Ozone National Ambient Air Quality Standard Health Exceedances on June 30, 2018

Exceedance Locations and Levels

On Saturday, June 30, 2018, there were six (6) 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 8-hr Maximum Ozone Concentrations on June 30, 2018

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	68
Bayonne	71
Brigantine	63
Camden Spruce St	75
Chester	61
Clarksboro	79
Colliers Mills	78
Columbia	59
Flemington	62
Leonia	77
Millville	63
Monmouth University	57
Newark Firehouse	71
Ramapo	60
Rider University	63
Rutgers University	59
Washington Crossing*	No Data
TOTAL EXCEEDANCES	6

*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 ten (10) exceedances of the ozone NAAQS. See Table 2.

Table 2. 8-hr Maximum Ozone Concentrations for Out-of-State Monitoring Stations in New Jersey's Ozone Non-Attainment Areas on June 30, 2018

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	74
CT	Greenwich	60
CT	Madison-Beach Road	64
CT	Middletown-CVH-Shed	56
CT	New Haven	58
CT	Stratford	64
CT	Westport	60
DE	BCSP (New Castle Co.)	65
DE	BELLFNT2 (New Castle Co.)	64
DE	KILLENS (Kent Co.)	65
DE	LEWES (Sussex Co.)	71
DE	LUMS 2 (New Castle Co.)	66
DE	MLK (New Castle Co.)	70
DE	SEAFORD (Sussex Co.)	67
MD	Fair Hill	71
NY	Babylon	70
NY	Bronx - IS52	78
NY	CCNY	74
NY	Holtsville	61
NY	Pfizer Lab	79
NY	Queens	72
NY	Riverhead	58
NY	Rockland Cty	60
NY	White Plains	72
NY	Susan Wagner	No Data
PA	BRIS (Bucks Co.)	56
PA	CHES (Delaware Co.)	73
PA	NEWG (Chester Co.)	62
PA	NORR (Montgomery Co.)	62
PA	LAB (Philadelphia Co.)	65
PA	NEA (Philadelphia Co.)	69
PA	NEW (Philadelphia Co.)	71
	TOTAL EXCEEDANCES	10

The number of days in 2018 on which exceedances of the ozone NAAQS were recorded for all the states is summarized in Table 3. Figure 1 shows graphically the region's ozone concentrations on June 30, 2018.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Non-Attainment Areas in 2018

STATE	# of Days NAAQS was Exceeded January 1 – June 30, 2018 NAAQS = 70 ppb
Connecticut	7
Delaware	4
Maryland	4
New Jersey	9
New York	8
Pennsylvania	6

Figure 1. Ozone Air Quality Index for June 30, 2018
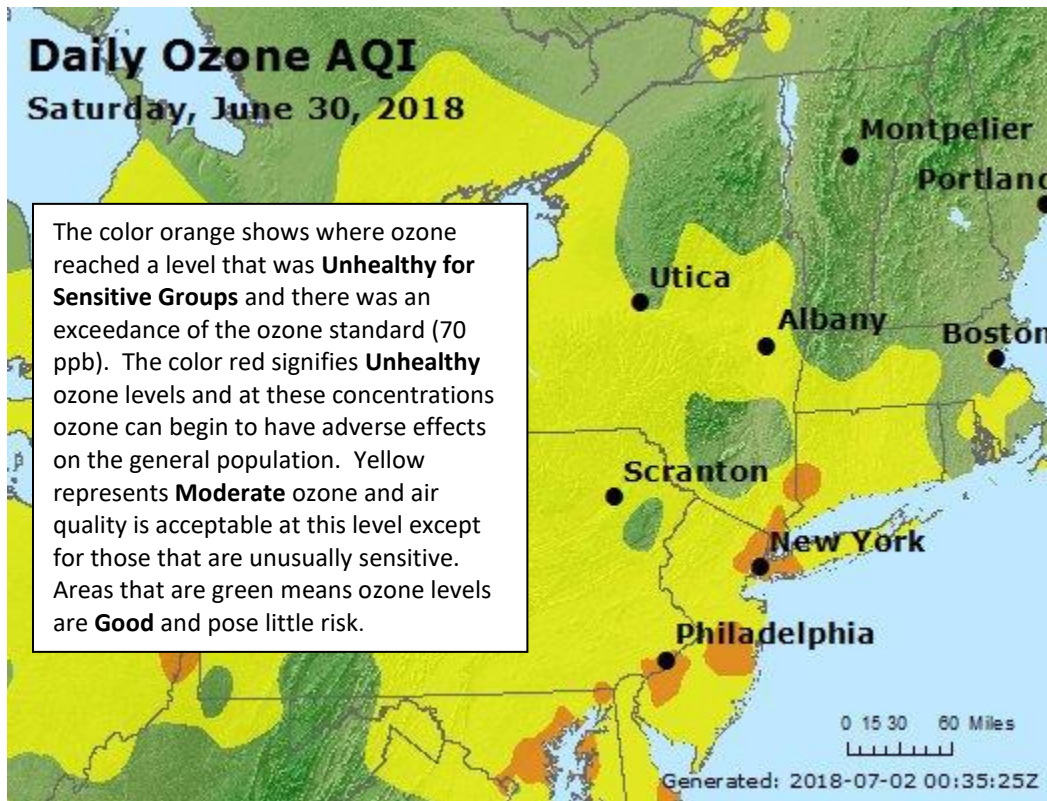
Source: www.airnow.gov

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

Weather

A large high pressure system dominated the weather pattern over the eastern half of the United States on Saturday, June 30th. The high pressure was centered just southwest of New Jersey, over the Mid-Atlantic, allowing for abundant sunshine, hot temperatures, and light/variable winds throughout the ozone nonattainment area. All these weather conditions are known to be favorable for ozone production and are commonly seen in an exceedance situation. In addition to these conditions at the surface, the broad nature of this high pressure system allowed upper level winds to transport air from the Great Lakes Region, which experienced moderate to scattered USG levels the previous day. This upper level component likely enhanced our locally produced ozone levels leading to scattered exceedances throughout the nonattainment area.

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 exceedance June 30, 2018. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. Eleven (11) monitoring stations with an 8-hr ozone exceedance were used to run back trajectories. The selected sites and the maximum 8-hr ozone level recorded are listed in Table 4 below:

**Table 4. Monitoring Stations with 8-hr Ozone Exceedances that
Were Selected to Run 48-hr Back Trajectories**

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	74
DE	LEWES (Sussex Co.)	71
MD	Fair Hill	71
NJ	Camden Spruce St.	75
NJ	Clarksboro	79
NJ	Colliers Mills	78
NJ	Leonia	77
NY	CCNY	74
NY	Bronx – IS52	78
NY	Pfizer Lab	79
PA	CHES (Delaware Co.)	73

Surface level back trajectories (Figure 2) originated north of Lake Erie and over Lake Michigan. Both of these regions saw widespread Moderate and USG ozone levels on June 29th. Surface trajectories affecting monitors in New York passed through Ontario, New York State and the NYC metropolitan area. Trajectories affecting southern locations of the nonattainment area traveled southeastward through New York State and Pennsylvania, where they passed through a heavily industrialized area picking up

emissions from cars, trucks, and industry along the way. Low level trajectories originated at higher levels of the atmosphere and were mixed down to the surface due to the presence of a surface trough that developed across the state. Mid-level trajectories (Figure 3) originated in portions of Ontario and Michigan. Much of the trajectories at the mid-level traveled through Ontario, New York State and Pennsylvania. In addition, mid-level winds traveled very slowly allowing for the air mass to grow increasingly polluted as it tracked eastward. Similar to the surface trajectories, the mid-level trajectories also experienced some mixing to lower levels. This is likely due to subsidence resulting from a strong high-pressure system. Upper level trajectories (Figure 4) originated in portions of Wisconsin, Lake Superior, and Minnesota. Upper air trajectories traveled through Canada, New York and in some cases parts of Pennsylvania before reaching their destinations. Trajectories at the upper level experienced some mixing to lower levels but remained aloft for the duration of their path.

Figure 5 shows graphically the national ozone concentrations on June 29th, 2018.

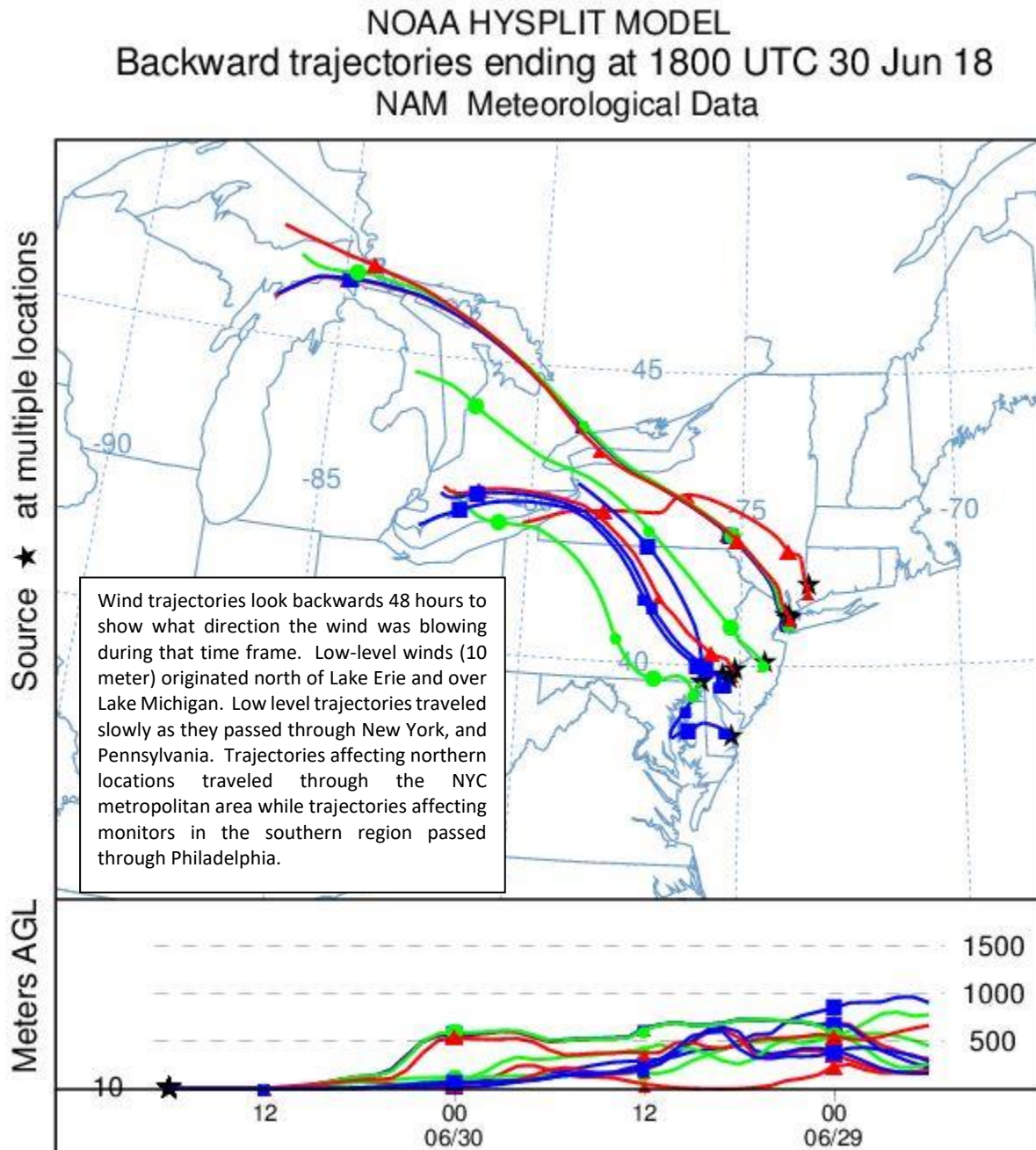**Figure 2. 48-hour Back Trajectories for June 30, 2018 at 10 meters**

NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 30 Jun 18
NAM Meteorological Data

Wind trajectories look backwards 48 hours to show what direction the wind was blowing during that time frame. Low-level winds (10 meter) originated north of Lake Erie and over Lake Michigan. Low level trajectories traveled slowly as they passed through New York, and Pennsylvania. Trajectories affecting northern locations traveled through the NYC metropolitan area while trajectories affecting monitors in the southern region passed through Philadelphia.

Figure 3. 48-hour Back Trajectories for June 30, 2018 at 500 meters

NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 30 Jun 18
NAM Meteorological Data

Wind trajectories look backwards 48 hours to show what direction the wind was blowing during that time frame. The mid-level winds (500 meter) originated in portions of Canada and traveled southeastward through New York and Pennsylvania. Trajectories at the mid-level traveled very slowly as they passed through urbanized locations just before reaching their destinations.

Figure 4. 48-hour Back Trajectories for June 30, 2018 at 1500 meters

NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 30 Jun 18
NAM Meteorological Data

Wind trajectories look backwards 48 hours to show what direction the wind was blowing during that time frame. The higher-level winds (1500 meter) originated in Wisconsin and Minnesota. Upper level trajectories traveled through Canada, New York and in some cases Pennsylvania before parting ways and traveling to their destinations. Air at the upper level remained aloft for the duration of its path.
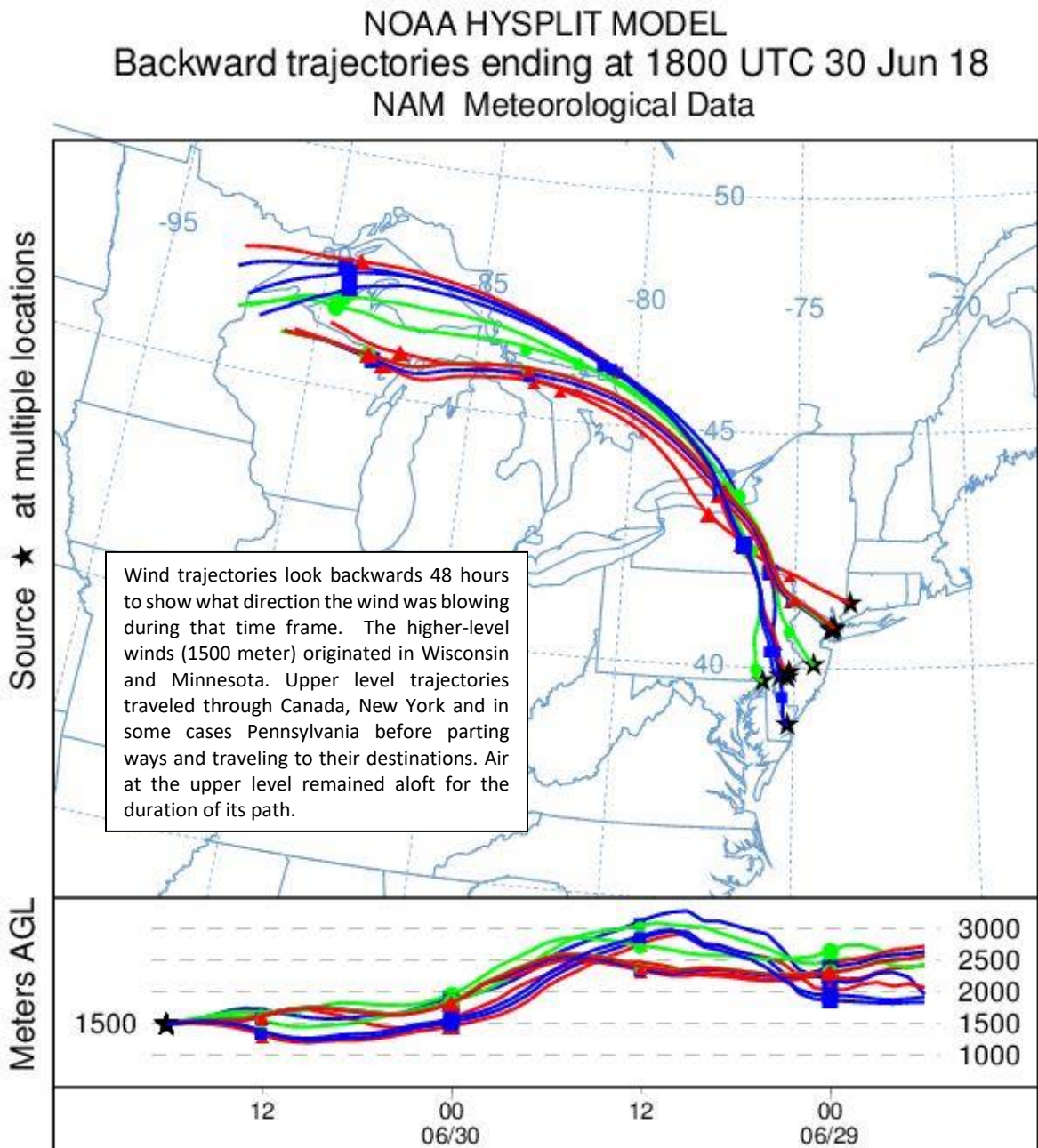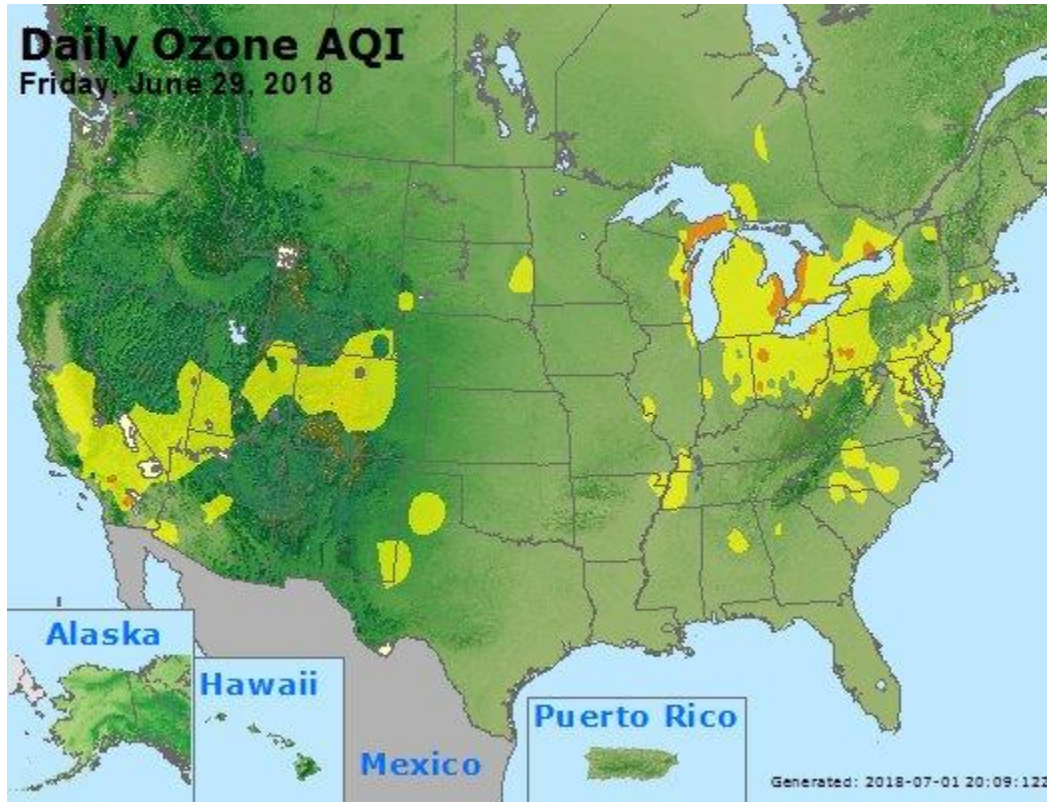
Figure 5. Ozone Air Quality Index for the United States on June 29, 2018

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.