



National Transportation Safety Board

Office of Aviation Safety
Washington, D.C. 20594-2000

June 28, 2010

WEATHER STUDY

DCA10MM017

A. Accident

Location: St. George, Staten Island, New York
Date: May 8, 2010
Time: 0919 eastern daylight time (1319 UTC¹)
Vessel: Andrew J. Barberi passenger ferry

B. Meteorological Specialist

Mike Richards
Meteorologist
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C. Summary

On Saturday, May 8, 2010, the passenger ferry Andrew J. Barberi, departed Whitehall Ferry Terminal in lower Manhattan for its regularly scheduled voyage to St. George's Ferry Terminal, Staten Island. At approximately, 0919 eastern daylight time (EDT), the vessel struck the boarding apron and transition bridge on slip No. 5 of the pier on Staten Island. At the time of the accident, there were 18 crewmembers, 2 New York City police officers, 2 concessionaires and 244 passengers on the ferry. Forty-eight persons reported minor injuries.

¹ UTC – abbreviation for Coordinated Universal Time

D. Details of Investigation

The National Transportation Safety Board's meteorological specialist was not on scene for this investigation and gathered weather data for this investigation from the Washington D.C. office from official National Weather Service (NWS) sources including the National Climatic Data Center (NCDC), except where noted. All times are EDT based upon the 24-hour clock, local time is -4 hours to UTC, and UTC=Z. Directions are referenced to true north and distances in nautical miles. Heights are above mean sea level (msl) unless otherwise noted. Visibility is in statute miles and fractions of statute miles.

The accident was reported at approximate coordinates: 40.6441° North latitude, 74.0724° West longitude.

Synoptic Conditions

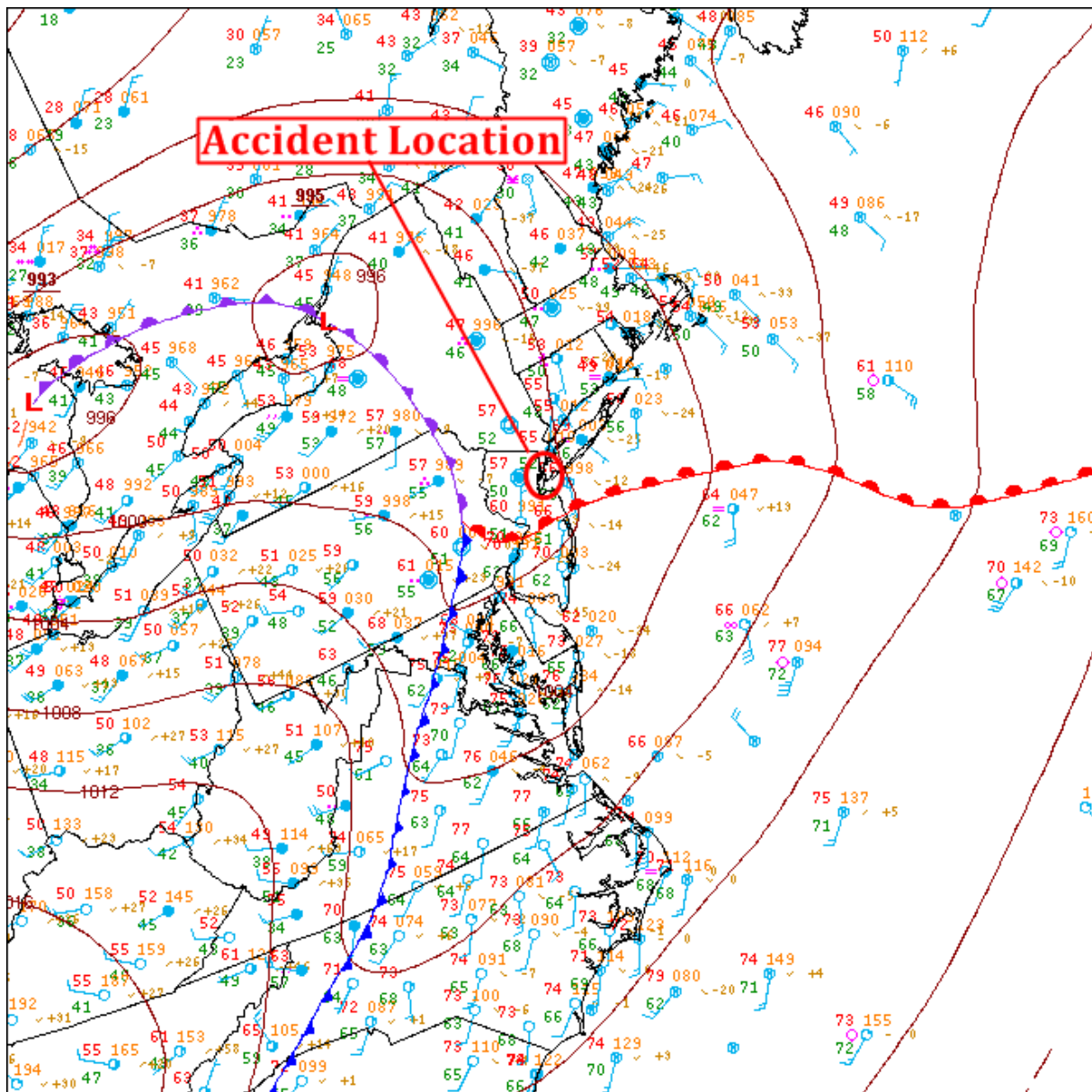


Figure 1 – NWS Surface Analysis Chart for 0800 EDT.

The NWS Surface Analysis Chart for 0800 EDT is included as figure 1. The chart depicted several surface low-pressure centers near Lake Huron and Lake Ontario, with an associated occluded front that stretched southward to a *triple point*² in western central Pennsylvania. An E-W oriented warm front extended from the triple point out over the Atlantic Ocean through central New Jersey. Wind measurements in the New York City area were generally southerly and light, with overcast skies observed immediately ahead of the warm front.

A regional mosaic of composite reflectivity data from WSR-88D stations (figure 2) in the northeastern U.S. at 0920 EDT indicated light to heavy precipitation intensities were observed from New Jersey through Maine, with New York City near the eastern edge of this region of precipitation.

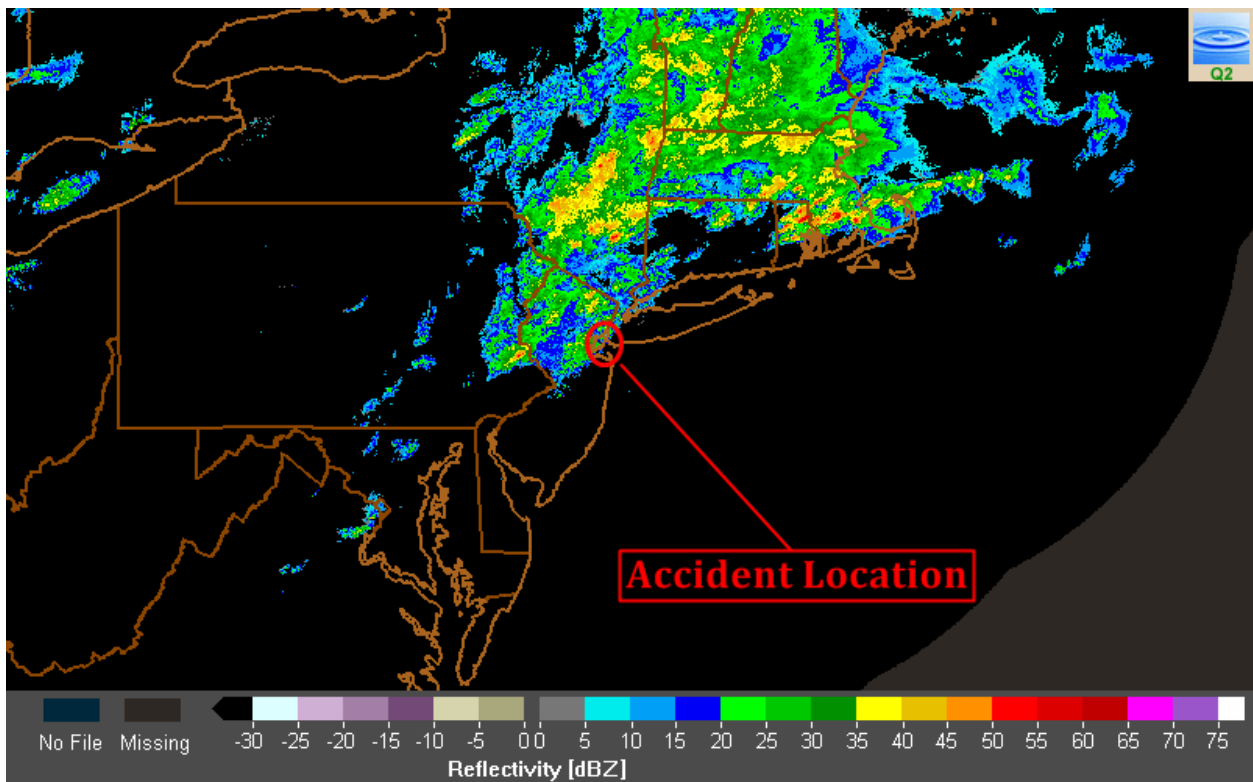


Figure 2 – WSR-88D composite reflectivity mosaic for the northeastern United States at 0920 EDT.

² Triple point - the intersection point between two boundaries (dry line, outflow boundary, cold front, etc.), often a focus for thunderstorm development. In the context of this report, the triple point refers to the intersection of the occluded, cold and warm fronts on the Surface Analysis Chart.

Surface Observations

Newark Liberty International Airport (KEWR), in Newark, New Jersey, was located approximately 5 miles northwest-west of the accident site at an elevation of 18 feet. The airport was equipped with an Automated Surface Observation System (ASOS) and was augmented by NWS certified weather observers.

**SPECI KEWR 081311Z 0000KT 10SM -RA SCT020 BKN029CB
OVC070 17/10 A2953 RMK AO2 CB OHD MOV NE P0000**

**SPECI KEWR 081324Z 24006KT 2 1/2SM -RA SCT020 BKN029CB
OVC070 17/11 A2953 RMK AO2 CB OHD MOV NE P0000**

At 0911 EDT, KEWR reported a calm wind, visibility of 10 miles or greater, light rain, scattered cloud bases at 2,000 feet above ground level (agl), broken ceiling at 2,900 feet agl with cumulonimbus present, overcast cloud base at 7,000 feet agl, temperature of 17° Celsius (C) with a dew point temperature of 10° C, an altimeter setting of 29.53 inches of Mercury. Remarks: automated observation system with a precipitation discriminator, cumulonimbus cloud overhead moving northeast, a trace amount of hourly precipitation.

At 0924 EDT, KEWR reported wind from 240° at 6 knots, visibility of 2 and 1/2 miles, light rain, scattered cloud bases at 2,000 feet agl, broken ceiling at 2,900 feet agl with cumulonimbus present, overcast cloud base at 7,000 feet agl, temperature of 17° C with a dew point temperature of 11° C, an altimeter setting of 29.53 inches of Mercury. Remarks: automated observation system with a precipitation discriminator, cumulonimbus cloud overhead moving northeast, a trace amount of hourly precipitation.

Meteorological information was also obtained from weather stations operated by local, state and federal agencies, and private mesonets³. These data are made available via the National Oceanic and Atmospheric Administration's (NOAA) Meteorological Assimilation Data Ingest System (MADIS). Only data that has passed MADIS' first two stages of quality control is presented here. Variables presented are sea-level pressure (SLP), air temperature (T), wind direction (Wdir), wind speed (Wspd), and wind gust (Wgst).

Data was obtained from the NOAA's National Ocean Service Water Level Observation Network buoy ROBN4 located at Robins Reef, New Jersey, approximately 0.84 miles north-northeast of the accident site.

<u>Time(EDT)</u>	<u>T(°F)</u>	<u>Wdir</u>	<u>Wspd(mph)</u>	<u>Wgst(mph)</u>
0900	61.0	266°	3	3
0906	61.0	291°	5	5
0912	61.0	299°	4	5
0918	61.0	293°	2	3
0924	61.0	267°	2	3

³ mesonet - a network of automated weather stations designed to observe mesoscale meteorological phenomena

Data was obtained from the WxFlow surface station XBYO at Bayonne, New Jersey, located approximately 1 mile north of the accident site at an elevation of 33 feet.

<u>Time(EDT)</u>	<u>T(°F)</u>	<u>Wdir</u>	<u>Wspd(mph)</u>	<u>Wgst(mph)</u>
0900	60.8	294°	0	1
0905	60.8	306°	2	3
0910	60.8	291°	3	4
0915	60.8	257°	3	4
0920	60.8	252°	4	4
0925	60.8	222°	4	5

Water temperature measurements were also acquired from NOAA’s National Ocean Service Water Level Observation Network buoy BGNN4 located at Bergen Point West Reach, New Jersey, approximately 3.4 miles west of the accident site.

At 0918 EDT, station BGNN4 reported a water temperature of 16.1° C.

At 0924 EDT, station BGNN4 reported a water temperature of 16.5° C.

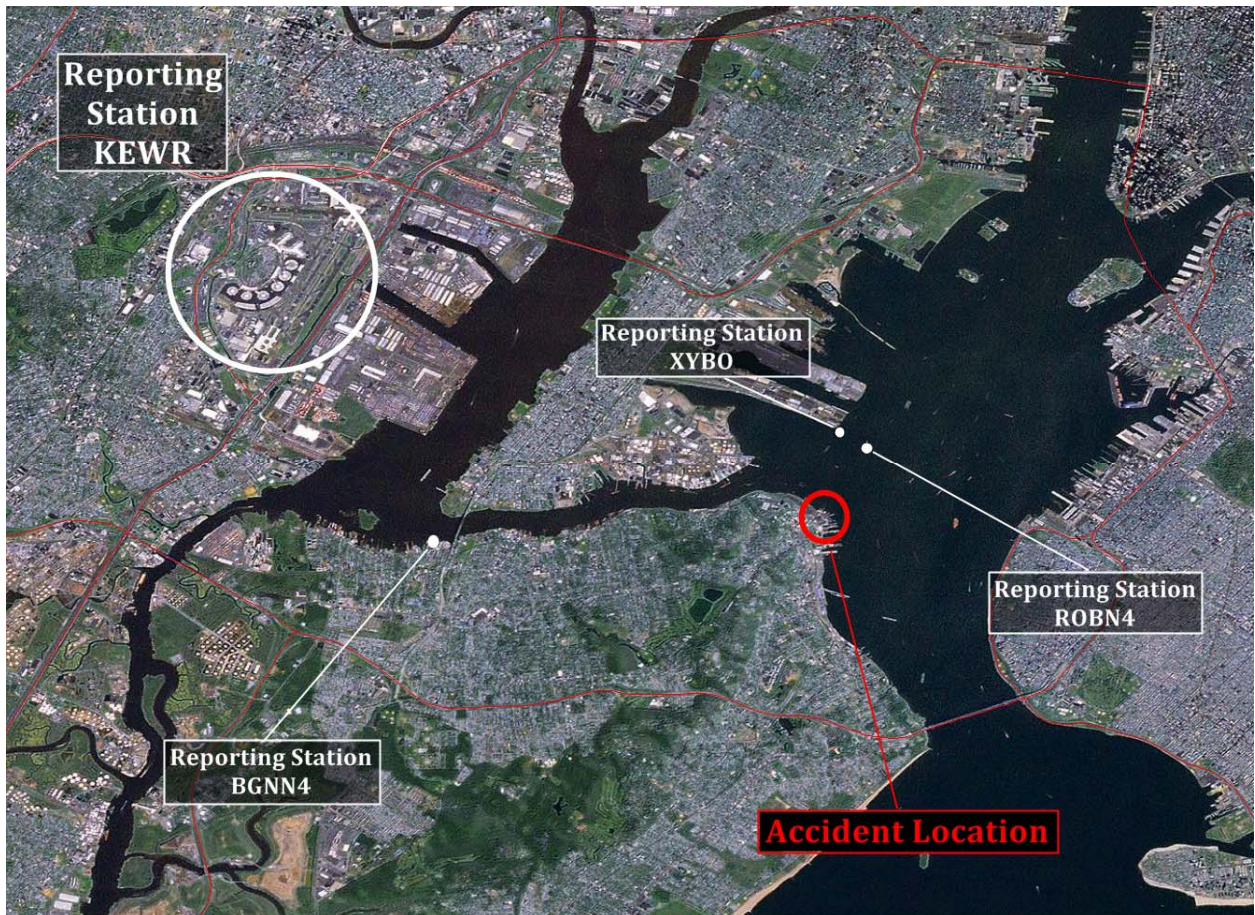


Figure 3 – Locations of surface weather reporting stations presented in this report.

Upper Air Report

A rawinsonde launch at 0800 EDT from Upton, NY (KOKX), located approximately 56 miles to the east-northeast of the accident site, provided information about the vertical temperature, dew point temperature and wind profile of the atmosphere approximately one hour and twenty minutes prior to the accident time. This data is presented in the Skew-T/Log-P⁴ diagram included as figure 4, with data from the surface to 10,000 feet or 700-hectopascals (hPa).

The KOKX 0800 EDT rawinsonde identified a 3°C dew point depression at the surface, with the atmosphere becoming more saturated with height. The atmosphere reached very near-saturation at approximately 1,600 feet, with the lifting condensation level⁵ identified as about 1,300 feet. CAPE⁶ values for this atmosphere were zero. Calculations of the Fog Stability Index (FSI) by the Universal RAwinsonde OBbservation program (RAOB) yielded a value of 45.4, indicating a moderate likelihood of radiation fog. When considering the temperature and dew point temperature values from KEWR at the time of the accident, the likelihood of radiation fog given by the FSI would have been smaller.

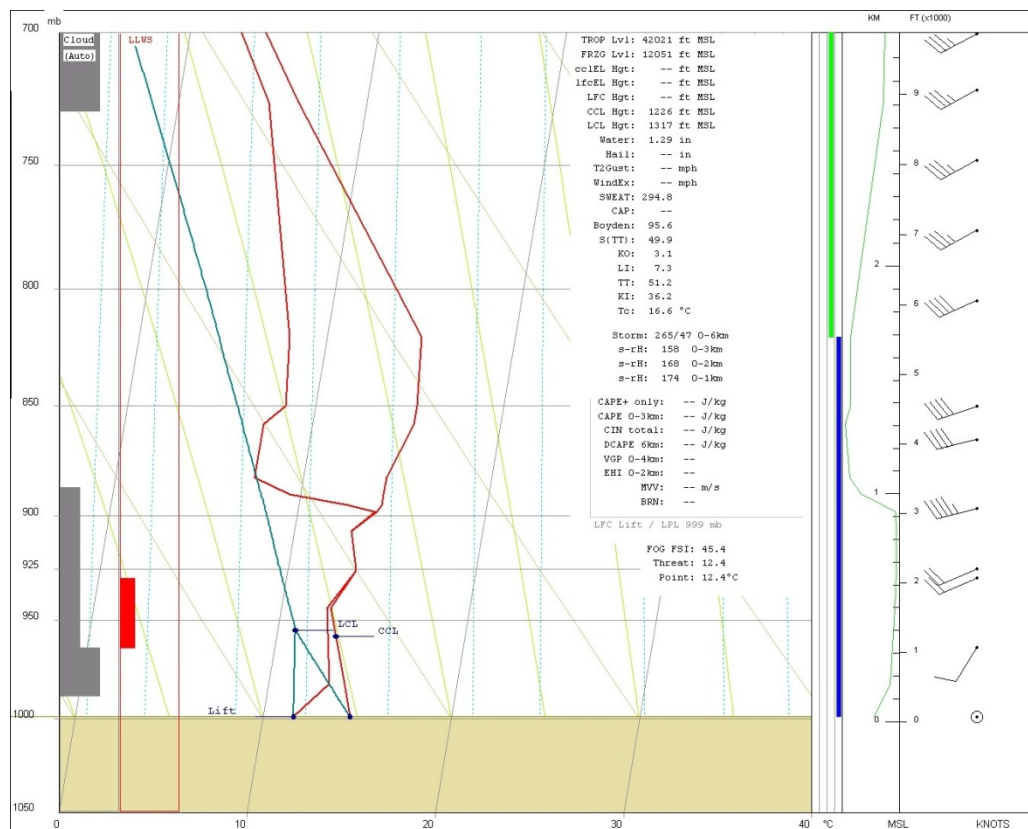


Figure 4 - Rawinsonde SkewT/LogP output for 0800 EDT from KOKX, surface to 700 hPa.

⁴ SkewT/LogP - A thermodynamic diagram, using the temperature and the logarithm of pressure as coordinates, which allows the plotting of the vertical profile of the temperature, humidity, and atmosphere above a particular point on the earth's surface.

⁵ Lifting Condensation Level - The level at which a parcel of moist air lifted dry-adiabatically would become saturated.

⁶ Convective Available Potential Energy (CAPE). A measure of the amount of energy available for convection. CAPE is directly related to the maximum potential vertical speed within an updraft; thus, higher values indicate greater potential for severe weather.

Weather Radar

The closest WSR-88D weather radar to the accident location was KOKX, located at an elevation of about 85 feet. Considering a radar tilt of 0.48° and a standard refraction of “1.33,” hydrometeors above the accident site were detected between approximate altitudes of 2,200 and 7,800 feet. Radar imagery from 0919 EDT (figure 5) indicated that light to moderate precipitation (45-50 dBz) was within the immediate vicinity of the accident location, however only very light intensities were observed at the accident site near accident time.

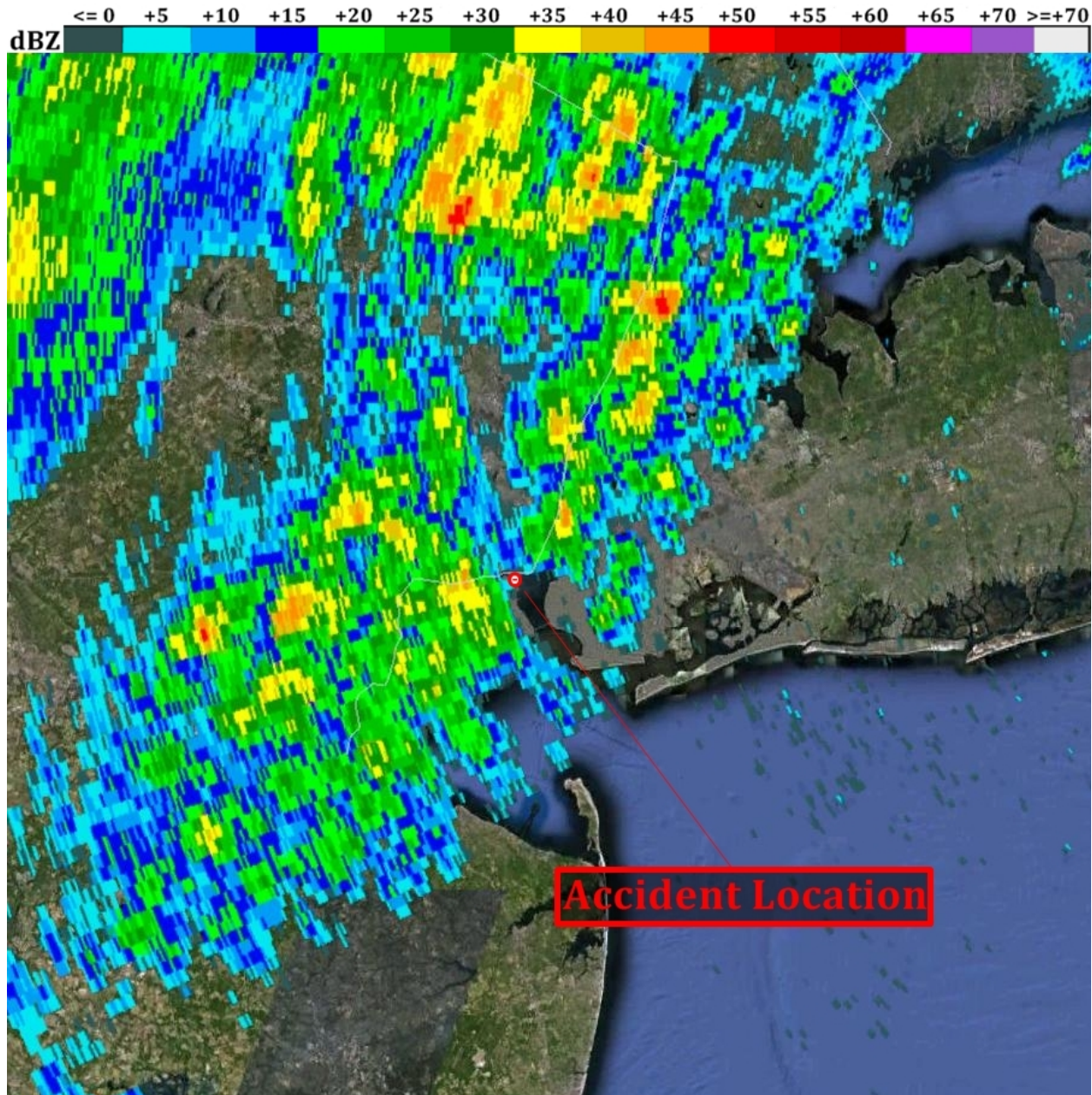


Figure 5 – KOKX WSR-88D 0.48 deg Level-II base reflectivity for 0919 EDT.

Satellite

Visible and infrared (10.7 μ m) retrievals from the Geostationary Operational Environmental Satellite (GOES)-13 imager (figure 6) were obtained from an archive at the Space Science Engineering Center at the University of Wisconsin-Madison. 10.7 μ m infrared imagery from GOES-13 near the time of the accident identifies relatively low-topped clouds in the immediate vicinity of the accident site, with the cloud tops exhibiting a blackbody brightness temperature of approximately -13° C., which corresponded to a height of approximately 18,000 feet. High-cloud contamination for this retrieval is probable, with the lower-layer tops probably reaching a height closer to 10,000 feet.

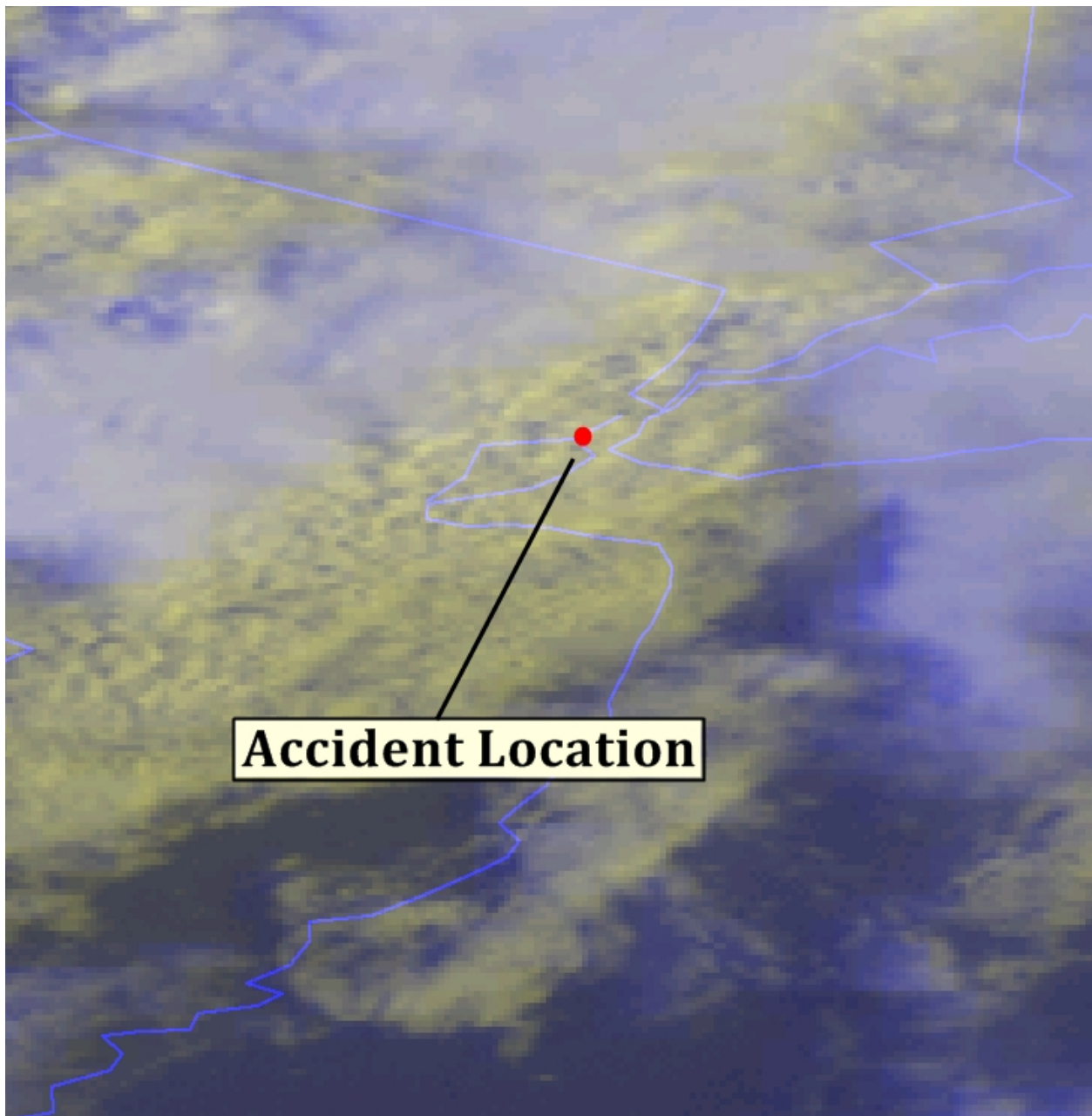


Figure 6 – GOES-13 RGB visible-infrared composite (ch1, ch1, ch4) at 0915 EDT. Processed via McIDAS.

Marine Forecast

A National Weather Service marine forecast was issued for New York Harbor at 0352 EDT.

FZUS51 KOKX 080752

CWFOKX

COASTAL WATERS FORECAST

NATIONAL WEATHER SERVICE NEW YORK NY

352 AM EDT SAT MAY 8 2010

MONTAUK POINT NEW YORK TO SANDY HOOK NEW JERSEY OUT
20 NM OFFSHORE INCLUDING LONG ISLAND SOUND...LONG
ISLAND BAYS AND NEW YORK HARBOR

ANZ300-081945-

352 AM EDT SAT MAY 8 2010

.SYNOPSIS FOR LONG ISLAND WATERS AND NEW YORK
HARBOR...

A WARM FRONT ASSOCIATED WITH THE LOW APPROACHING
FROM THE WEST WILL LIFT THROUGH THE WATERS THIS
MORNING. A STRONG COLD FRONT MOVES ACROSS THE WATERS
THIS AFTERNOON. CANADIAN HIGH PRESSURE WILL THEN BUILD
IN THROUGH MONDAY NIGHT. ANOTHER WARM FRONT
APPROACHES FROM THE SOUTHWEST TUESDAY WITH ANOTHER
LOW PRESSURE AREA MOVING ACROSS THE
REGION WEDNESDAY.

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ANZ338-081945-

NEW YORK HARBOR-

352 AM EDT SAT MAY 8 2010

...GALE WARNING IN EFFECT THROUGH SUNDAY AFTERNOON.

...TODAY...S WINDS 10 TO 15 KT WITH GUSTS UP TO 20 KT

**EARLY...BECOMING SW 15 TO 20 KT WITH GUSTS UP TO 30 KT
LATE THIS MORNING...THEN BECOMING W AROUND 25 KT
WITH GUSTS UP TO 45 KT THIS AFTERNOON. WAVES 1 TO 2
FT...BUILDING TO 2 TO 4 FT THIS AFTERNOON. SHOWERS AND
TSTMS LIKELY THIS MORNING...THEN A CHANCE OF
SHOWERS AND TSTMS EARLY THIS AFTERNOON. VSBY 1 TO 3
NM THIS MORNING.**

.TONIGHT...W WINDS 20 TO 25 KT WITH GUSTS UP TO 40 KT.
WAVES 2 TO

4 FT.

.SUN...NW WINDS AROUND 20 KT WITH GUSTS UP TO 35 KT.
WAVES 2 TO 4 FT.

.SUN NIGHT...NW WINDS 15 TO 20 KT...DIMINISHING TO 10 TO 15
KT AFTER MIDNIGHT. WAVES 2 TO 3 FT...SUBSIDING TO 1 TO 2 FT
AFTER MIDNIGHT. .MON...NW WINDS 15 TO 20 KT WITH GUSTS UP
TO 25 KT. WAVES AROUND 2 FT.

.MON NIGHT...NW WINDS 10 TO 15 KT WITH GUSTS UP TO 20 KT...
DIMINISHING TO 5 TO 10 KT AFTER MIDNIGHT. WAVES SUBSIDING
TO 1 FT OR LESS.

.TUE...N WINDS AROUND 5 KT...BECOMING S. WAVES 1 FT OR LESS. A CHANCE OF SHOWERS THROUGH THE NIGHT.
.WED...S WINDS 5 TO 10 KT...BECOMING NW IN THE AFTERNOON...THEN BECOMING NE. WAVES 1 FT OR LESS. A CHANCE OF SHOWERS. WINDS AND WAVES HIGHER IN AND NEAR TSTMS.
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Astronomical Data

The astronomical data obtained from the United States Naval Observatory for 40.8°N and 74.1°W on May 8, 2010, indicated the following:

SUN

Begin civil twilight	0516
Sunrise	0546
Sun transit	1253
Sunset	2000
End civil twilight	2030

MOON

Moonset	1350 (May 7, 2010)
Moonrise	0247
Moon transit	0844
Moonset	1449
Moonrise	0309 (May 9, 2010)

Mike Richards
NTSB Meteorologist