2.2	79	249 / 35			

Figure 5 - HRRR sounding parameters through 13,000 ft

4.0 Satellite Imagery

The Geostationary Operational Environmental Satellite number 16 (GOES-16) 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 (McIDAS) software. Both the infrared long wave and visible band imagery were obtained surrounding the time of the accident. The infrared long wave imagery (band 13) at a wavelength of 10.35 microns (μm) provided radiative cloud top temperatures with a nominal spatial resolution of 2 km. The visible imagery (band 1) at a wavelength of 0.64 μm provided a nominal spatial resolution of 0.5 km.

Figures 6 and 7 are the GOES-16 infrared and visible images, respectively, at 1415 EDT at 2X magnification, which depicted an extensive area of clouds over the area. The infrared image indicated a radiative cloud top temperature of 250° Kelvin or -23° C over the accident site, which corresponded to tops near 25,000 ft.

and positive values as stable where the parcel sinks back to its equilibrium point.

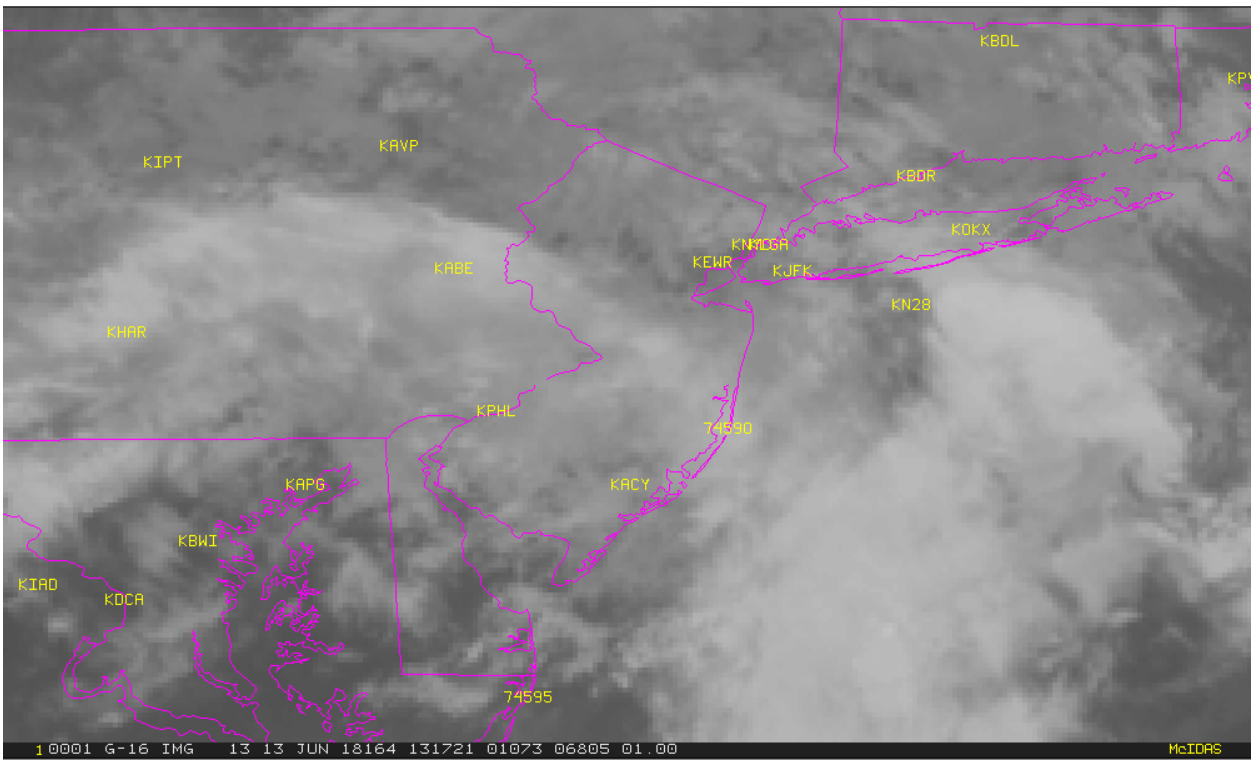

Figure 6 - GOES-16 infrared image at 1415 EDT

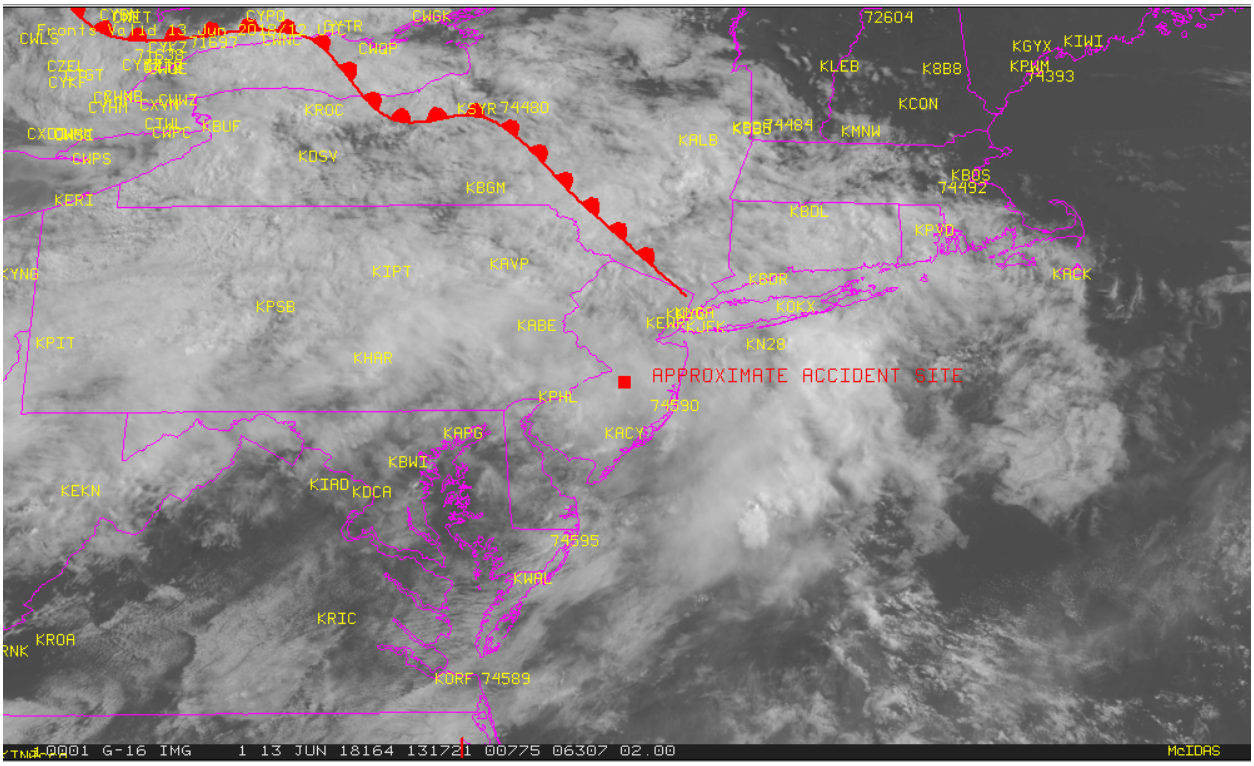

Figure 7 - GOES-15 visible image at 1415 EDT with frontal positions

5.0 Pilot Reports

A search of the NWS database for pilot reports (PIREPs) below 18,000 ft provided numerous reports within 100 miles from 4 hours prior to 2 hours after the accident, and are provided below in standard code and abbreviations:

JFK UA /OV JFK200006/TM 1044/FL030/TP C525/SK SCT/RM THIN LAYER
JFK UA /OV JFK220006/TM 1126/FLDURC/TP E135/SK SCT/RM THIN LAYERS AT 022 AND 050
PHL UA /OV PHL/TM 1129/FL010/TP CRJ2/RM BASES RWY 17 1000/
PHL UA /OV PHL/TM 1129/FL007/TP E170/RM BASES RWY 09R 750/
ABE UA /OV FJC/TM 1140/FL050/TP BE58/SK BASE-BKN012 -BKN035 TOPS/WX VMC/TA 18/WV 26926/TB NEG
EWR UA /OV 6 NE OF EWR/TM 1153/FL020/TP E145/SK 020 BKN
MMU UA /OV MMU/TM 1200/FL016/TP J328/SK OVC016
EWR UA /OV 4 E OF EWR/TM 1215/FL010/TP SK76/SK 012 BKN
LGA UA /OV FINAL RWY 22/TM 1224/FL014/TP CRJ9/SK BASES REPORTED AT 1400 FT
EWR UA /OV EWR/TM 1237/FL010/TP S76/SK 015BKN
ILG UA /OV KILG/TM 1240/FL010/TP C560/SK BKN010/RM LANDING RWY 19
EWR UA /OV EWR045006/TM 1242/FL016/TP B738/SK 016BKN
EWR UA /OV RWY22L/TM 1305/FL011/TP E170/SK 011BKN/RM ILS RY22L
Accident 1308Z
PNE UA /OV RWY 24 FINAL/TM 1310/FL007/TP BE20/SK OVC007
JFK UA /OV JFK/TM 1316/FL018/TP A319/SK OVC018-TOP060
PHL UA /OV PHL135004/TM 1317/FL009/TP A320/SK BASES OVC 009 TOPS 018 HIGHER LAYER ABOVE
ILG UA /OV KILG/TM 1318/FL012/TP F2TH/SK BKN012/RM LANDING RWY 19
MMU UA /OV DURD RY 23/TM 1338/FL014/TP C56X/SK OVC014
FRG UA /OV DEPT 19/TM 1345/FL003/TP B350/SK OVC003
FRG UA /OV DEPT 19/TM 1350/FL005/TP C172/SK OVC005
EWR UA /OV 3 NORTH EWR/TM 1405/FL016/TP DH8/SK 016BKN/RM ILS RY22L
FRG UA /OV KFRG/TM 1420/FL004/TP LJ35/RM BASE REPORTED AT 400FT ILS APPROACH TO RY14 BY A LJ35
EWR UA /OV SBJ070007/TM 1421/FL060/TP A320/TB SMOOTH/IC NEG/RM BET LAYERS
SMQ UA /OV SBJ240015/TM 1442/FL170/TP PC12/TA M05/IC LGT RIME
EWR UA /OV 4 NORTH EWR/TM 1456/FL013/TP E145/SK 013BKN/RM ILS RY22L
LGA UA /OV 2 MI NE LGA/TM 1507/FL008/TP A319/SK OVC008/RM BASES 800 REPORTED BY A319 LANDING RY22
JFK UA /OV JFK220005/TM 1510/FLDURGC/TP E190/SK OVC/RM BASES 600 TOPS 2000

All the reports were regarding sky coverage and cloud bases, with a few cloud tops reported over the area. The majority of the reports were over northern New Jersey and in the area of the major New York City airports. There were four pilot's reporting immediately west of the accident site from the Philadelphia Airports (highlighted in bold type) that reported varying cloud bases from 700 to 1,000 ft. Two of those reports included cloud coverage reported as overcast, with one indicating the overcast clouds tops at 1,800 ft with a higher cloud layer above.

6.0 Terminal Aerodrome Forecast

The closest NWS Terminal Aerodrome Forecasts (TAF) to the accident site were from KWRI, located about 7 miles east of the accident site and 13 miles northeast of KVAY, and from North Philadelphia Airport (KPNE), located 12 miles west of the accident site and 12 miles northwest of

KVAY. While a TAF is only valid for a 5-mile radius of the airport center point, it provides a more time-specific forecast of wind direction, speed, gusts, visibility, weather phenomena, cloud coverage and height. The forecasts issued by the United States Air Force (USAF) for KWRI and the NWS Philadelphia/Mt. Holly (KPHI), New Jersey, Weather Forecast Office (WFO) during the period were as follows:

USAF – KWRI Forecast

TAF KWRI 131000Z 1310/1416 20009KT 8000 -SHRA OVC015 QNH3000INS
BECMG 1316/1317 21012G18KT 8000 -SHRA SCT015 BKN025 QNH2983INS
BECMG 1400/1401 21009KT 8000 -SHRA SCT015 BKN035 QNH2977INS
BECMG 1411/1412 28009KT 9999 NSW BKN035 QNH2981INS
TX27/1319Z TN16/1310Z=

The forecast for the period of the accident expected a wind from 210° at 12 knots gusting to 18 knots, with visibility 8 kilometers or approximately 5 miles in light rain showers, scattered clouds at 1,500 ft agl, ceiling broken at 2,500 ft, with an altimeter setting of 29.83 inches of Hg.

NWS – KPNE Forecast

TAF AMD KPNE 130803Z 1308/1406 16004KT P6SM VCSH OVC040
FM131000 VRB03KT P6SM VCSH OVC015
FM131400 20007KT P6SM OVC015
FM131600 23010KT P6SM OVC025
FM131800 24010KT P6SM BKN035=

The forecast current during the preflight period was issued at 0403 EDT, and expected from 0600 through 1000 EDT, light and variable winds of 3 knots, visibility better than 6 miles, with showers in the vicinity, ceiling overcast at 1,500 ft agl. MVFR conditions due to low overcast ceilings were expected to continue through the day.

TAF KPNE 131120Z 1312/1412 18006KT P6SM VCSH OVC015
TEMPO 1312/1315 4SM -SHRA OVC006
FM131600 22010KT P6SM VCSH BKN020
FM131800 22012KT P6SM VCTS BKN050CB
FM132100 22012KT P6SM BKN050 PROB30 1321/1403 5SM -TSRA BKN030CB
FM140500 31005KT P6SM SCT200=

The next scheduled forecast was issued at 0720 EDT and expected a wind from 180° at 6 knots, visibility better than 6 miles with showers in the vicinity, ceiling overcast at 1,500 ft agl, temporary conditions between 0800 and 1100 EDT of visibility 4 miles in light rain showers and ceiling overcast at 600 ft agl.

TAF AMD KPNE 131301Z 1313/1412 18004KT P6SM VCSH OVC010
FM131600 22010KT P6SM VCSH BKN020
FM131800 22012KT P6SM VCTS BKN050CB
FM132200 22012KT P6SM BKN050 PROB30 1322/1403 5SM -TSRA BKN030CB
FM140500 31005KT P6SM SCT200=

The forecast was amended at 0901 EDT and expected the wind from 180° at 4 knots, visibility better than 6 miles with showers in the vicinity, ceiling overcast at 1,000 ft agl. MVFR conditions continued to be expected through 1800 EDT.

7.0 Inflight Weather Advisories

Inflight Aviation Weather Advisories are forecasts to advise en route aircraft of development of potentially hazardous weather. Inflight aviation weather advisories in the conterminous U.S. are issued by the NWS AWC, as well as from the Center Weather Service Units (CWSU) associated with FAA Air Route Traffic Control Centers (ARTCCs).

The only advisory applicable for the accident site at the time of the accident was an NWS AWC Airmen Meteorology Information (AIRMET) Sierra advisory current for IFR conditions. No Significant Meteorological Information (SIGMET) or Center Weather Advisories (CWA) advisories were current during the period over central New Jersey. The AIRMET advisory was as follows:

WAUS41 KKCI 130845
WA1S
BOSS WA 130845
AIRMET SIERRA UPDT 1 FOR IFR AND MTN OBSCN VALID UNTIL 131500
.
AIRMET IFR...NJ WV MD DE VA NC SC GA FL AND CSTL WTRS
FROM 20WSW SIE TO 80S ECG TO SAV TO CRG TO CTY TO 50SE CEW TO 50SSE SJI
TO 40W CEW TO 50SW PZD TO GQO TO HMV TO 30SSW BKW TO 20WSW SIE
CIG BLW 010/VIS BLW 3SM BR. CONDS ENDG 12-15Z.

The AIRMET Sierra update 1 extended south of the accident site over the eastern seaboard into northern Florida. The advisory was amended at 0741 EDT with AIRMET Sierra update 2 and was as follows:

WAUS41 KKCI 131141 AAA
WA1S
BOSS WA 131141 AMD
AIRMET SIERRA UPDT 2 FOR IFR AND MTN OBSCN VALID UNTIL 131500
.
AIRMET IFR...MA RI CT NY LO NJ PA WV MD DC DE VA AND CSTL WTRS
FROM 70SSE MSS TO 30SE ALB TO 20ESE PVD TO 80SSW ACK TO 110SE SBY TO 20NE ECG
TO 20WSW SIE TO 30SSW BKW TO 30W JST TO 40NNE SLT TO 30N SYR TO 70SSE MSS
CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS CONTG BYD 15Z THRU 21Z.
.
AIRMET IFR...NJ WV MD DE VA NC SC GA FL AND CSTL WTRS...UPDT
FROM 20WSW SIE TO 20NE ECG TO 80S ECG TO SAV TO 20NNW CRG TO
50SW PZD TO GQO TO 50SSW VXV TO 30SSW BKW TO 20WSW SIE
CIG BLW 010/VIS BLW 3SM BR. CONDS ENDG 12-15Z.

WAUS41 KKCI 130845
WA1T
BOST WA 130845
AIRMET TANGO UPDT 1 FOR TURB AND LLWS VALID UNTIL 131500
.
AIRMET TURB...ME NH MA RI CT AND CSTL WTRS

FROM 70NW PQI TO 60NE PQI TO 140E ACK TO 20SW ACK TO 20SSW BDL TO 20W CON TO 70NW PQI
MOD TURB BLW 080. CONDS ENDG 09-12Z.

.

LLWS POTENTIAL...ME AND CSTL WTRS
BOUNDED BY 50ESE PQI-100SSW YSJ-30NE ENE-50SE YSC-70WSW PQI-50ESE PQI
LLWS EXP. CONDS ENDG 09-12Z.

.

LLWS POTENTIAL...PA WV MD VA
BOUNDED BY 40SE EWC-40WSW HAR-50W CSN-40SSE EKN-40ENE HNN-20NNEAIR-40SE EWC
LLWS EXP. CONDS DVLPG 09-12Z. CONDS ENDG 12-15Z.

Figure 8 is a plot of AIRMET Sierra update 2 for IFR conditions over the GOES-16 visible satellite image at 0742 EDT. The accident site was located within the boundary of the advisory for ceilings below 1,000 ft and/or visibility below 3 miles in precipitation or mist. The conditions were expected to continue beyond 1100 EDT through 1700 EDT.

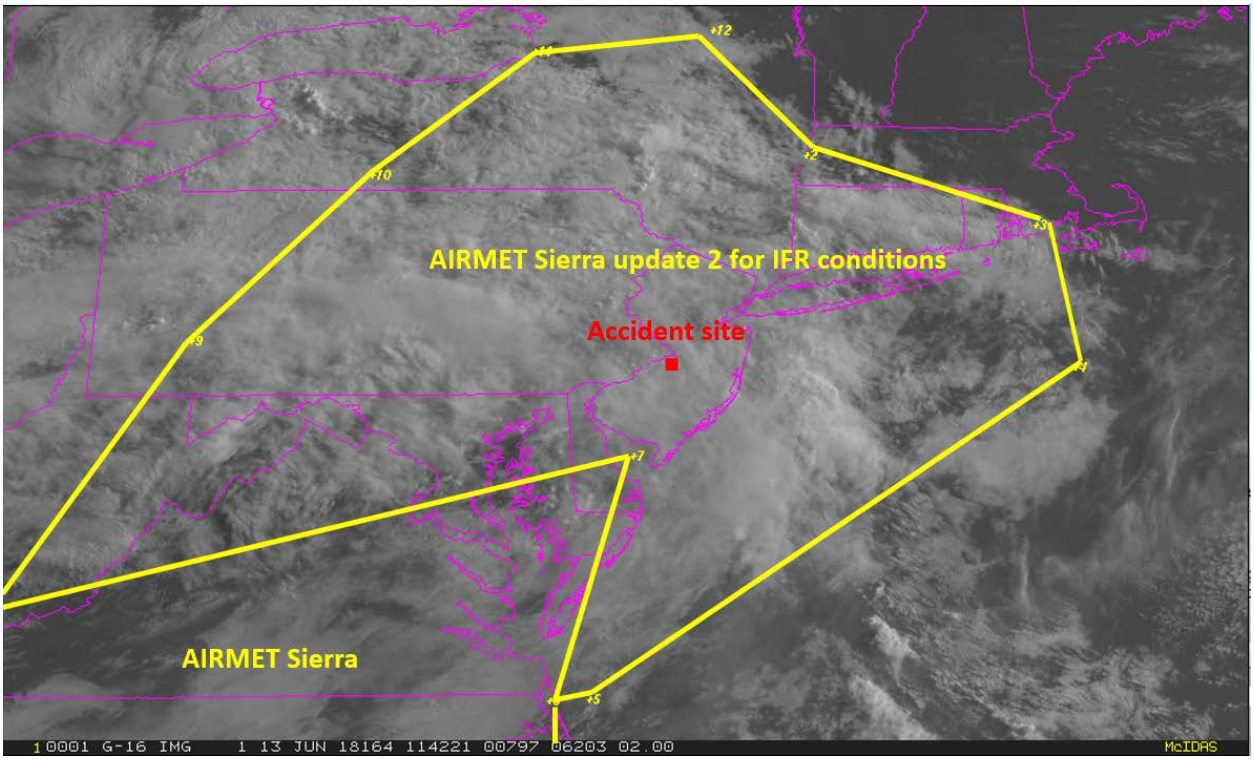

Figure 8 - AIRMET Sierra Update 2 for IFR Conditions

8.0 Graphic Aviation Forecast

The NWS AWC Graphic Aviation Forecasts (GFA) of cloud coverage and expected mountain obscuration and icing conditions issued at 0600 EDT and valid for 0800 and 1100 EDT are included in figure 9 and 10, respectively. The products are generated at the AWC from the Rapid Refresh Model (RAP) numerical model for cloud coverage (dark blue) and cloud bases and tops, and will overlay Graphic AIRMETs for mountain obscuration (pink) and icing (light blue) expected during the period. Note all cloud heights are MSL in this product.

The GFA valid for 0800 EDT indicated overcast clouds between 1,500 to 2,000 ft with tops between 2,500 to 3,500 ft over New Jersey, with lower conditions near the coast at 300 ft with tops layered to 5,500 ft with higher cirrus clouds above. The GFA valid for 1100 EDT continued with the overcast clouds with bases between 1,500 to 2,000 ft with tops from 3,000 to 7,000 ft. Lower clouds continued along the coastal section into Long Island, New York, with overcast clouds at 300 ft with tops to 500 to 3,500 ft.

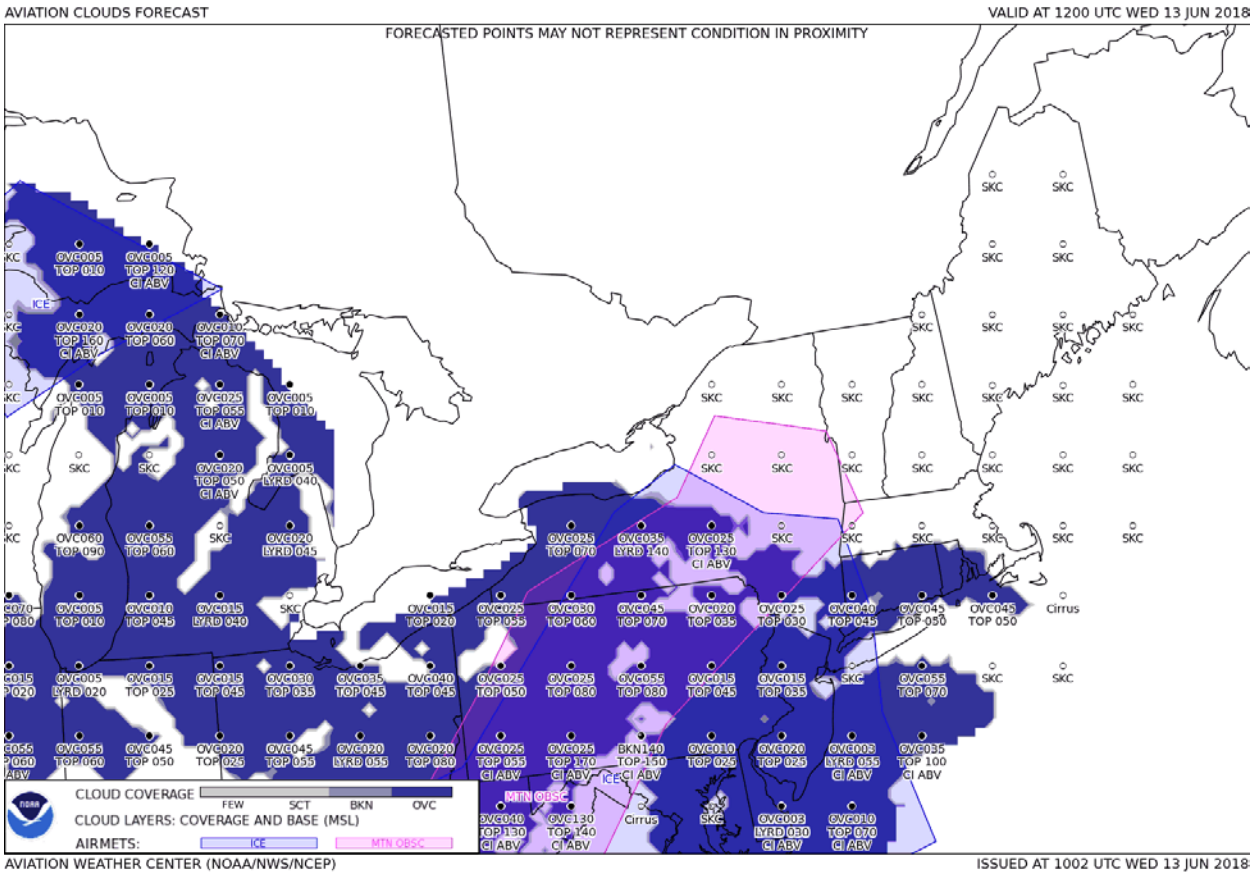

Figure 9 - GFA cloud and AIRMET for mountain obscurations and icing valid at 0800 EDT

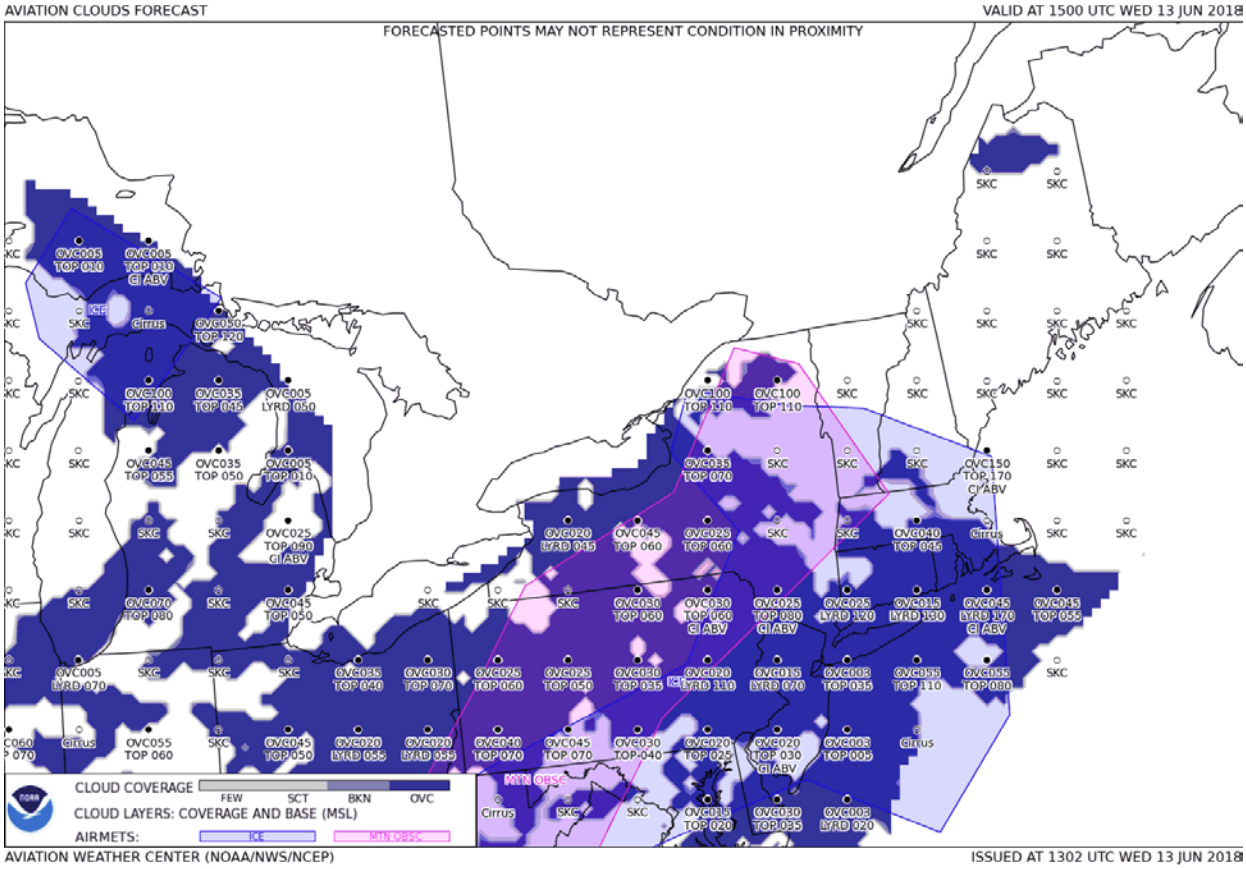

Figure 10 - GFA cloud and AIRMET for mountain obscurations and icing valid at 1100 EDT

The GFA visibility, surface winds and precipitation valid for 0800 and 1100 EDT are included as figures 11 and 12. The GFA utilizes the LAMP (Local Aviation Model Output Statistics (MOS) Program) flight category for ceiling and visibility with an overlay of the Graphic AIRMET Sierra for IFR conditions. The GFA depicted IFR conditions over the area with southerly winds with a 30% probability of rain showers over the region. The visibility restrictions were shown to expand over the area from 0800 through 1100 EDT.

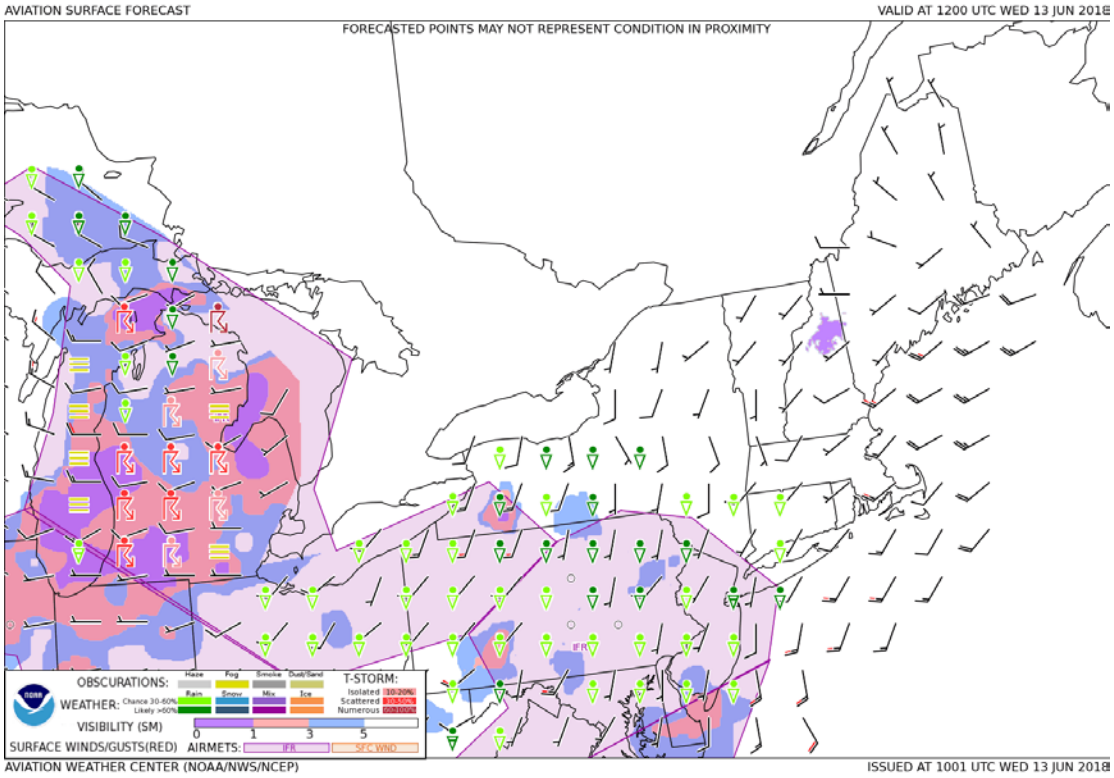

Figure 11 - GFA Wind and Weather with Graphic AIRMET Sierra for IFR conditions valid for 0800 EDT

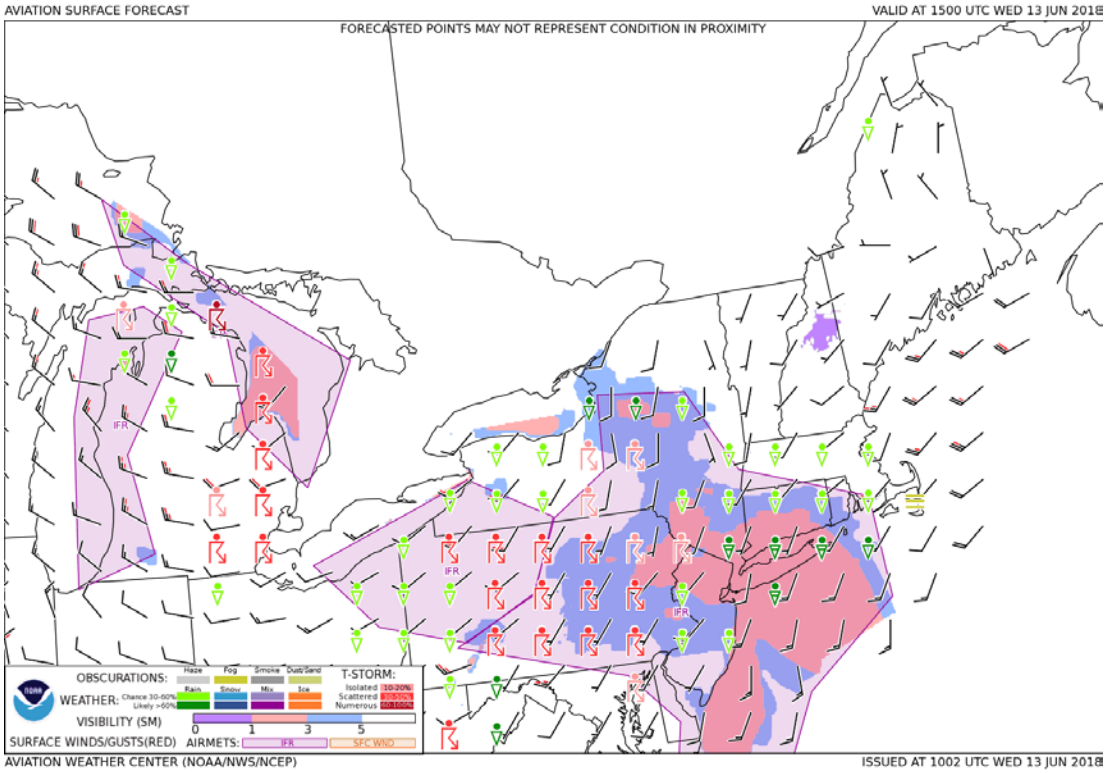

Figure 12 – GFA Wind and Weather with Graphic AIRMET Sierra for IFR conditions valid for 1100 EDT

9.0 Weather Briefing

A search of the FAA contract Automated Flight Service Station (AFSS) provider Leidos indicated no contact with the pilot for any weather briefing data. A further search of ForeFlight.com (one of the largest private commercial weather providers) indicated that the pilot obtained an Outlook Briefing[8] at 1745 EDT on June 12, 2018 and filed an IFR flight plan at that time. The Outlook Briefing indicated that no adverse weather advisories were current at the time, and that clear skies and visual meteorological conditions (VMC) prevailed from New Jersey through the Hyannis, Massachusetts, area at that time. The TAF for KPNE included in that briefing expected MVFR conditions with ceiling overcast at 1,200 ft agl during the morning. A copy of that briefing[9] is included as attachment 1. There were no other records of the pilot receiving any updated weather information prior to departure.

The IFR flight plan expected a departure at 0830 EDT on June 13, 2018 with a requested cruising altitude of 7,000 ft to KHYA and expected time enroute was 1:25. No alternate was filed, and 2 persons were expected to be on board. The remarks also noted that it was an Angle Flight[10] to pick up a passenger.

F. LIST OF ATTACHMENTS

Attachment 1 – ForeFlight Outlook Weather Briefing

Submitted by:

_____

Don Eick
Senior Meteorologist

[8] An Outlook Briefing is typically requested when the proposed time of departure is six or more hours from the time of the briefing. The briefing will provide applicable forecast data to the proposed flight and is designed for planning purposes only. Pilot's should obtain a Standard or Abbreviated briefing prior to departure in order to obtain items such as adverse conditions, current conditions, updated forecasts, winds aloft and NOTAMs.

[9] The Outlook Briefing consisted of 143 pages of information, the first 19 pages the required adverse weather, observations, forecasts, GFA product links, and winds aloft followed by 124 pages of notice to Airmen (NOTAMs) and other FDC NOTAMS, Flow Control and Volcanic Advisories which were not pertinent to the route of flight.

[10] Angle Flight is a volunteer organization that arranges non-emergency air travel for children and adults with serious medical conditions and other compelling needs. Pilots typically donate their aircraft, pilot skills, and flying expenses to help the families in need, enabling them to receive vital treatment that might otherwise be inaccessible because of financial, medical, or geographic limitations.