Ozone National Ambient Air Quality Standard Health Exceedances on July 2, 2019

Exceedance Locations and Levels

On Tuesday, July 2, 2019, there were five (5) 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 July 2, 2019

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	74
Bayonne	56
Brigantine	59
Camden Spruce St	78
Chester	57
Clarksboro	80
Colliers Mills	85
Columbia	43
Flemington	63
Leonia	56
Millville	72
Monmouth University	65
Newark Firehouse	61
Ramapo	41
Rider University	65
Rutgers University	64
Washington Crossing*	68
TOTAL EXCEEDANCES	5

*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 six (6) 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 7/2/2019

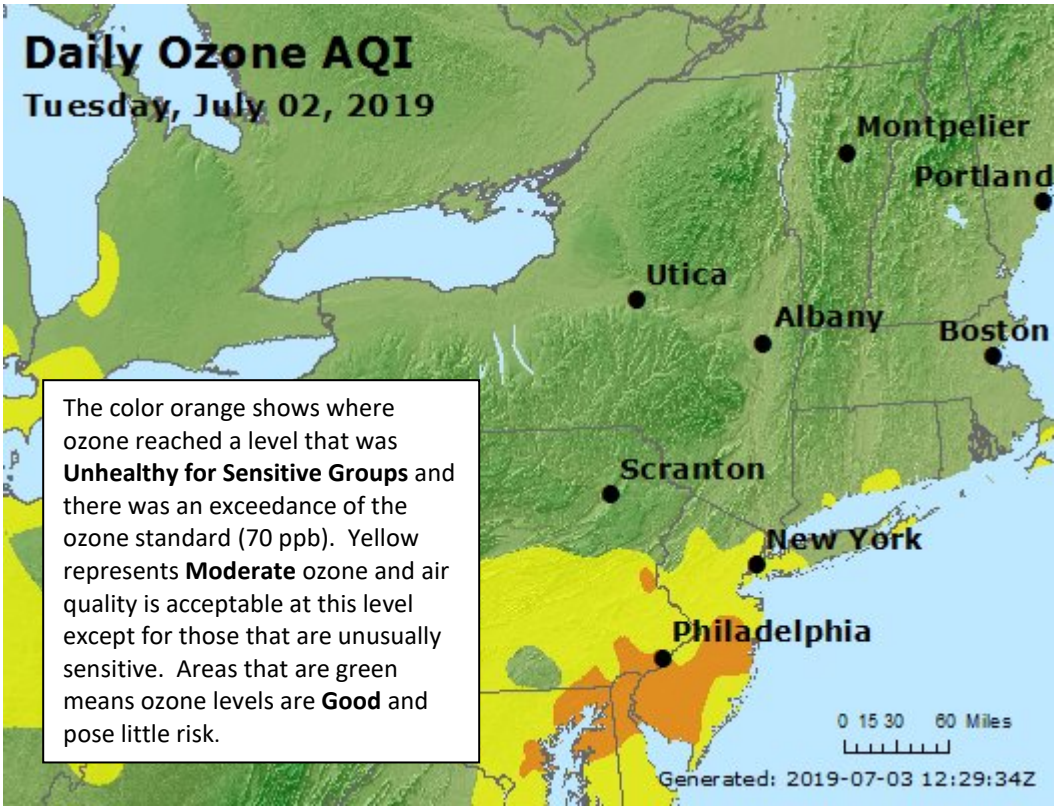
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	47
CT	Greenwich	52
CT	Madison-Beach Road	67
CT	Middletown-CVH-Shed	45
CT	New Haven	47
CT	Stratford	55
CT	Westport	51
DE	BCSP (New Castle Co.)	75
DE	BELLFNT2 (New Castle Co.)	81
DE	KILLENS (Kent Co.)	61
DE	LEWES (Sussex Co.)	55
DE	LUMS 2 (New Castle Co.)	75
DE	MLK (New Castle Co.)	80
DE	SEAFORD (Sussex Co.)	59
MD	Fair Hill	85
NY	Babylon	66
NY	Bronx - IS52	60
NY	CCNY	56
NY	Fresh Kills	60
NY	Holtsville	52
NY	Pfizer Lab	53
NY	Queens	61
NY	Riverhead	53
NY	Rockland Cty	39
NY	White Plains	46
PA	BRIS (Bucks Co.)	No Data
PA	CHES (Delaware Co.)	78
PA	NEWG (Chester Co.)	66
PA	NORR (Montgomery Co.)	66
PA	LAB (Philadelphia Co.)	No Data
PA	NEA (Philadelphia Co.)	69
PA	NEW (Philadelphia Co.)	61
	TOTAL EXCEEDANCES	6

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 – July 2, 2019 NAAQS = 70 ppb
Connecticut	5
Delaware	3
Maryland	2
New Jersey	5
New York	4
Pennsylvania	2

Figure 1. Ozone Air Quality Index for July 2, 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

A large swath of high pressure returned to our region on Tuesday July 2, 2019, which resulted in favorable meteorological conditions for the production of ozone, such as sunny skies, hot temperatures, and southwesterly winds. This caused several ozone exceedances throughout Maryland, northern Delaware, southeastern Pennsylvania, and southern New Jersey.

Early on Tuesday, several areas of high pressure were in place over the Appalachian Mountains and over the mid-Atlantic coast-line. As high pressure began to build, light winds shifted from the northwest to the southeast along with increasing temperatures and sunny skies yet again. Additionally, a surface trough extended from the upper Northeast down south to the Mid-Atlantic region, which allowed for mixing of polluted air down to the surface. As the day progressed, temperatures climbed into the upper 80's and low 90's. With the surface trough in place, as well as rising dewpoint temperatures, instability began to grow throughout much of Pennsylvania and the mid-Atlantic. Isolated showers and thunderstorms began to form and travel in a southeasterly direction from Pennsylvania into northern New Jersey, resulting in increased cloud cover and precipitation that inhibited further ozone production in northern New Jersey.

These high-pressure centers, along with the surface trough, brought pollution from multiple regions into our non-attainment area and allowed this air to mix down to the surface. Combined with local emissions and the favorable meteorological conditions, ozone concentrations were able to climb well into the USG category.

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 July 2, 2019. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. Eight (8) 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	Ancora State Hospital	74
NJ	Millville	72
NJ	Camden Spruce St	78
NJ	Colliers Mill	85
DE	BELLFNT2 (New Castle Co.)	81
DE	MLK	80
PA	Chester	78
MD	Fair Hill	85

Figure 2 shows that surface-level air was transported in a southerly direction from New York State and Pennsylvania the day prior, before turning in a northeasterly direction as a result of southwest winds. This abrupt turn of the surface-level air was highly influenced by the high-pressure circulation over the Appalachian Mountains, which circulated the air southward in a clockwise direction. Another high-pressure center formed early on Tuesday off the coast of the Mid-Atlantic region, which shifted the winds in a southwesterly direction, thus transporting the air in a northeasterly direction. Throughout the day on Tuesday, previously polluted surface air from the Mid-Atlantic region traveled towards the area over the metropolitan Washington D.C.-Baltimore area, picking up additional emission from cars, trucks, and local industry.

At 500 m, Figure 3 shows that upper level air was transported from the Great Lakes and Ohio River Valley region and brought down to the surface as well. This previously polluted air traveled over metropolitan cities such as Cleveland, Pittsburgh, Washington D.C., and Baltimore. Figure 4 shows that at 1500 m, upper level air from days prior was transported into the region from the southern Great Lakes. This previously polluted upper level air was able to mix down to the surface because of the surface trough in place over the northeast.

Figure 5 shows the national air quality observed on July 1, the day prior to the localized air quality exceedances. As shown in the Ozone AQI map, the majority of the southern Great Lakes and Ohio River Valley region experienced moderate air quality the day before, with isolated areas of USG. 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 ground-level ozone production.

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

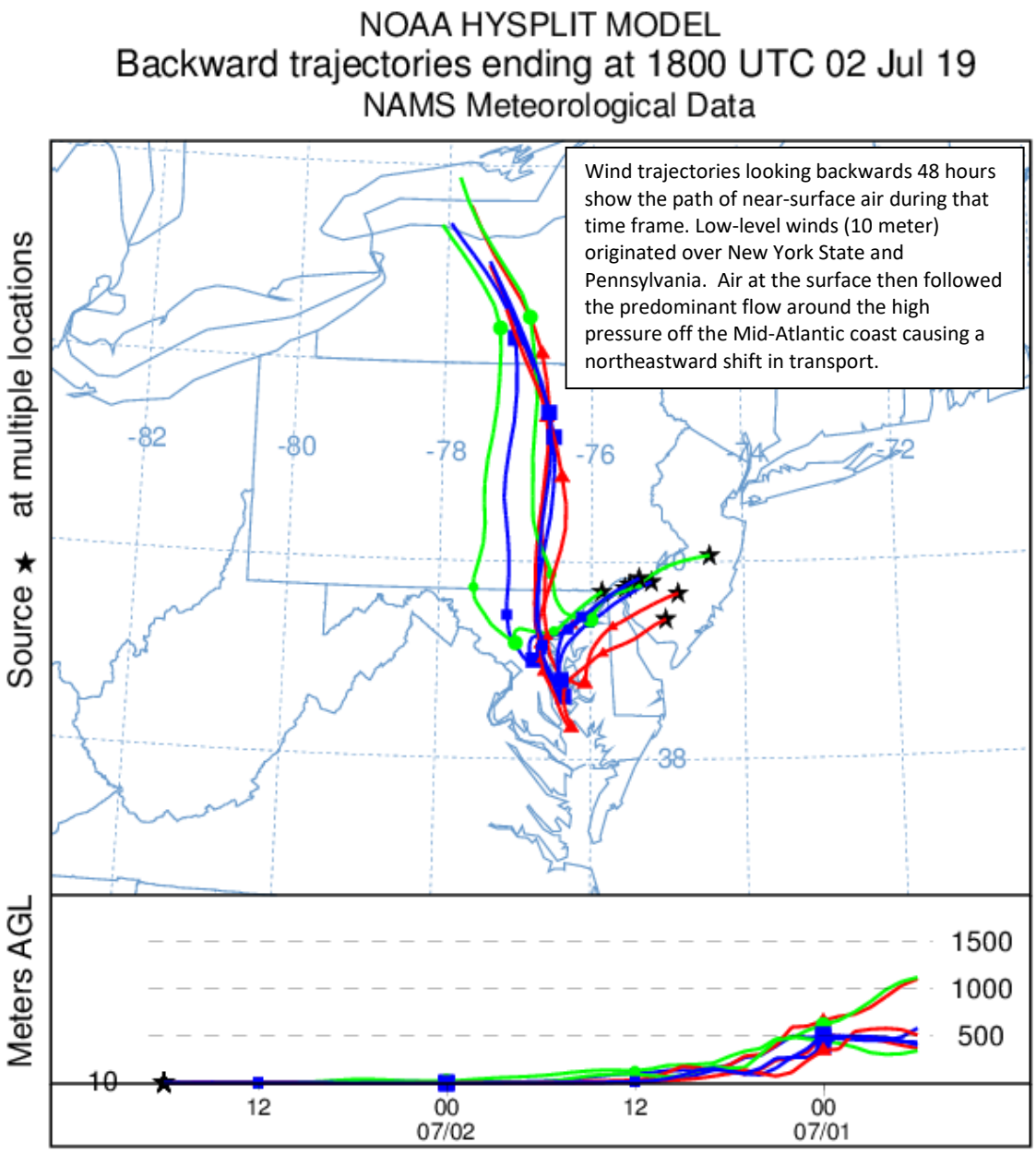


Figure 3. 48-hour Back Trajectories for July 2, 2019 at 500 meters

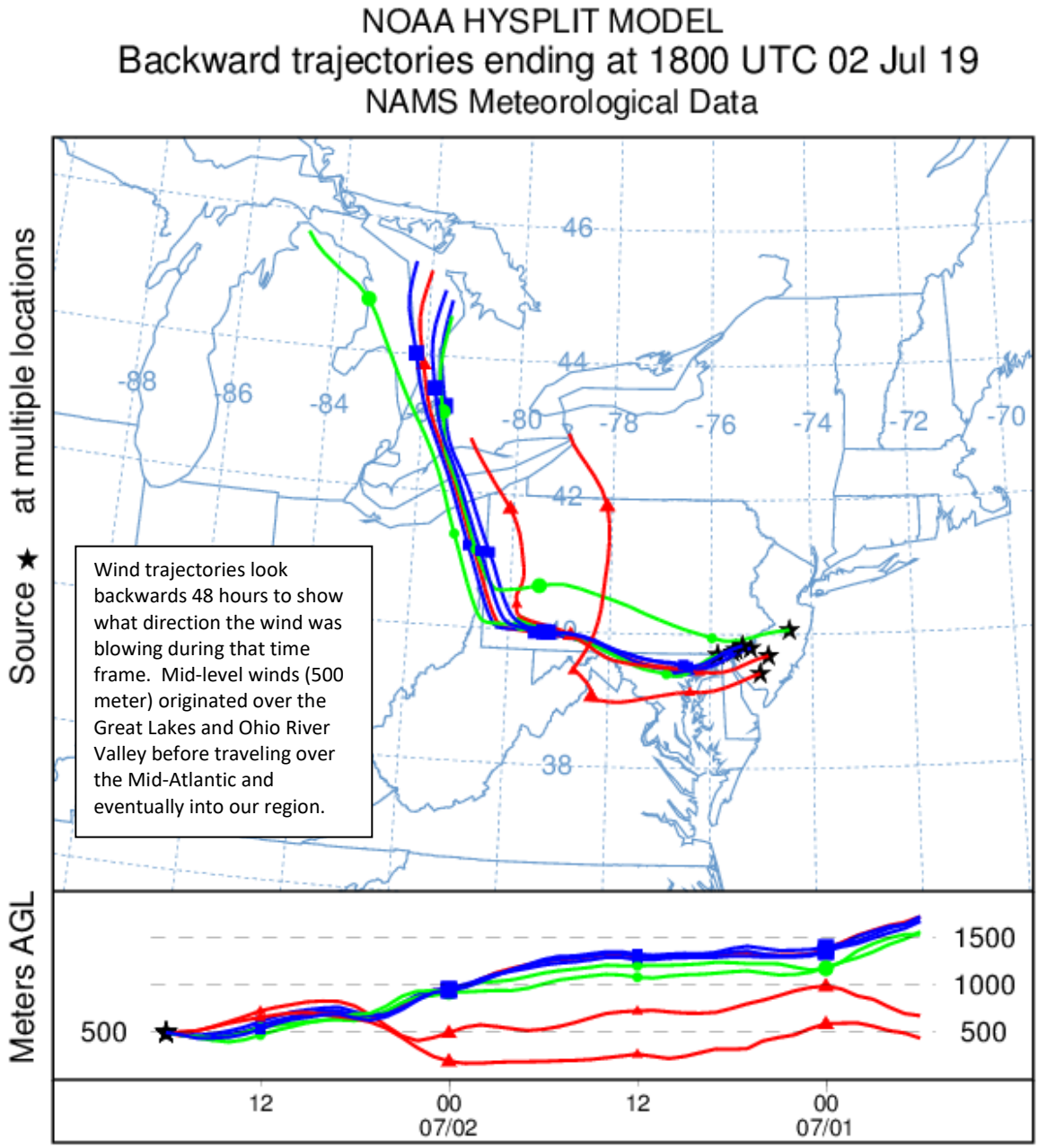


Figure 4. 48-hour Back Trajectories for July 2, 2019 at 1500 meters

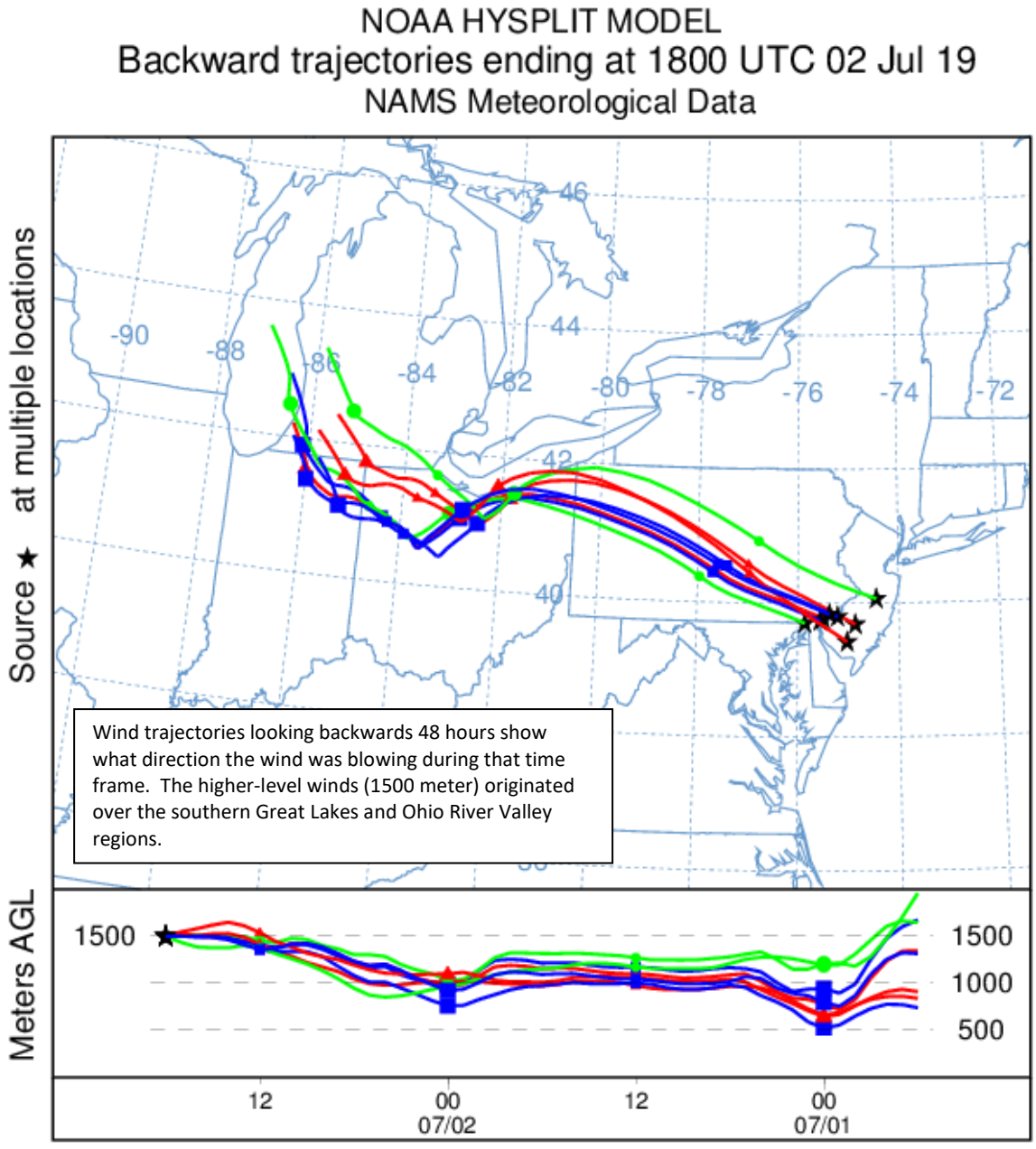
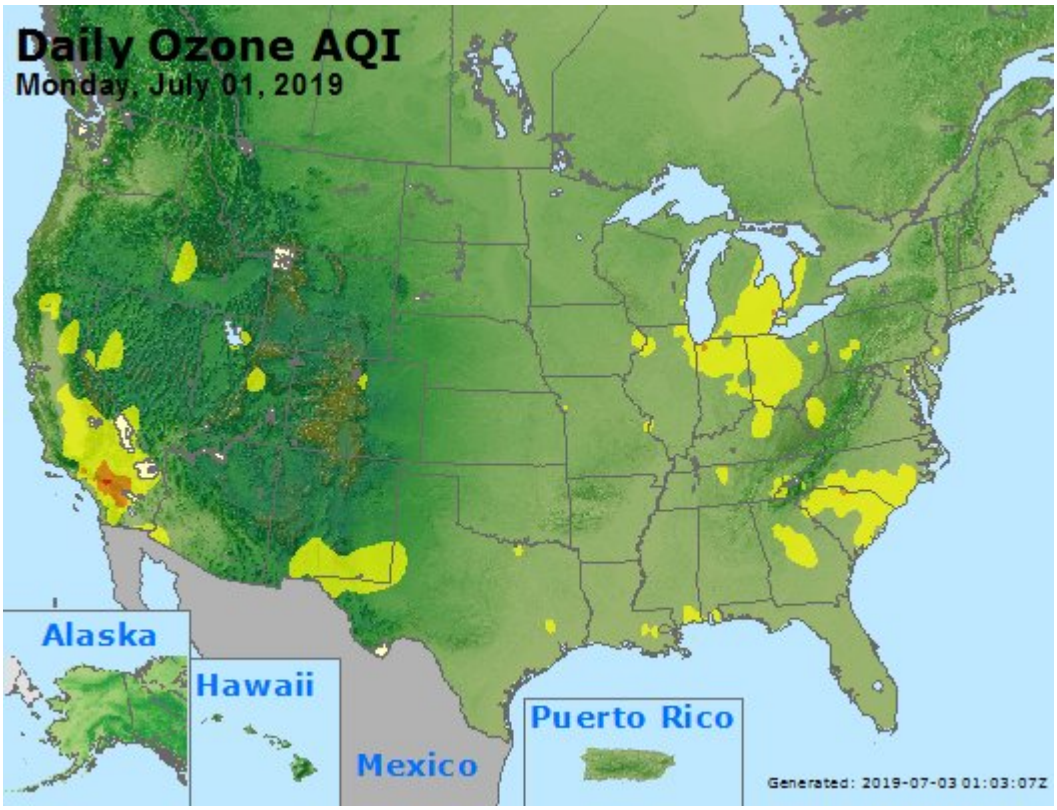


Figure 5. Ozone Air Quality Index for the United States on July 1, 2019



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.