



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

February 10, 2021

Specialist's Report

METEOROLOGY

ERA21LA083

Table Of Contents

A.	ACCIDENT	3
B.	METEOROLOGIST	3
C.	DETAILS OF THE INVESTIGATION	3
D.	WEATHER INFORMATION	3
1.0	Surface Observations	3
2.0	Pilot Reports.....	5
3.0	Weather Radar	5
4.0	HRRR Model Sounding.....	5
5.0	Satellite Imagery	6
6.0	Area Forecast Discussion.....	7
7.0	Terminal Aerodrome Forecasts.....	8
8.0	AIRMETs SIERRA	8
9.0	SIGMETs	8
10.0	CWSU Products	9
11.0	HEMS Tool.....	9

A. ACCIDENT

Location: Farmingdale, New York
Date: December 20, 2020
Time: 2035 eastern standard time (0135 UTC on December 21, 2020)¹
Aircraft: Type – Hawker 800XP; Registration – N412JA

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 standard time (EST) for December 20, 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: 40.7268° north latitude; 73.410425° west longitude at an elevation of about 65 feet.

This report provides information on ceiling and visibility conditions at and around Republic Airport (FRG²) in Farmingdale, New York, (the departure airport) around the accident time.

D. WEATHER INFORMATION

1.0 Surface Observations

An Automated Surface Observing System (ASOS) was located at FRG, which had a magnetic variation of about 13° west. Automated longline³ reports from the FRG ASOS during the times surrounding the departure 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

[1933 EST] SPECI KFRG 210033Z 02003KT 2 1/2SM BR BKN002 01/00 A3004 RMK
AO2 T00110000=

[1953 EST] METAR KFRG 210053Z 04003KT 3/4SM BR OVC002 01/00 A3004 RMK
AO2 SFC VIS 2 SLP171 T00110000=

**[2033 EST] SPECI KFRG 210133Z 08003KT 1/4SM FG VV002 01/M01 A3002 RMK
AO2 T00061006=**

**[2053 EST] METAR KFRG 210153Z 00000KT 1/4SM FG VV002 01/M01 A3002
RMK AO2 SLP165 T00061006=**

[0116 EST] SPECI KFRG 210216Z 00000KT 1/2SM FG VV002 01/00 A3001 RMK
AO2 T00060000=

At 2033 EST, the FRG ASOS reported a wind from 080° at 3 knots, visibility of 1/4 of a statute mile, fog, vertical visibility of 200 feet above ground level (agl), temperature of 1° Celsius (C) and a dew point temperature of -1°C, altimeter setting of 30.02 inches of mercury; remarks: automated station with a precipitation discriminator, temperature of 0.6°C and a dew point temperature of -0.6°C.

At 2053 EST, the FRG ASOS reported a calm wind, visibility of 1/4 of a statute mile, fog, vertical visibility of 200 feet agl, temperature of 1°C and a dew point temperature of -1°C, altimeter setting of 30.02 inches of mercury; remarks: automated station with a precipitation discriminator, sea level pressure of 1016.5 hectopascals (hPa), temperature of 0.6°C and a dew point temperature of -0.6°C.

Five-minute data from the FRG ASOS for times surrounding the departure time are presented here. At 2035 EDT, the FRG ASOS five-minute observation indicated a visibility of 1/4 of a statute mile and a vertical visibility of 200 feet agl.

[2025 EST] 5-MIN KFRG 210125Z 08004KT 1/2SM FG VV002 01/M01 A3002 -10 92
-1700 100/04 RMK AO2 T00061006

[2030 EST] 5-MIN KFRG 210130Z 08003KT 1/4SM FG VV002 01/M01 A3002 -10 92
-1700 100/03 RMK AO2 T00061006

**[2035 EST] 5-MIN KFRG 210135Z 07003KT 1/4SM FG VV002 01/M01 A3002 -10
92 -1700 090/03 RMK AO2 T00061006**

[2040 EST] 5-MIN KFRG 210140Z 06003KT 1/4SM FG VV002 01/00 A3002 -10 96 -
1700 080/03 RMK AO2 T00060000

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

2.0 Pilot Reports

There was one publicly longline-disseminated pilot report⁴ (PIREP) made between 1900 EST and 2200 EST within 50 miles of FRG. At 2144 EST, a Boeing 787 type aircraft at 1,500 feet four miles north of Newark Liberty International Airport in Newark, New Jersey, reported overcast clouds at 1,500 feet.

EWR UA /OV 4N OF EWR/TM 0244/FL015/TP B787/SK 015 OVC

3.0 Weather Radar

A review of weather radar imagery from the TJFK Terminal Doppler Weather Radar (TDWR), which was located about 23 miles west-southwest of the accident site, did not identify any pertinent reflectivity in the accident region around the accident time.

4.0 HRRR Model Sounding

A High-Resolution Rapid Refresh (HRRR) model⁵ sounding (figure 1) for the accident site at 2000 EST using an elevation of 65 feet was retrieved from the National Oceanic and Atmospheric Administration's Air Resources Laboratory. Near the surface the wind was from the east at magnitude of less than 5 knots but veered to a southwest wind of 15 knots at about 2,500 feet. The relative humidity was 90 percent or greater from the surface to about 4,000 feet except for a layer between about 150 and 300 feet, and the Rawinsonde OBservation Program (RAOB) identified cloudy conditions between about 1,000 and 4,500 feet. A temperature inversion⁶ was noted below 330 feet.

⁴ These do not include pilot reports only broadcast via radio.

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 A temperature inversion is a thin layer of the atmosphere where the normal decrease in temperature with height switches to the temperature increasing with height.

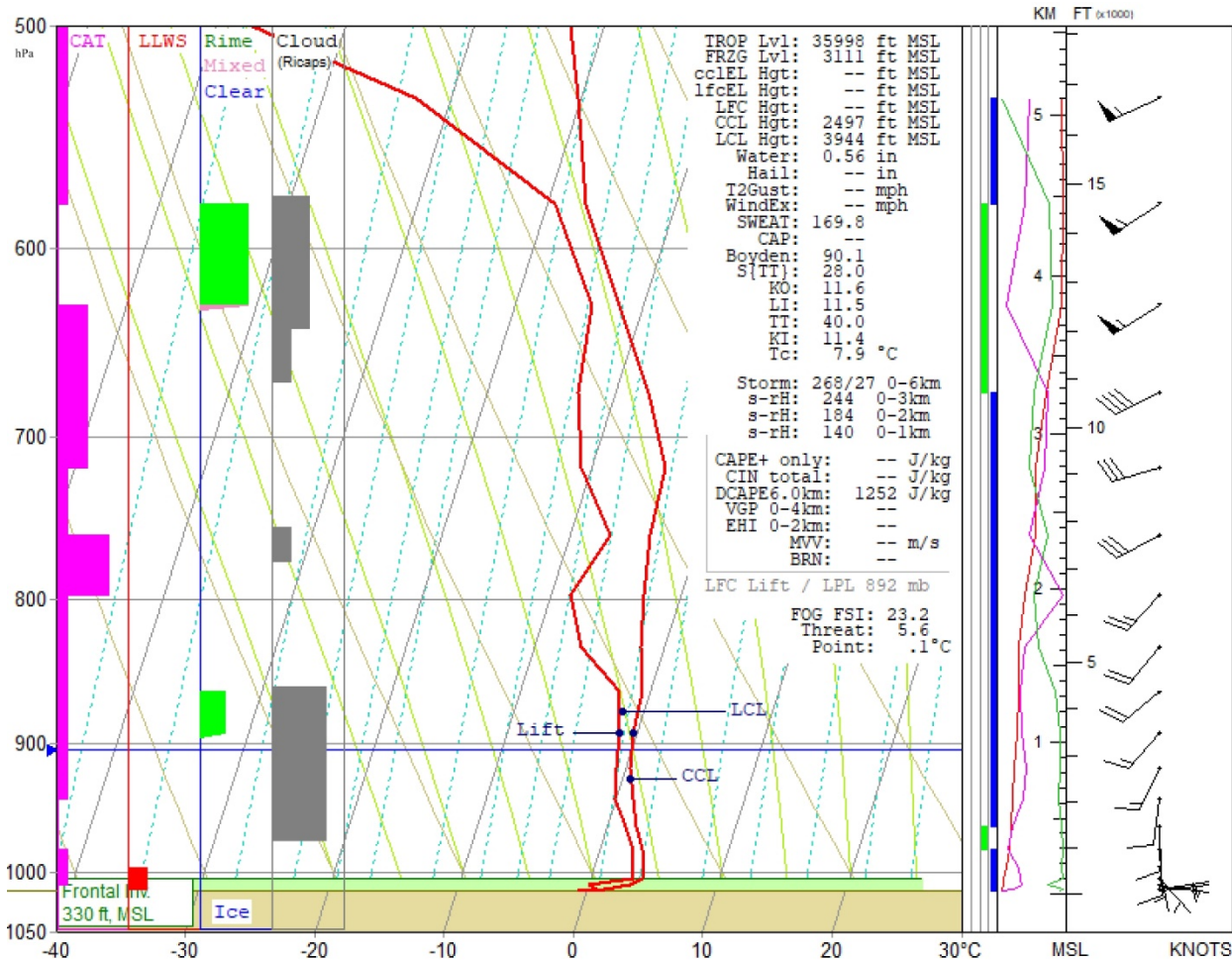


Figure 1 – HRRR model sounding data in SkewT/LogP format for 2000 EST at the accident site, surface to 500 hPa.

5.0 Satellite Imagery

Geostationary Operational Environmental Satellite (GOES)-16 infrared ($10.3\mu\text{m}$) data were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison. An image from 2041 EST is presented in figure 2. The GOES-16 infrared brightness temperatures over the accident location were -1°C .

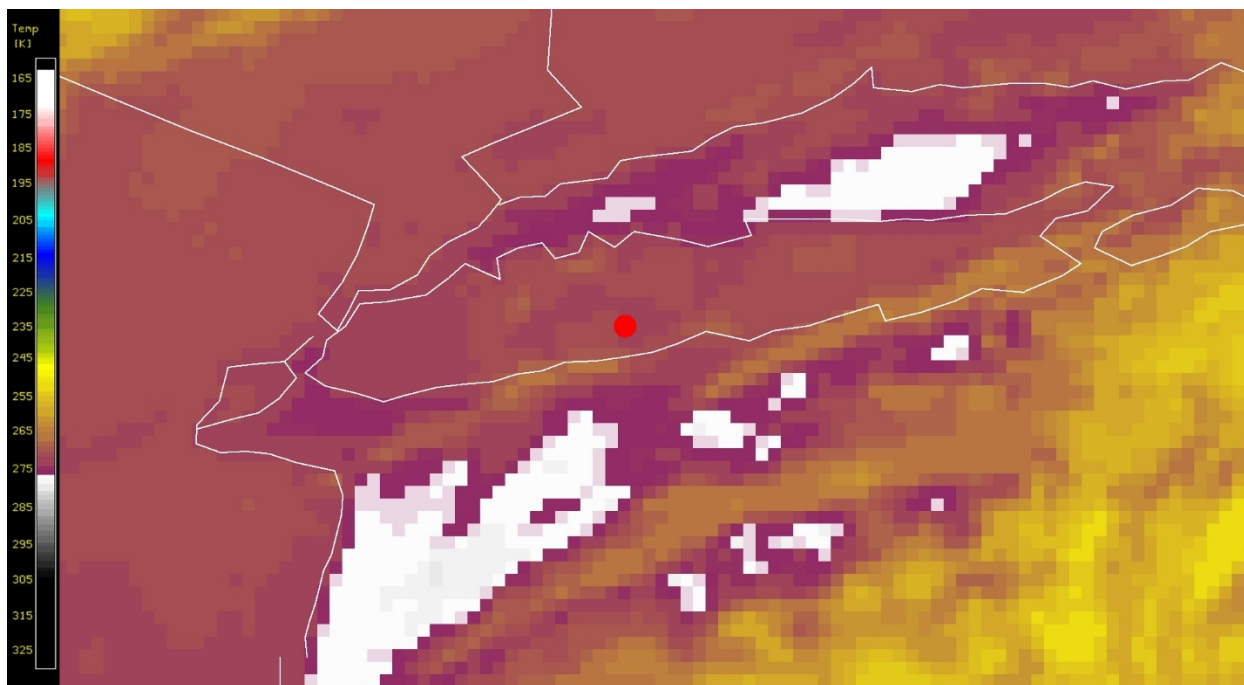


Figure 2 – GOES-16 infrared brightness temperature imagery from 2041 EST. Accident location is denoted by the red circle. This image has not been corrected for any parallax error.

6.0 Area Forecast Discussion

Presented here is the “Aviation” section of the Area Forecast Discussion issued at 1919 EST by the National Weather Service (NWS) Upton, New York, Weather Forecast Office.

*FXUS61 KOKX 210019
AFDOKX
Area Forecast Discussion
National Weather Service New York NY
719 PM EST Sun Dec 20 2020*

.AVIATION /00Z MONDAY THROUGH FRIDAY/...

Weak disturbance pass south of the area through Monday morning.

MVFR to IFR conditions this evening and overnight may hold or gradually improve to MVFR through late Monday morning. Patchy fog will have to be monitored closely overnight.

Light and variable winds this evening. Winds then return out of the NW at 5-10 kt overnight into early Monday morning. Northerly winds expected though most of the day tomorrow.

...NY Metro (KEWR/KLGA/KJFK/KTEB) TAF Uncertainty...

Patchy fog will have to be monitored closely overnight.

7.0 Terminal Aerodrome Forecasts

The closest NWS Terminal Aerodrome Forecast (TAF) site was JFK, which was located about 17 miles west-southwest of FRG, but its TAFs were not applicable to the accident site. According to NWS Instruction 10-813: “A NWS TAF consists of the expected meteorological conditions significant to aviation at an airport for a specified time period. For the U.S., this is the area within five (5) statute miles (SM) of the center of an airport's runway complex.”⁷

At 1836 EST a TAF was issued by the NWS for JFK that forecasted for the accident time: wind variable at 4 knots, visibility greater than 6 statute miles, few clouds at 700 feet agl, broken clouds at 2,500 feet agl.

KJFK 202336Z 2100/2206 **VRB04KT P6SM FEW007 BKN025**
FM210300 VRB04KT 6SM BR FEW007 OVC015
FM210800 35005KT 4SM BR BKN007
FM211500 32007KT P6SM SCT007 BKN020
FM212000 29007KT P6SM BKN020
FM220100 29004KT 6SM BR BKN030=

8.0 AIRMETs SIERRA

The NWS Aviation Weather Center (AWC) issued an Airmen's Meteorological Information (AIRMET) SIERRA advisory at 1545 EST for instrument meteorological conditions (IFR) that was applicable to the accident location at the accident time.

WAUS41 KPCI 202045
WAIS
-BOSS WA 202045
AIRMET SIERRA UPDT 7 FOR IFR AND MTN OBSCN VALID UNTIL 210300
AIRMET IFR...ME NH VT MA RI CT NY LO NJ PA OH LE WV MD DC DE VA
AND CSTL WTRS
FROM 70NW PQI TO 60NE PQI TO 50WSW YSJ TO 20SE ENE TO 30SSW PVD TO
50ESE SIE TO 30ENE ECG TO 20ENE HMV TO 30W EKN TO 40NE ROD TO
30WSW SYR TO 50N SYR TO MSS TO 20SW YSC TO 70NW PQI
CIG BLW 010/VIS BLW 3SM PCPN/BR. CONDS CONTG BYD 03Z THRU 09Z.

9.0 SIGMETs

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

⁷ www.nws.noaa.gov/directives/sym/pd01008013curr.pdf

10.0 CWSU Products

There were no Center Weather Advisories or Meteorological Impact Statements issued by the NWS Center Weather Service Units (CWSU) at the New York and Boston Air Route Traffic Control Centers that were active for the accident location at the accident time.

11.0 HEMS Tool

The Helicopter Emergency Medical Services (HEMS) tool (hereafter referred to as the “HEMS tool”) was designed specifically to show weather conditions for short-distance and low-altitude flights that are common for the HEMS community (but the tool is available for use by anyone). HEMS tool images present high-resolution output of critical weather parameters, particularly cloud ceiling and surface visibility. These images can be accessed through the interactive HEMS tool available on the NWS Aviation Weather Center’s website.⁸

Figures 3-8 provide static images of what the underlying gridded model (the LAMP model), which is the forecast product used for the HEMS tool, produced for 2000 and 2100 EST for surface visibility, ceiling and flight category. The exact images that would have been seen if using the HEMS tool on the accident day were unavailable.

⁸ For more information see: <https://www.aviationweather.gov/hemst>

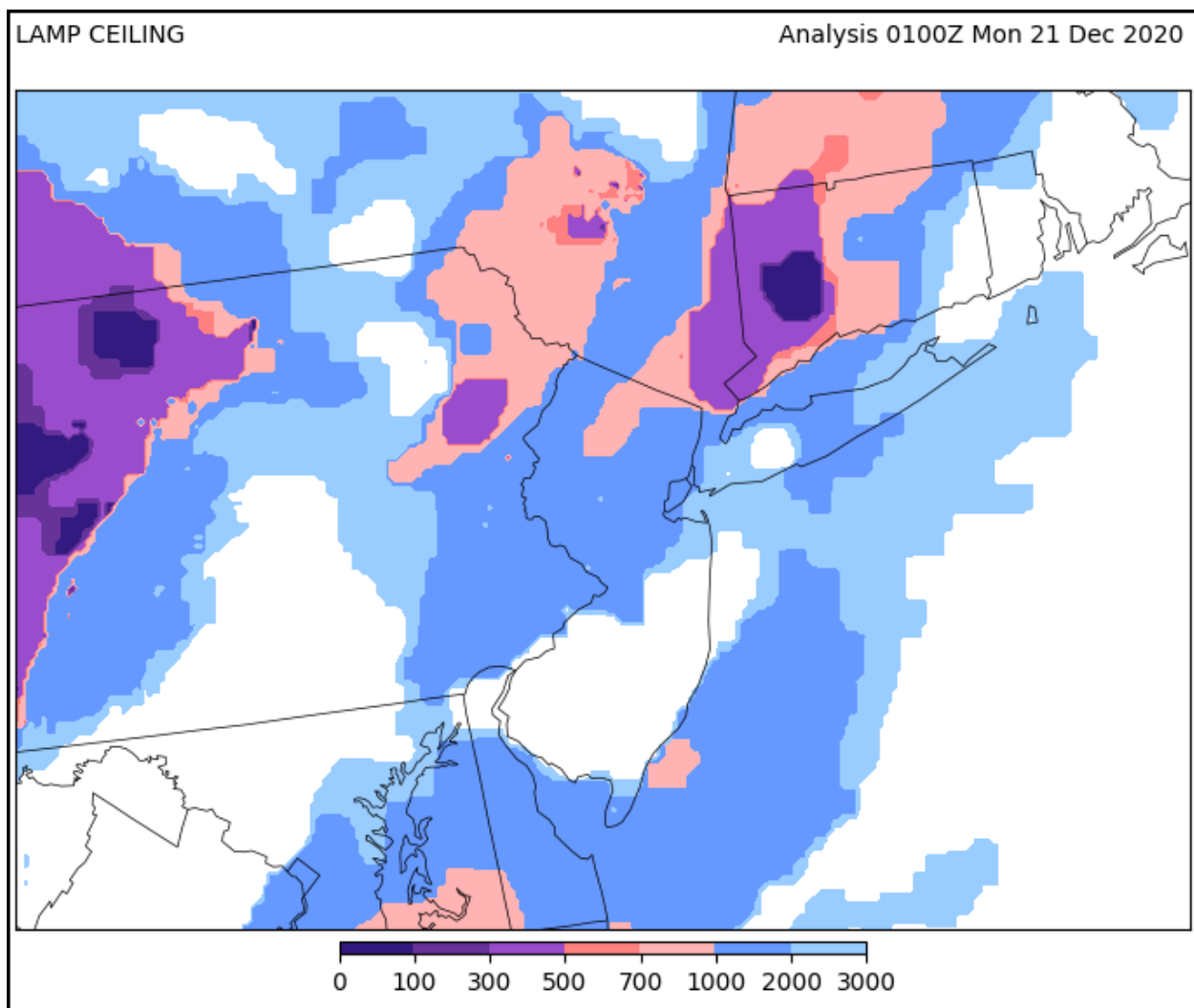


Figure 3 – LAMP ceiling analysis for the accident region valid at 2000 EST.

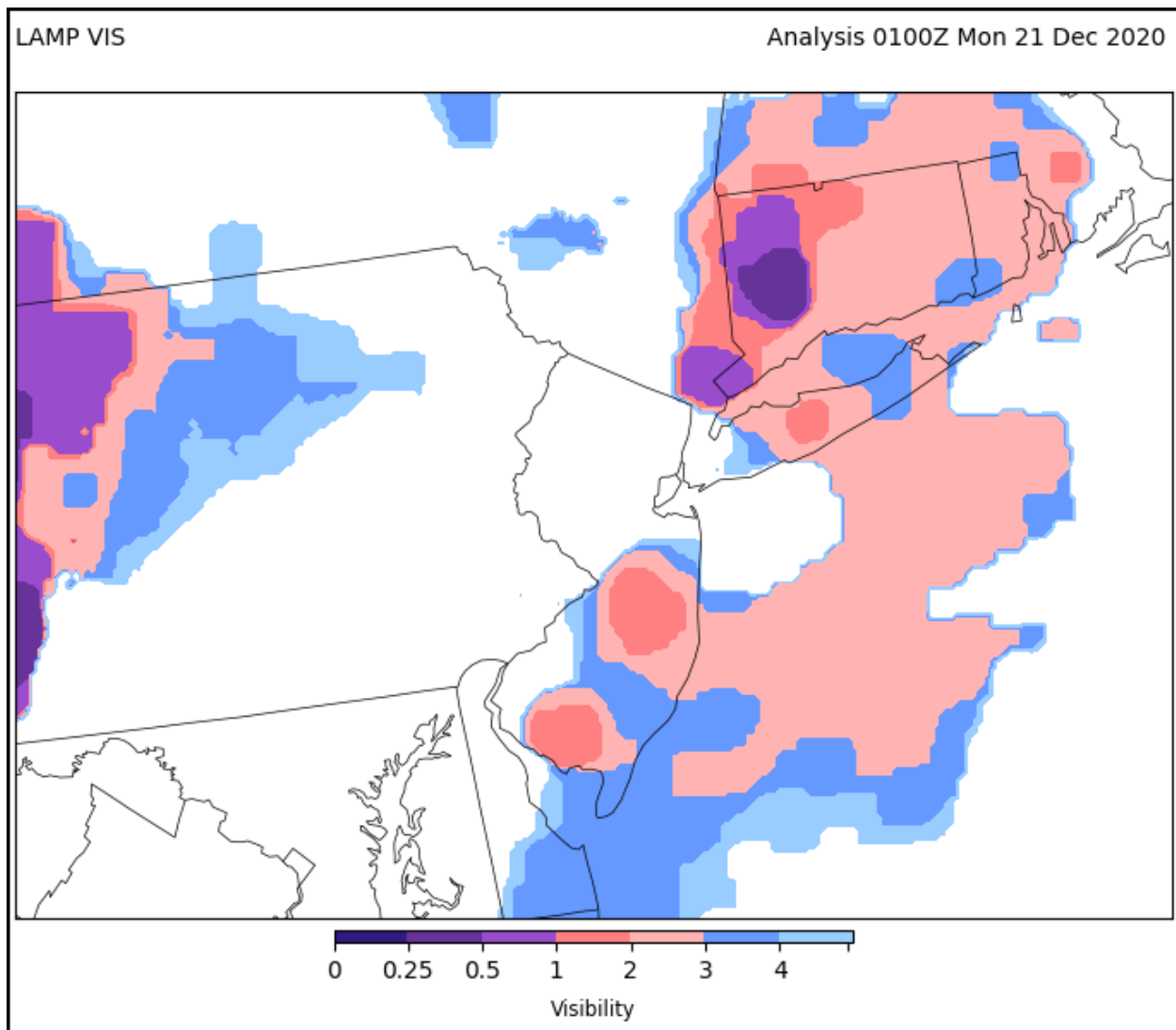


Figure 4 – LAMP surface visibility analysis for the accident region valid at 2000 EST.

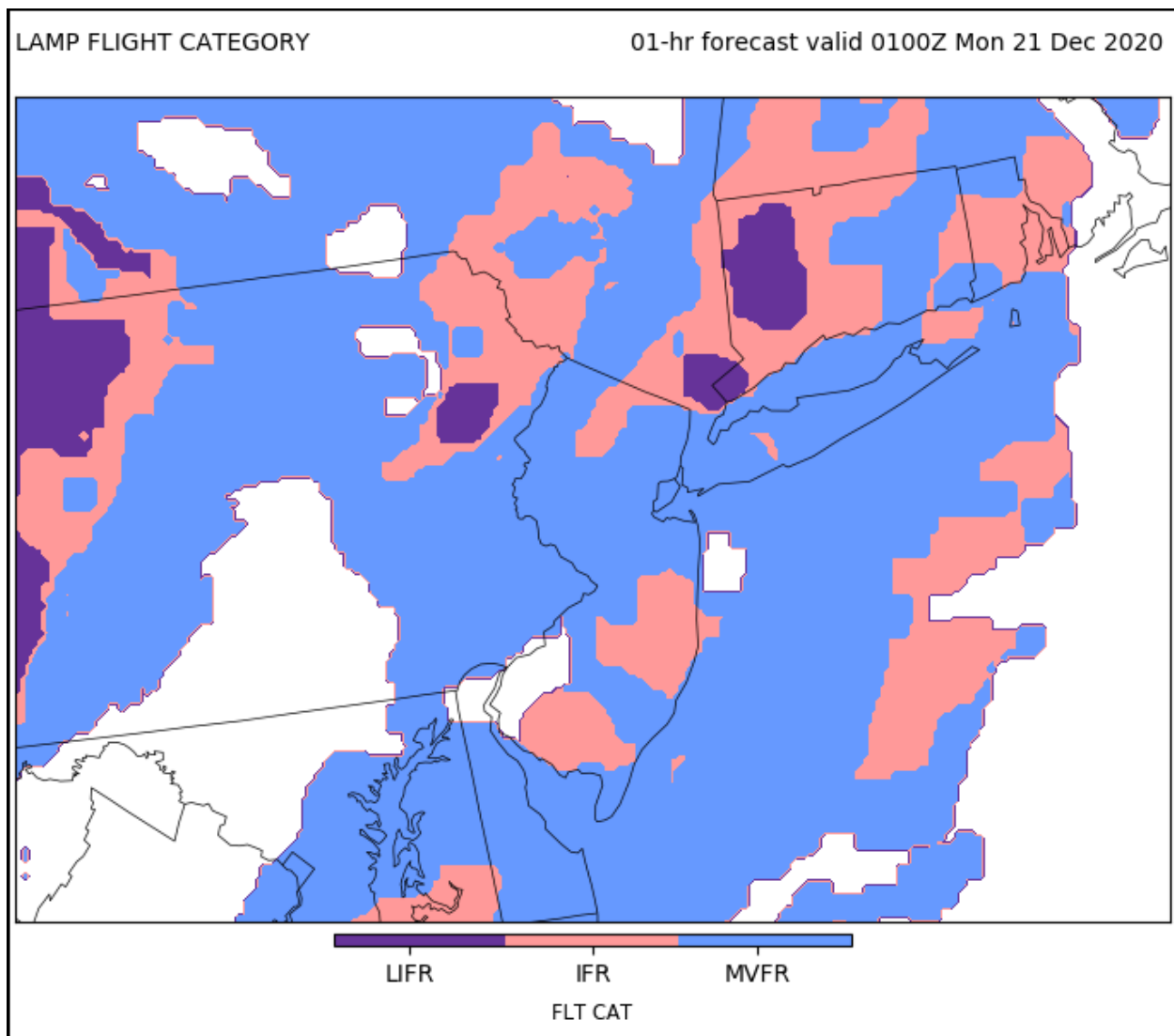


Figure 5 – LAMP flight category 1-hour forecast for the accident region valid at 2000 EST.

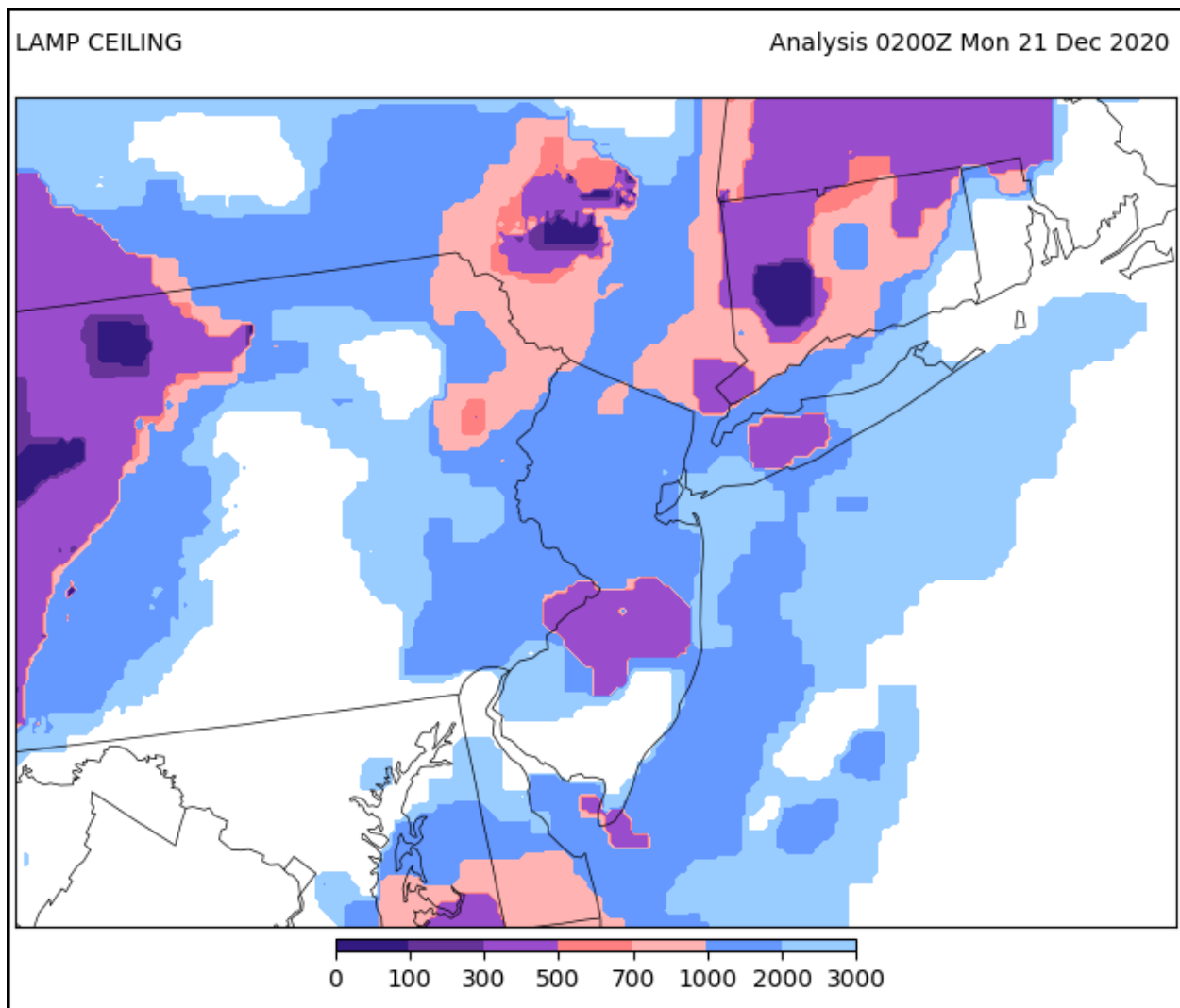


Figure 6 – LAMP ceiling analysis for the accident region valid at 2100 EST.

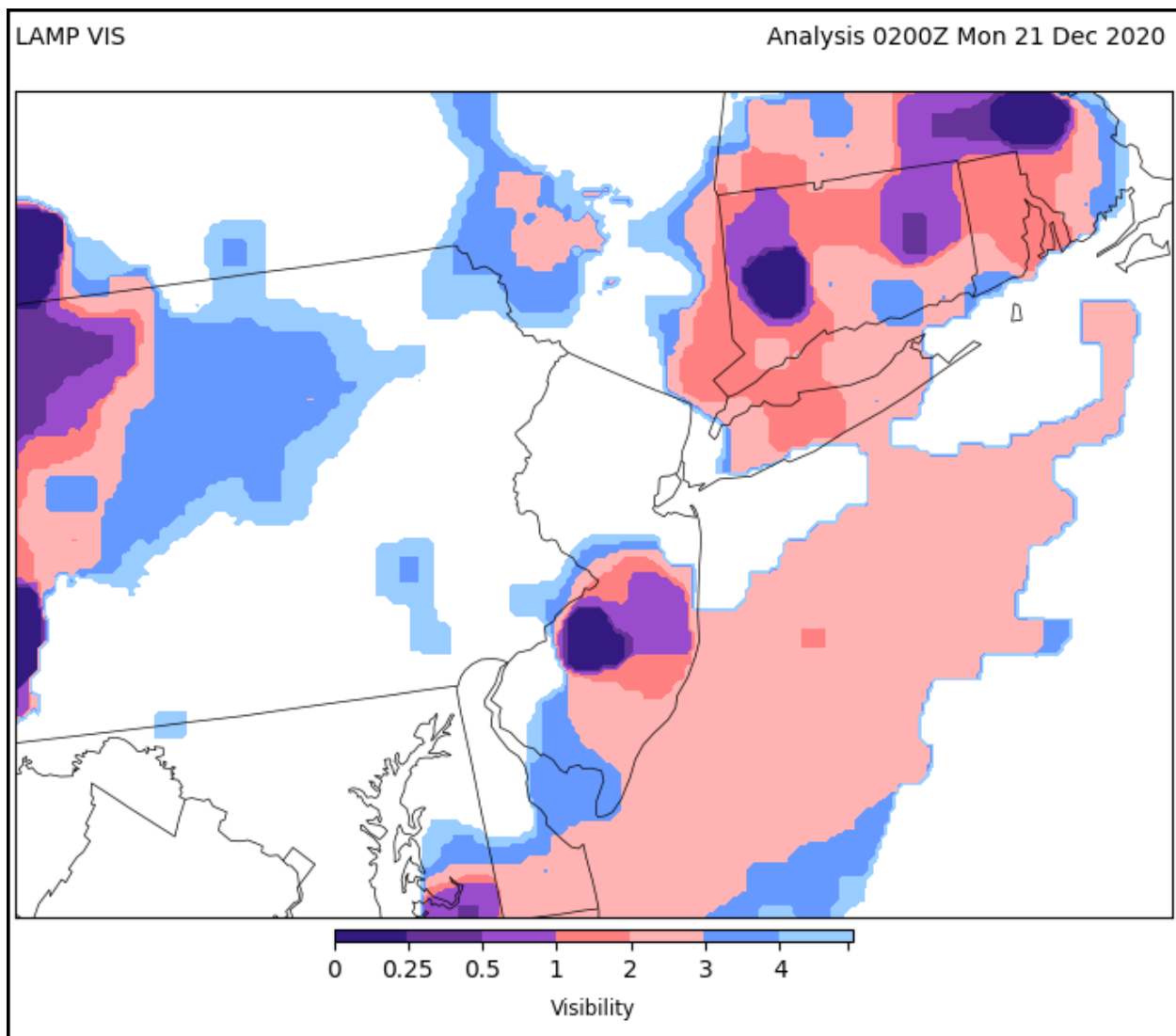


Figure 7 – LAMP surface visibility analysis for the accident region valid at 2100 EST.

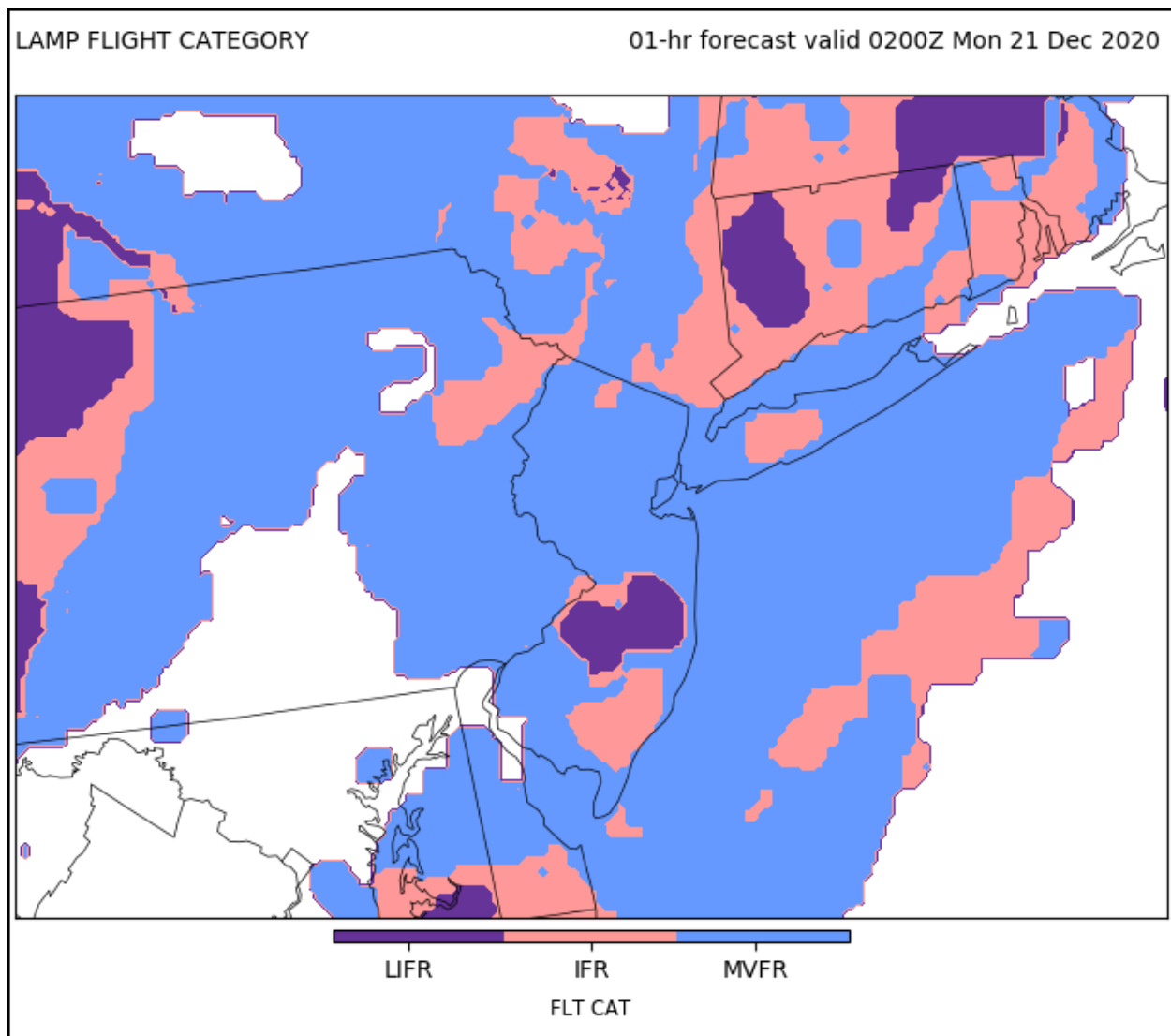


Figure 8 – LAMP flight category 1-hour forecast for the accident region valid at 2100 EST.

Submitted by:

Mike Richards
Senior Meteorologist