Ozone National Ambient Air Quality Standard Health Exceedances on August 19, 2019

Exceedance Locations and Levels

On Monday, August 19, 2019, there were no exceedances in New Jersey of the National Ambient Air Quality Standard (NAAQS) for ozone (daily maximum 8-hour average of 70 ppb). See Table 1.

Table 1. New Jersey Ozone Concentrations on 8/19/2019

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	42
Bayonne	47
Brigantine	30
Camden Spruce St	52
Chester	50
Clarksboro	40
Colliers Mills	41
Columbia	40
Flemington	51
Leonia	52
Millville	44
Monmouth University	34
Newark Firehouse	50
Ramapo	42
Rider University	50
Rutgers University	No Data
Washington Crossing*	52
TOTAL EXCEEDANCES	0

*The Washington Crossing station is operated and maintained by EPA as part of the nationwide Clear Air Status and Trends Network (CASTNET).

From the out-of-state stations within New Jersey's ozone non-attainment areas, there were two (2) exceedances of the ozone NAAQS. See Table 2.

Table 2. Ozone Concentrations at Out-of-State Monitoring Stations in New Jersey's Ozone Non-Attainment Areas on 8/19/2019

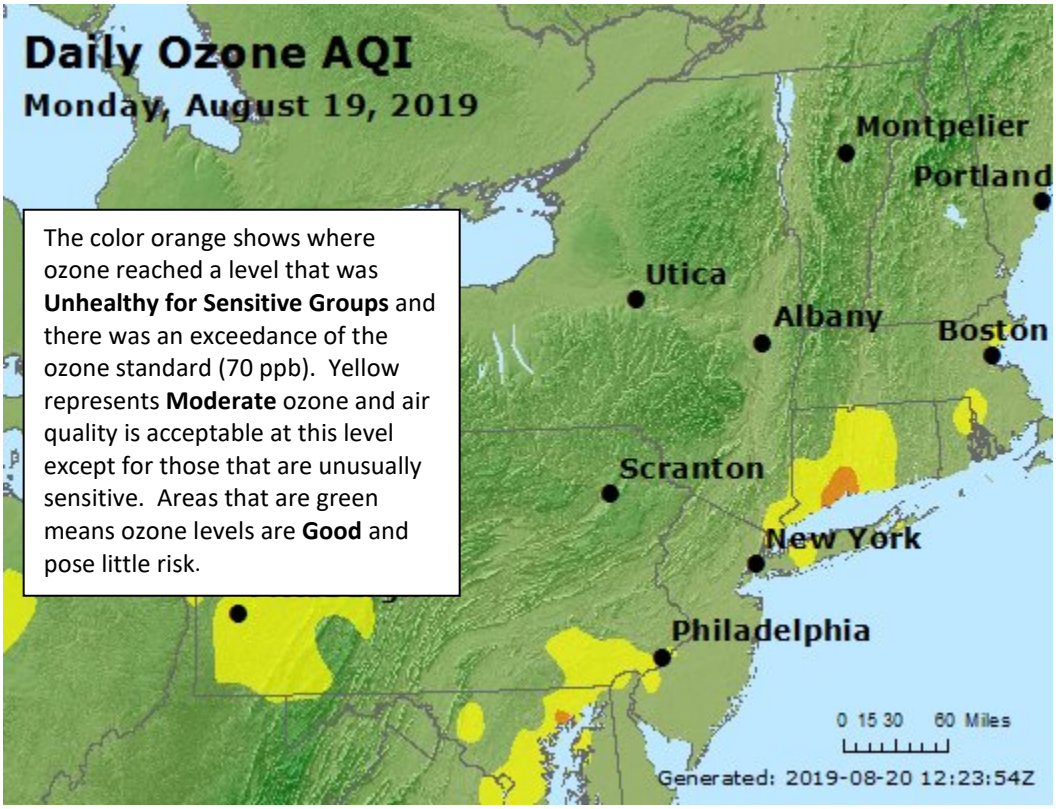
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	59
CT	Greenwich	66
CT	Madison-Beach Road	60
CT	Middletown-CVH-Shed	70
CT	New Haven	71
CT	Stratford	72
CT	Westport	68
DE	BCSP (New Castle Co.)	56
DE	BELLFNT2 (New Castle Co.)	51
DE	KILLENS (Kent Co.)	42
DE	LEWES (Sussex Co.)	36
DE	LUMS 2 (New Castle Co.)	52
DE	MLK (New Castle Co.)	54
DE	SEAFORD (Sussex Co.)	41
MD	Fair Hill	54
NY	Babylon	39
NY	Bronx - IS52	47
NY	CCNY	51
NY	Fresh Kills	48
NY	Holtsville	39
NY	Pfizer Lab	56
NY	Queens	50
NY	Riverhead	50
NY	Rockland Cty	46
NY	White Plains	57
PA	BRIS (Bucks Co.)	50
PA	CHES (Delaware Co.)	57
PA	NEWG (Chester Co.)	57
PA	NORR (Montgomery Co.)	53
PA	LAB (Philadelphia Co.)	48
PA	NEA (Philadelphia Co.)	53
PA	NEW (Philadelphia Co.)	55
	TOTAL EXCEEDANCES	2

The number of days in 2019 on which exceedances of the ozone NAAQS were recorded for all the states within New Jersey's ozone non-attainment areas is summarized in Table 3.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Non-Attainment Areas in 2019

STATE	# of Days NAAQS was Exceeded January 1 – August 19, 2019 NAAQS = 70 ppb
Connecticut	18
Delaware	3
Maryland	2
New Jersey	12
New York	10
Pennsylvania	8

Figure 1. Ozone Air Quality Index for August 19, 2019



Source: www.airnow.gov

For ozone terminology definitions see NJDEP Air Quality Planning's Glossary and Acronyms webpage: http://nj.gov/dep/baqp/glossary.html

Weather

On Monday August 19, 2019, a swath of high pressure located over the Mid-Atlantic and southeastern United States brought warm temperatures, partly sunny skies, and southwesterly winds to our non-attainment zone. Despite the presence of high pressure, a strong surface trough was in place that produced extensive cloud cover and thunderstorms suppressing ozone formation across most of the region. However, a few locations in Connecticut remained mostly sunny for the majority of the afternoon and led to two exceedances of the 8-hour average NAAQS in New Haven and Stratford.

Early on Monday, high pressure was in place over the Appalachians along with a weak center of low pressure off the Mid-Atlantic coast, which resulted in mostly sunny skies and light southwesterly winds that caused temperatures to climb into the mid-80's to low 90's. As the day progressed, a surface trough developed over the I-95 corridor from western Connecticut to New Jersey, where it remained throughout the day and allowed polluted air aloft to mix down to the surface. As the trough strengthened, sufficient moisture allowed clouds and severe thunderstorms to develop throughout the majority of New Jersey by mid-afternoon, limiting ozone production throughout the state. As the trough pushed through, a line of severe thunderstorms moved eastward and reached the exceedance locations by 5 pm, effectively cleaning out the air mass. However, before the thunderstorms moved in, the majority of Connecticut experienced a relatively cloudless sky, which contributed to ozone concentrations to rapidly spike into the very unhealthy category for a short period.

For the remainder of the non-attainment region, extensive cloud cover, thunderstorms, and a southerly flow along the coast kept ozone concentrations in the good to moderate range. However, favorable meteorological conditions in Connecticut, combined with localized transport of emissions along the I-95 corridor led to the two exceedances in New Haven and Stratford.

Where Did the Air Pollution that Caused Ozone Come From?

Figures 2, 3, and 4 show the back trajectories starting at different wind heights for the monitored exceedances on August 19, 2019. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone exceedances. Two (2) monitoring stations with an 8-hour average ozone exceedance were used to run back trajectories. The selected site and 8-hour average ozone level recorded is listed in Table 4 below.

Table 4. Monitoring Stations with an 8-hr Ozone Exceedance that Were Selected to Run 48-hour Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	New Haven	71
CT	Stratford	72

Backward trajectories from August 19th show that air was influenced by a surface trough draped across the non-attainment area in the days preceding this high ozone event. This resulted in light, variable winds along this boundary allowing pollutants to accumulate at ground level. The favorable

meteorological conditions mentioned above, along with the transport of common ozone precursors from local industry resulted in two exceedance of the 8-hour average NAAQS in Connecticut.

Surface level backward trajectories (Figure 2) originated on the shoreline of North Carolina and traveled in a northerly direction up the coast. Air at the ground level then traveled over Long Island and the Sound where peaking units may have been operating on this day due to hot temperatures and high humidity. Picking up emissions from cars, trucks, and local industry, this air remained at the surface for the duration of its path.

Mid-level backward trajectories (Figure 3) originated off the coast of Georgia and South Carolina and initially traveled in a similar path to surface trajectories. While traveling up the coast, air remained at higher levels of the atmosphere before making a sharp turn in the westerly direction. This wind shift resulted from weak low pressure off the coast of Virginia providing onshore winds to this region. At this time, air entered southern Delaware where it was quickly brought down to the surface allowing any polluted air aloft to mix down to the surface. Meanwhile, as air progressed further inland it was influenced by the surface trough draped along the I-95 corridor. Air traveled along this boundary, picking up additional emissions as it traveled through the New York City metropolitan center before reaching its destination in Connecticut.

Upper level backward trajectories (Figure 4) originated in Virginia and West Virginia near the center of a weak high-pressure system. Air at higher levels experienced a slight recirculation over this region where it may have picked up emissions from local industry and peak demand electric generating units (EGUs) operating because of multiple days of hot, sunny weather. Air at this level continued to travel very slowly along a stationary front that was in place across the nonattainment area. This front directed air into southeastern Pennsylvania before traveling northeastward through the New York City metropolitan area.

Figure 5 shows the national Air Quality Index observed on August 18th, the day prior to the exceedance event. As shown in the figure, a few isolated areas in Pennsylvania and Connecticut reached the moderate category the day before, indicating that previously polluted air was transported to the surface from upper levels. Despite the lack of widespread moderate and unhealthy for sensitive groups air quality in the region, southwesterly winds were able to transport a plume of ozone precursors into Connecticut from upwind locations including the New York City metropolitan area. Previous day conditions, along with the favorable meteorological influences mentioned above, allowed ground level ozone concentrations to reach the USG category in isolated locations of coastal Connecticut.

Figure 2. 48-hour Back Trajectories for August 19, 2019 at 10 meters

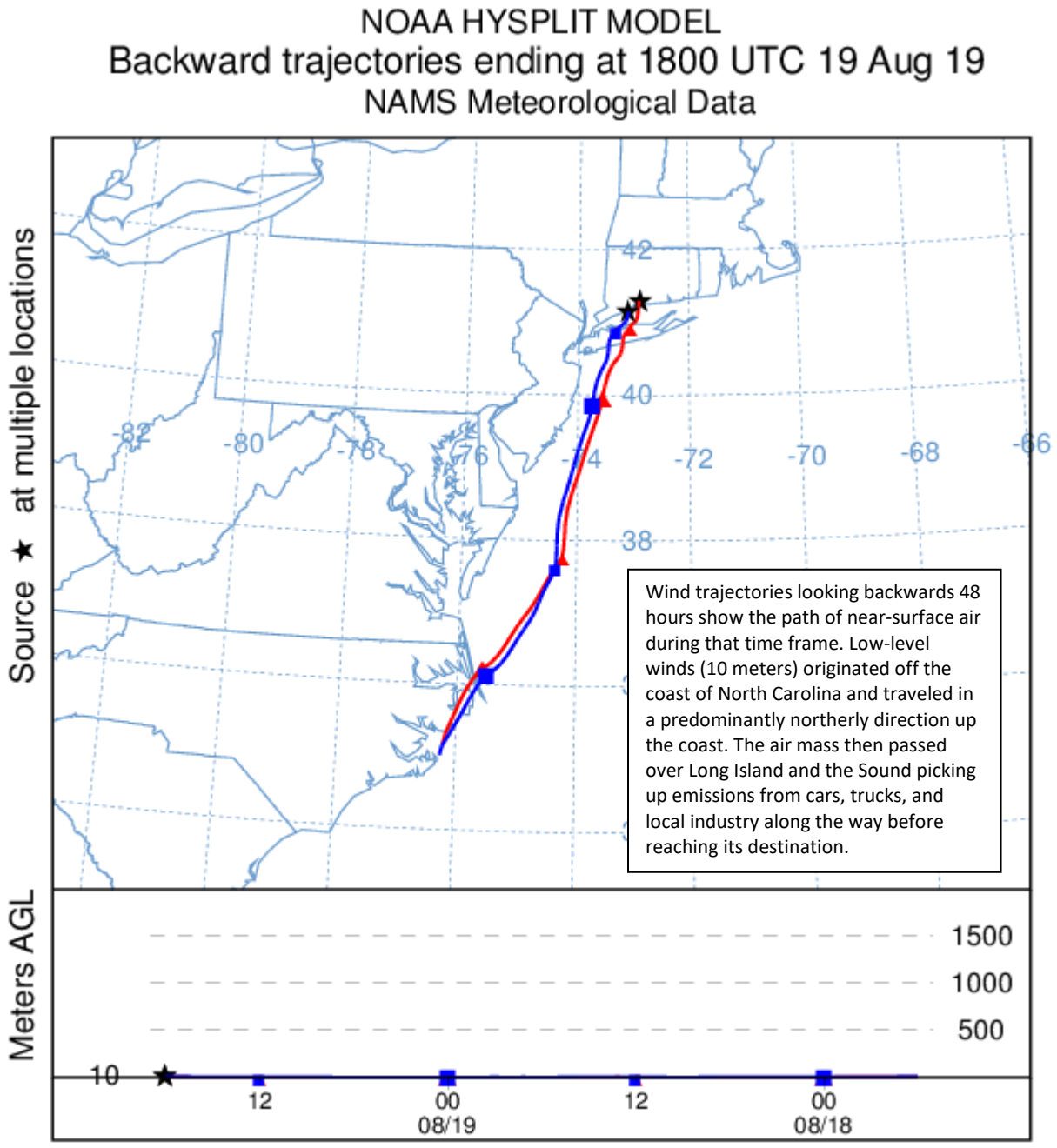


Figure 3. 48-hour Back Trajectories for August 19, 2019 at 500 meters

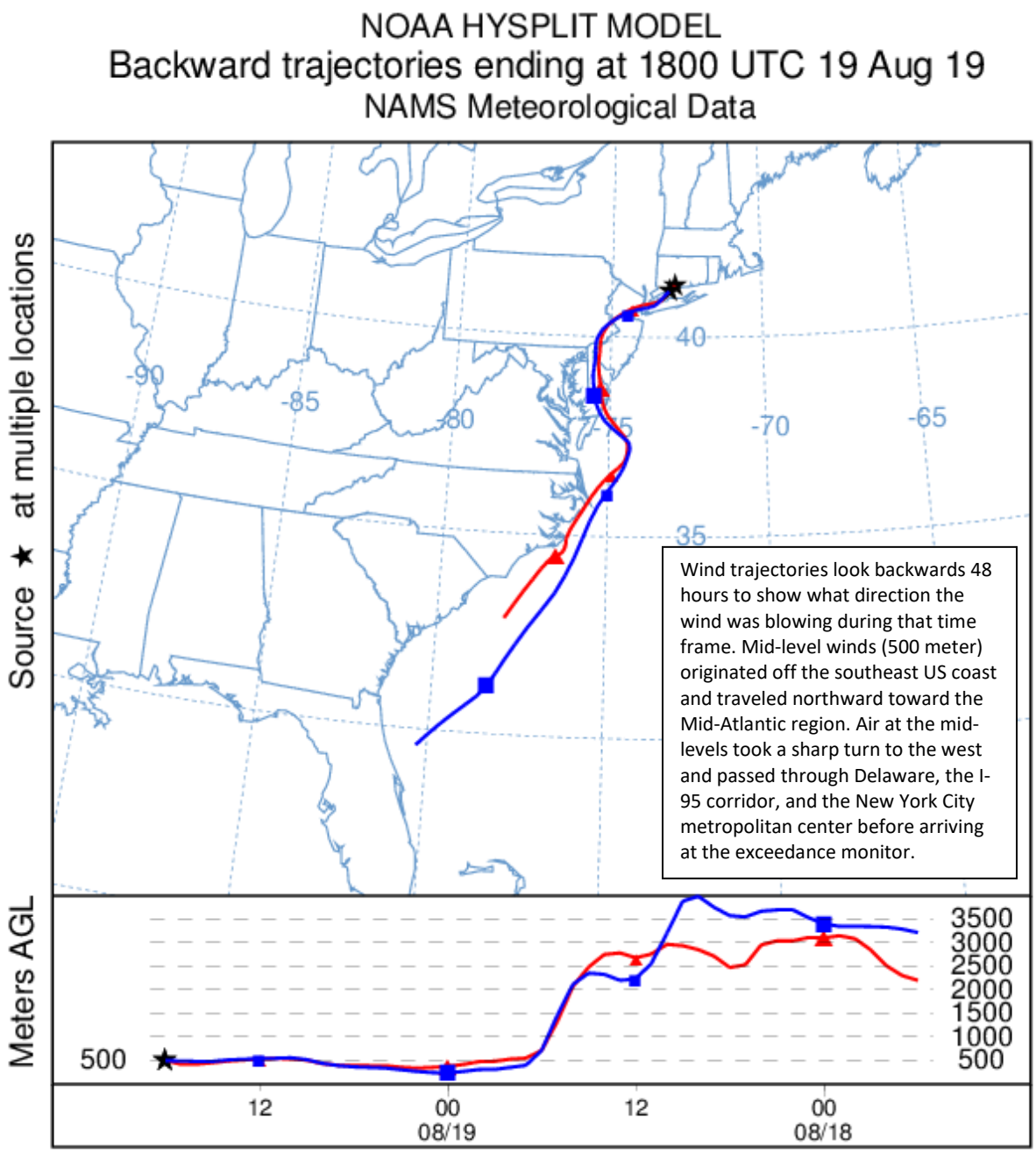


Figure 4. 48-hour Back Trajectories for August 19, 2019 at 1500 meters

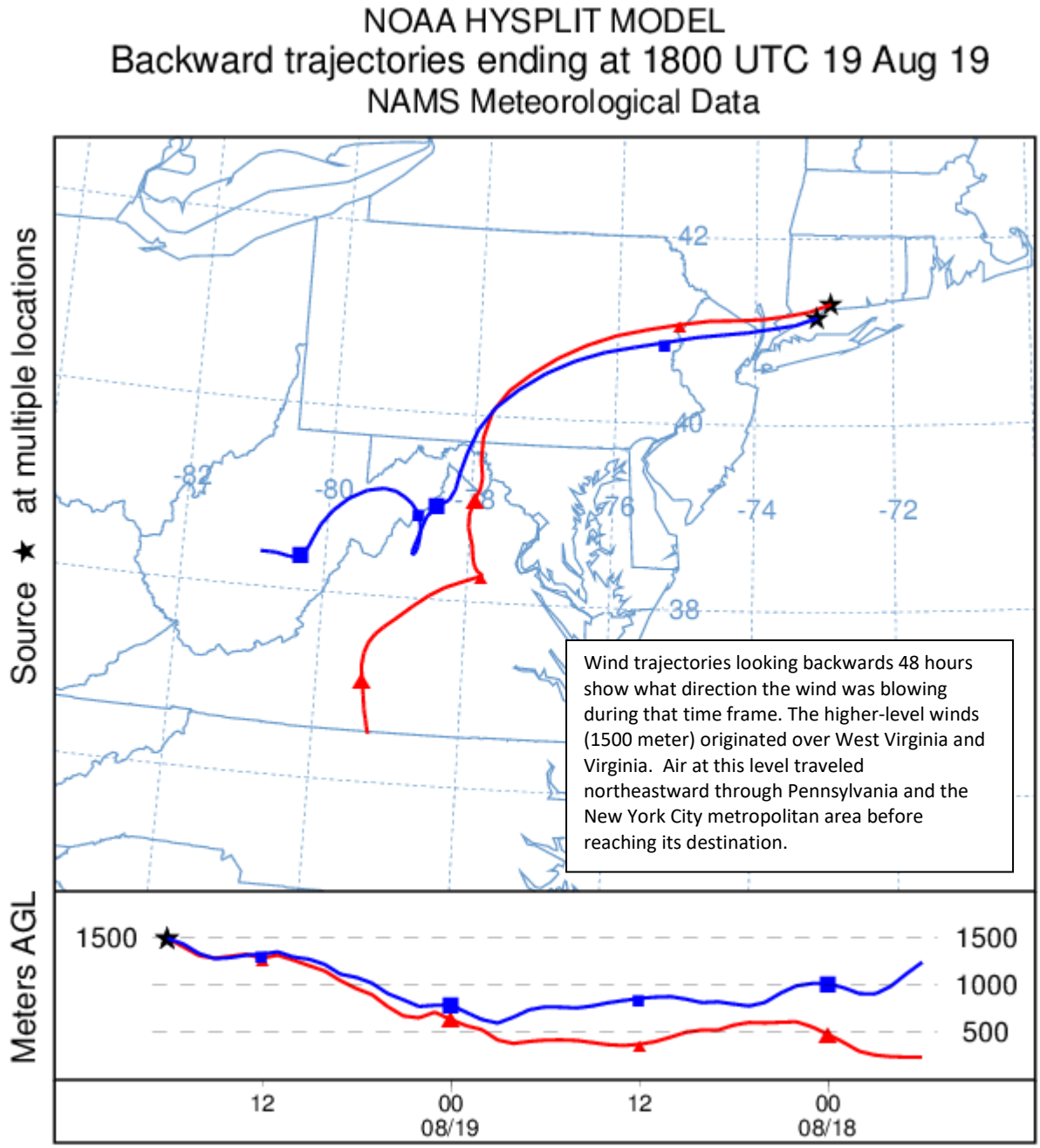
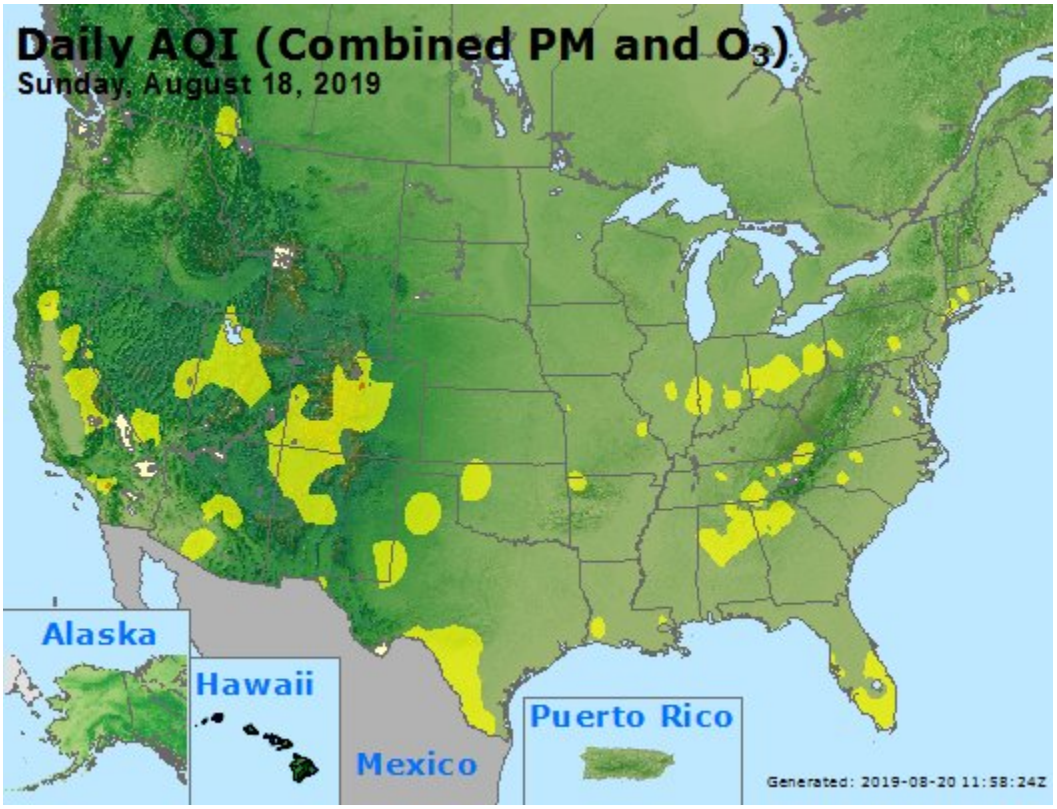


Figure 5. Combined Air Quality Index for the United States on August 18, 2019



Source: www.airnow.gov

How is Ozone Created?

Ground-level ozone is an air pollutant known to cause a number of health effects and negatively impact air quality and the environment in New Jersey. Ozone is formed when oxides of nitrogen (NOx) and volatile organic compounds (VOCs) react in the presence of sunlight. Ozone can irritate any person's lungs, but the effect may be more pronounced for those with existing lung-related deficiencies, and therefore, one should take extra precautions on bad ozone days.

Find Out About Air Quality Every Day

The "What's Your Air Quality Today?" page at http://www.nj.gov/dep/cleanairnj/ tells you how to sign up to receive notifications and find out when your local air has reached unhealthy ozone levels.