Ozone National Ambient Air Quality Standard Health Exceedances on June 28, 2019

Exceedance Locations and Levels

On Friday, June 28, 2019, 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 28, 2019

STATION	Daily Maximum 8-Hr Average (ppb)
Angora State Hospital	67
Bayonne	67
Brigantine	72
Camden Spruce St	71
Chester	64
Clarksburg	68
Colliers Mills	67
Columbia	57
Flemington	73
Leonia	85
Millville	71
Monmouth University	55
Newark Firehouse	70
Ramapo	No Data
Rider University	70
Rutgers University	72
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 fifteen (15) 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 6/28/2019

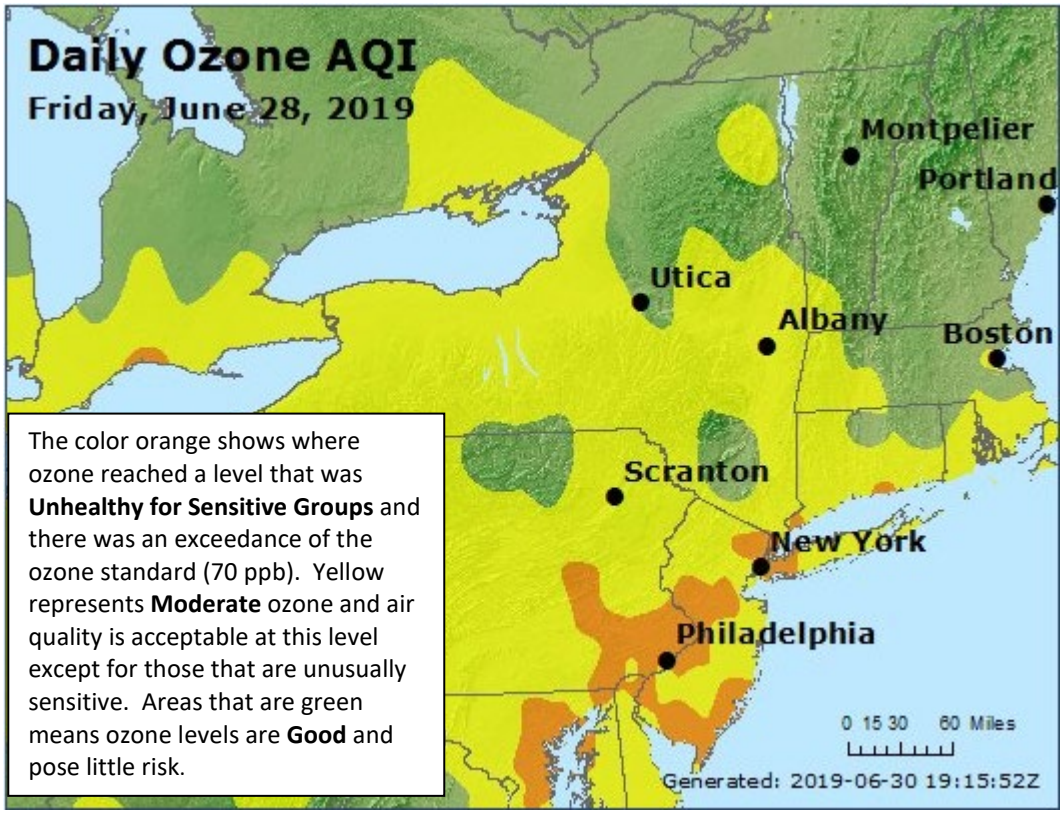
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	59
CT	Greenwich	72
CT	Madison-Beach Road	71
CT	Middletown-CVH-Shed	58
CT	New Haven	54
CT	Stratford	65
CT	Westport	68
DE	BCSP (New Castle Co.)	68
DE	BELLFNT2 (New Castle Co.)	72
DE	KILLENS (Kent Co.)	64
DE	LEWES (Sussex Co.)	No Data
DE	LUMS 2 (New Castle Co.)	62
DE	MLK (New Castle Co.)	71
DE	SEAFORD (Sussex Co.)	61
MD	Fair Hill	72
NY	Babylon	68
NY	Bronx - IS52	75
NY	CCNY	81
NY	Fresh Kills	64
NY	Holtsville	66
NY	Pfizer Lab	75
NY	Queens	70
NY	Riverhead	59
NY	Rockland Cty	54
NY	White Plains	67
PA	BRIS (Bucks Co.)	72
PA	CHES (Delaware Co.)	73
PA	NEWG (Chester Co.)	75
PA	NORR (Montgomery Co.)	79
PA	LAB (Philadelphia Co.)	79
PA	NEA (Philadelphia Co.)	81
PA	NEW (Philadelphia Co.)	72
	TOTAL EXCEEDANCES	15

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 – June 28, 2019 NAAQS = 70 ppb
Connecticut	4
Delaware	2
Maryland	1
New Jersey	4
New York	3
Pennsylvania	1

Figure 1. Ozone Air Quality Index for June 28, 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

Sunny skies, hot temperatures, and light variable winds persisted throughout the northeastern United States as high pressure remained over the eastern half of the country. This resulted in multiple ozone exceedances in northeastern Maryland, Delaware, eastern Pennsylvania, New Jersey, New York City, and coastal portions of Connecticut on Friday, June 28, 2019.

As high pressure persisted throughout the northeast, temperatures climbed into the upper 80's and lower 90's for the third day in a row. This continued high pressure resulted in upper level long-range transport from the Great Lakes, Ohio River Valley, and Mid-Atlantic regions down to the surface in our non-attainment area. Additionally, a very weak stationary front extended from southern New England southward through central New Jersey and Pennsylvania overnight into early Friday morning. As the morning progressed, the front began to dissipate and transition into a weak warm front that eventually tapered off to the northwest in northern Pennsylvania. Despite the front's weak strength, it allowed for additional mixing of upper level air down to the surface specifically in the New York City and New Jersey region. As the day progressed, the winds began to shift out of the south and a clearly defined sea-breeze front formed over the New Jersey shore coast-line. This resulted in a recirculation of previously polluted air from the Mid-Atlantic states onto mainland New Jersey.

The transport of polluted upper-level and surface air from upwind states, favorable meteorological conditions, and a formerly polluted air mass allowed for the continued production of ground-level ozone.

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 June 28, 2019. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. Ten (10) monitoring stations with 8-hr ozone exceedances were used to run back trajectories. The selected sites and the maximum 8-hr ozone levels recorded are listed in Table 4 below.

Table 4. Monitoring Station with an 8-hr Ozone Exceedance that Was Selected to Run 48-hr Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
NJ	Leonia	85
NJ	Brigantine	72
NJ	Flemington	73
NJ	Rutgers University	72
CT	Madison-Beach Road	71
NY	CCNY (Bronx)	81
DE	BELLFNT2	72
MD	Fair Hill	72
PA	Bristol	72
PA	Chester	73

Figure 2 shows that the majority of the surface-level air entered the region from the Great Lakes and Ohio River Valley regions. This air mass was heavily polluted from days prior, as seen in Figure 5. This air mass along with local emissions from cars, trucks, buses, industry and power plants resulted in high levels of ground-level ozone. Additional sites saw transport of upper level and surface air from the mid-Atlantic states due to an enhanced sea-breeze effect along the New Jersey coast-line. At upper levels, air was transported primarily from the Great Lakes and Ohio River Valley, across southern and central New York state and Pennsylvania, and into our region as a result of high-pressure circulation as seen in Figures 3 and 4. In addition, the height portion of the trajectory modeling shows that air, and possibly air pollution aloft, was brought to the surface by the atmospheric sinking motion associated with the high-pressure system.

Figure 5 shows the national air quality observed on June 27th, the day prior to the localized air quality exceedances. As shown in the Ozone AQI map, the majority of the southern Great Lakes, Ohio River Valley, and Mid-Atlantic regions experienced moderate air quality the day before, with multiple isolated areas of unhealthy for sensitive groups (USG) category air quality. Looking at the HYSPLIT back trajectories suggests that the polluted air in this region was transported into our non-attainment area at upper levels and at the surface, resulting in continued ground-level ozone production.

Figure 2. 48-hour Back Trajectories for June 28, 2019 at 10 meters

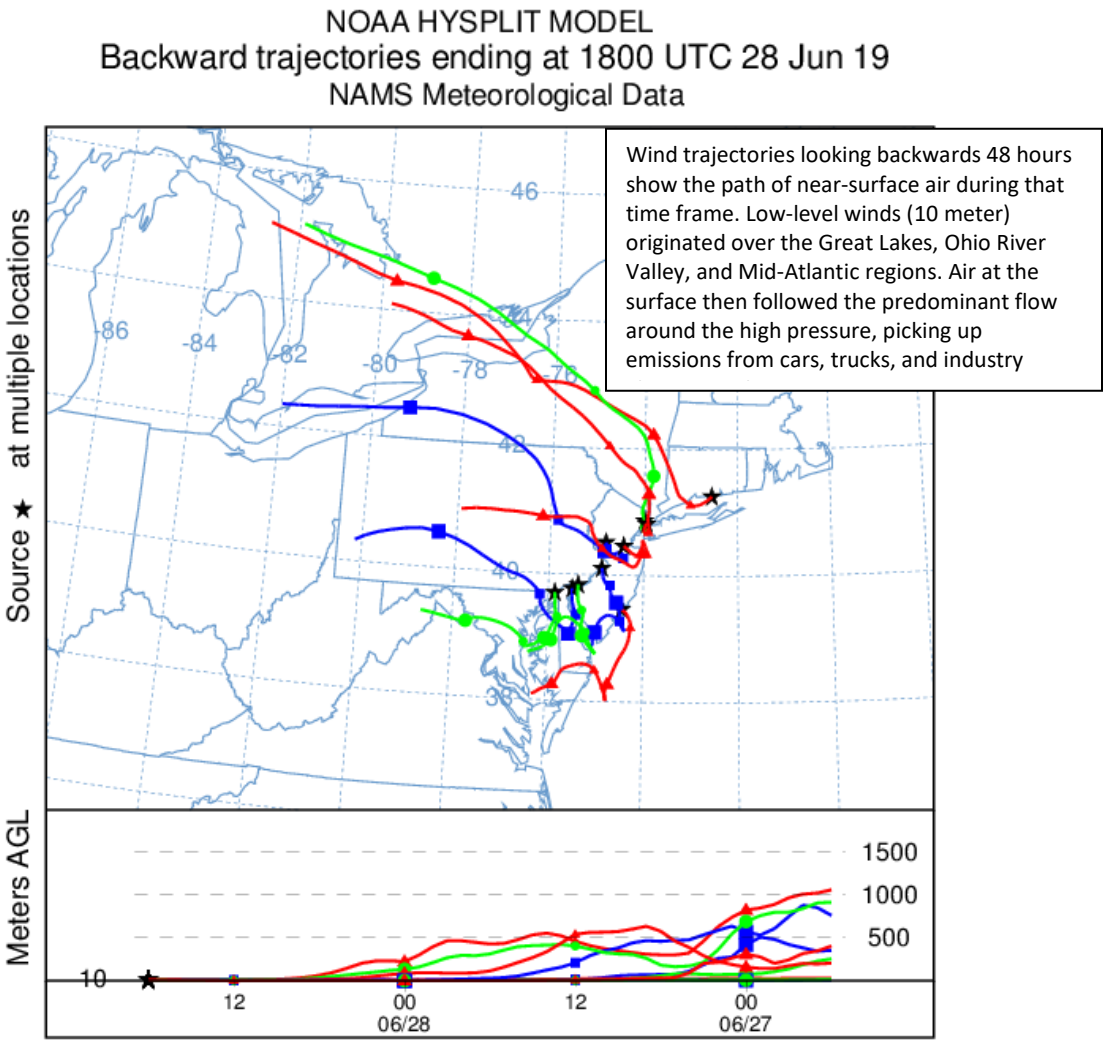


Figure 3. 48-hour Back Trajectories for June 28, 2019 at 500 meters

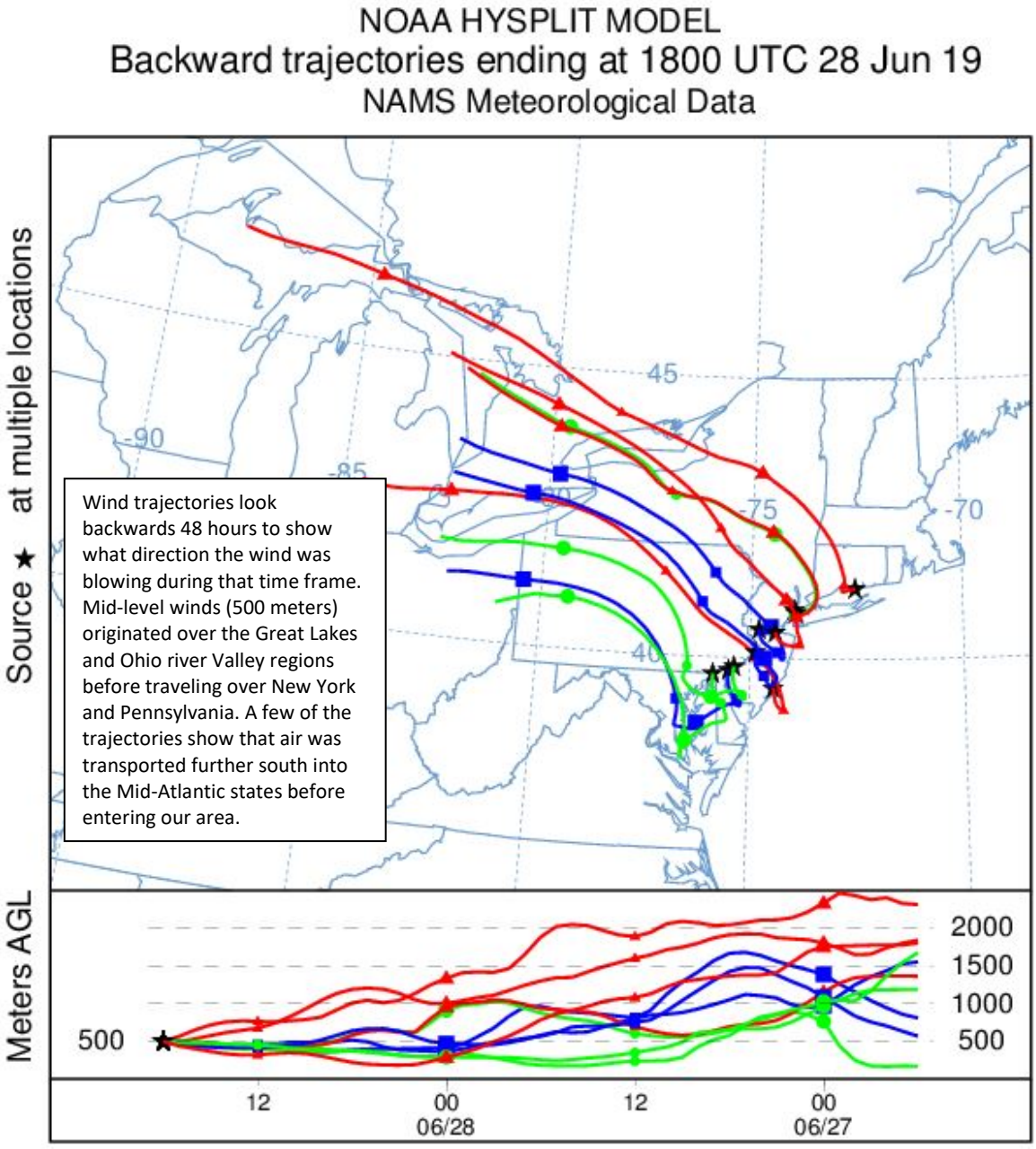

NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 28 Jun 19
NAMS Meteorological Data
Source ★ at multiple locations
Wind trajectories look backwards 48 hours to show what direction the wind was blowing during that time frame. Mid-level winds (500 meters) originated over the Great Lakes and Ohio river Valley regions before traveling over New York and Pennsylvania. A few of the trajectories show that air was transported further south into the Mid-Atlantic states before entering our area.
45
-90
-85
-75
-70
40
Meters AGL
2000
1500
1000
500
500
12
00
06/28
12
00
06/27

Figure 4. 48-hour Back Trajectories for June 28, 2019 at 1500 meters

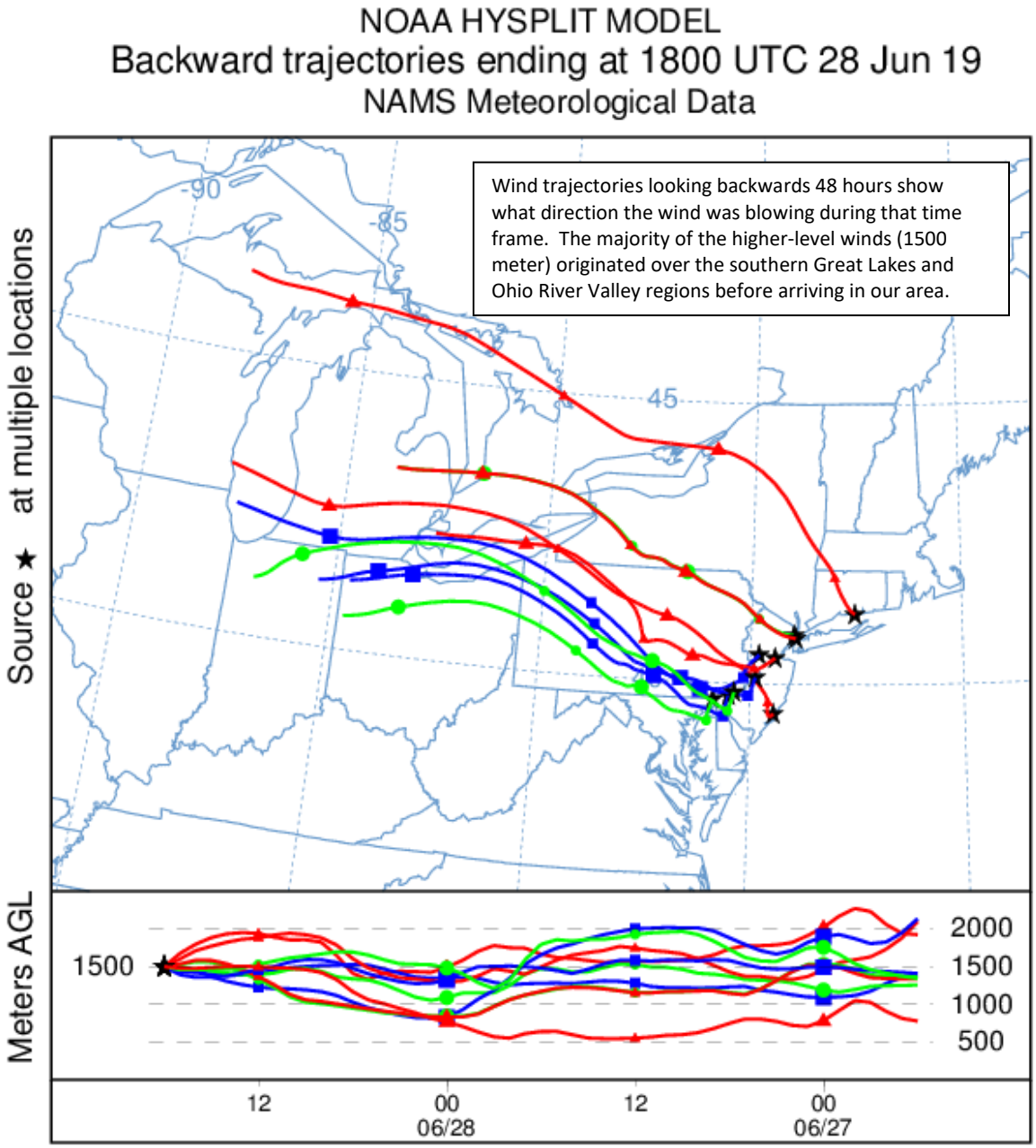
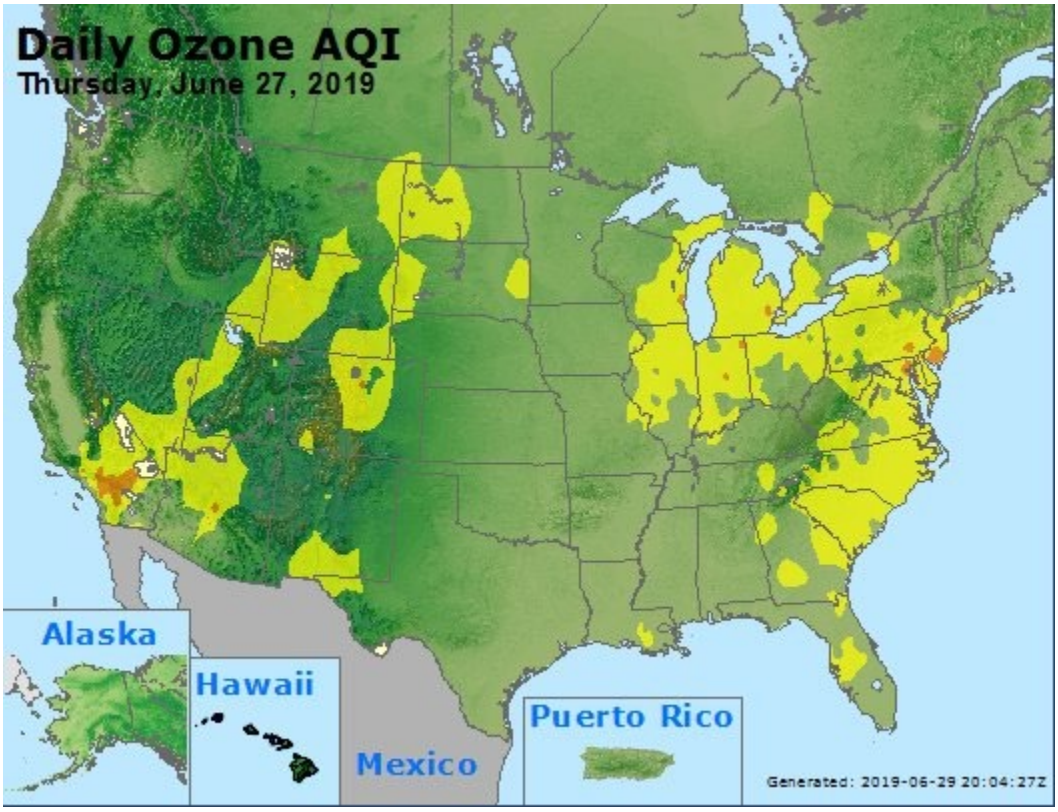


Figure 5. Ozone Air Quality Index for the United States on June 27, 2019



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.