Ozone National Ambient Air Quality Standard Health Exceedances on July 10, 2019

Exceedance Locations and Levels

On Wednesday, July 10, 2019, there was one (1) exceedance 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 7/10/2019

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	52
Bayonne	66
Brigantine	46
Camden Spruce St	62
Chester	58
Clarksboro	51
Colliers Mills	68
Columbia	53
Flemington	59
Leonia	69
Millville	58
Monmouth University	55
Newark Firehouse	65
Ramapo	57
Rider University	69
Rutgers University	74
Washington Crossing*	66
TOTAL EXCEEDANCES	1

*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 four (4) 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 7/10/2019

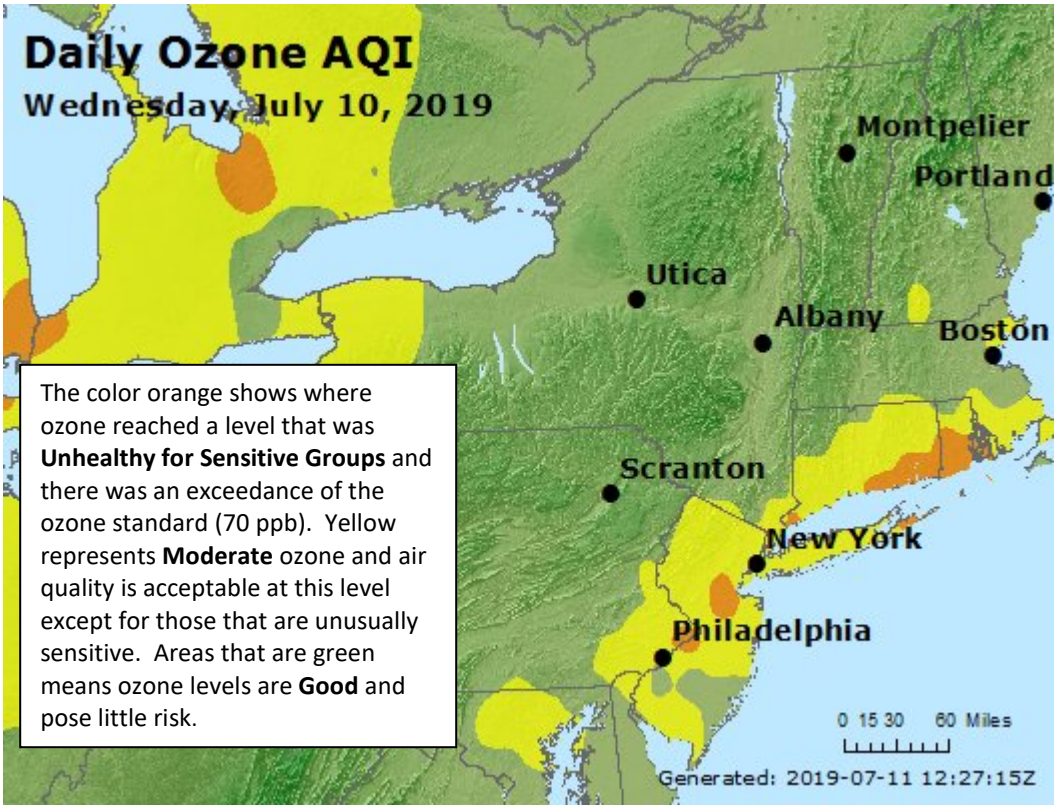
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	58
CT	Greenwich	72
CT	Madison-Beach Road	79
CT	Middletown-CVH-Shed	60
CT	New Haven	60
CT	Stratford	64
CT	Westport	67
DE	BCSP (New Castle Co.)	54
DE	BELLFNT2 (New Castle Co.)	55
DE	KILLENS (Kent Co.)	48
DE	LEWES (Sussex Co.)	53
DE	LUMS 2 (New Castle Co.)	48
DE	MLK (New Castle Co.)	61
DE	SEAFORD (Sussex Co.)	54
MD	Fair Hill	52
NY	Babylon	69
NY	Bronx - IS52	67
NY	CCNY	64
NY	Fresh Kills	69
NY	Holtsville	63
NY	Pfizer Lab	66
NY	Queens	66
NY	Riverhead	63
NY	Rockland Cty	50
NY	White Plains	62
PA	BRIS (Bucks Co.)	71
PA	CHES (Delaware Co.)	56
PA	NEWG (Chester Co.)	57
PA	NORR (Montgomery Co.)	56
PA	LAB (Philadelphia Co.)	67
PA	NEA (Philadelphia Co.)	72
PA	NEW (Philadelphia Co.)	67
	TOTAL EXCEEDANCES	4

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 10, 2019 NAAQS = 70 ppb
Connecticut	7
Delaware	3
Maryland	2
New Jersey	7
New York	6
Pennsylvania	3

Figure 1. Ozone Air Quality Index for July 10, 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 Wednesday, July 10th, 2019, a large swath of high pressure over the Mid-Atlantic and Northeastern United States resulted in favorable meteorological conditions for the production of ground-level ozone, such as southwesterly winds, sunny skies, and warm temperatures. Several sites exceeded the 70 ppb standard in portions of southeastern Pennsylvania, New Brunswick NJ, and coastal portions of Connecticut.

Early on Wednesday, two high pressure centers remained over southern New York State and off the coast of the Mid-Atlantic states. This broad region of high pressure allowed for abundant sunshine and southwesterly winds throughout the morning, which caused temperatures to climb into the upper 80's and low 90's. This southwesterly flow, a common ozone precursor, transported warm polluted air from the Mid-Atlantic states into our region. As the day progressed, the high pressure off the Mid-Atlantic coast began to push offshore, resulting in a clockwise circulation of moist Atlantic Ocean air onto mainland. This increase in moisture allowed for cloud cover to increase throughout most of the non-attainment zone, inhibiting drastic increases of ozone production. By late afternoon, cloud cover began to gradually decrease, allowing for ozone to climb into the Unhealthy for Sensitive Groups category in isolated areas. A sea-breeze front also developed along coastal portions of New Jersey, Long Island, NY, and Connecticut, resulting in an onshore flow of cooler and cleaner air off of the Atlantic Ocean, which allowed these regions to remain mostly in the moderate category. Additionally, a large plume of Canadian wildfire smoke covered much of the region, which reduced the amount of sunlight reaching the surface. The increased cloud cover, the sea breeze front, and the Canadian wildfire smoke all hindered rapid ozone production throughout the entire region.

Despite all the factors that prevented ozone production, ozone concentrations were still able to reach the Unhealthy for Sensitive Groups category in isolated areas due to southwesterly winds, partly sunny skies, and contributions from the previous day's air pollution over the Mid-Atlantic region.

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 10, 2019. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. Five (5) monitoring stations with 8-hour average ozone exceedances were used to run back trajectories. The selected sites and 8-hour average 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	Rutgers University	74
CT	Greenwich	72
CT	Madison-Beach Road	79
PA	Bristol	71
PA	NEA (Philadelphia)	72

At the surface (Figure 2), trajectories for the exceedance locations in Pennsylvania and New Brunswick, New Jersey show air circulating around the surface high pressure and originating over the Baltimore and Washington D.C. areas, as well as parts of southeastern Pennsylvania. This air picked up emissions from cars, trucks, buses, local industry, and power plants along the I-95 corridor in Maryland and southeastern Pennsylvania. The trajectory over Greenwich, Connecticut moved over northern New York City and the Westchester, NY area before recirculating back onshore due to the sea breeze. The trajectory over Madison, Connecticut originated from the southwest before shifting in a southerly direction as the result of the sea breeze front. This air mass picked up local emissions from Long Island before traveling into Connecticut. Most of the trajectories did not travel very far, indicating that the polluted air recirculated throughout the region and allowed air pollution to build up over the two days.

The upper level trajectories at 500m and 1500m (Figures 3 and 4) were highly influenced by the clockwise high-pressure circulation and showed a general sinking motion. For the Connecticut trajectories, the Canadian wildfire smoke was transported at upper levels and brought down to the surface. The New Jersey and Pennsylvania trajectories showed recirculation of previously polluted air from the Mid-Atlantic into the region.

Figure 5 shows the national air quality observed on July 9, the day prior to the localized air quality exceedances. The Mid-Atlantic, as well as Long Island, New York and Coastal Connecticut, had scattered areas of moderate air quality.

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

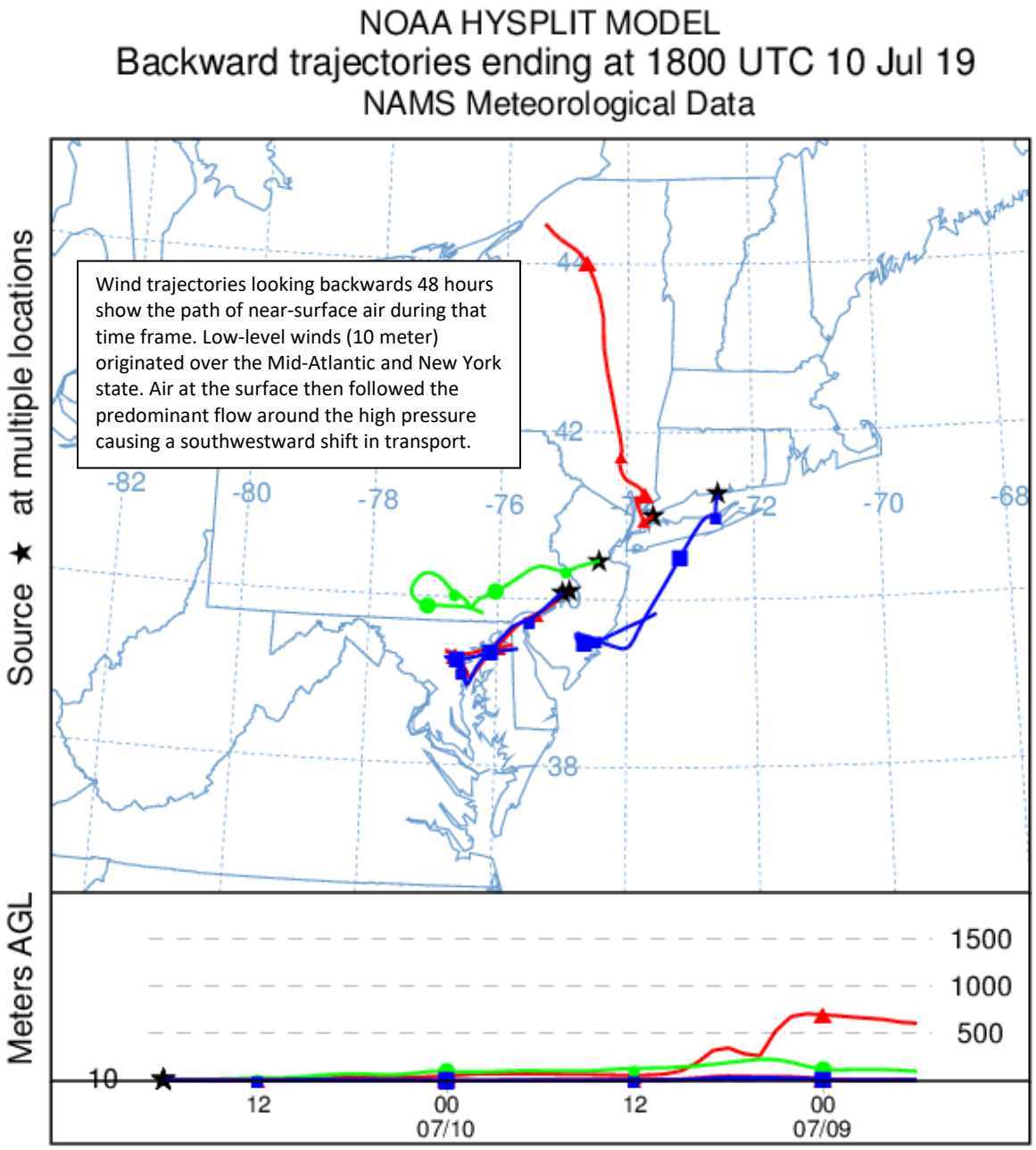


Figure 3. 48-hour Back Trajectories for July 10, 2019 at 500 meters

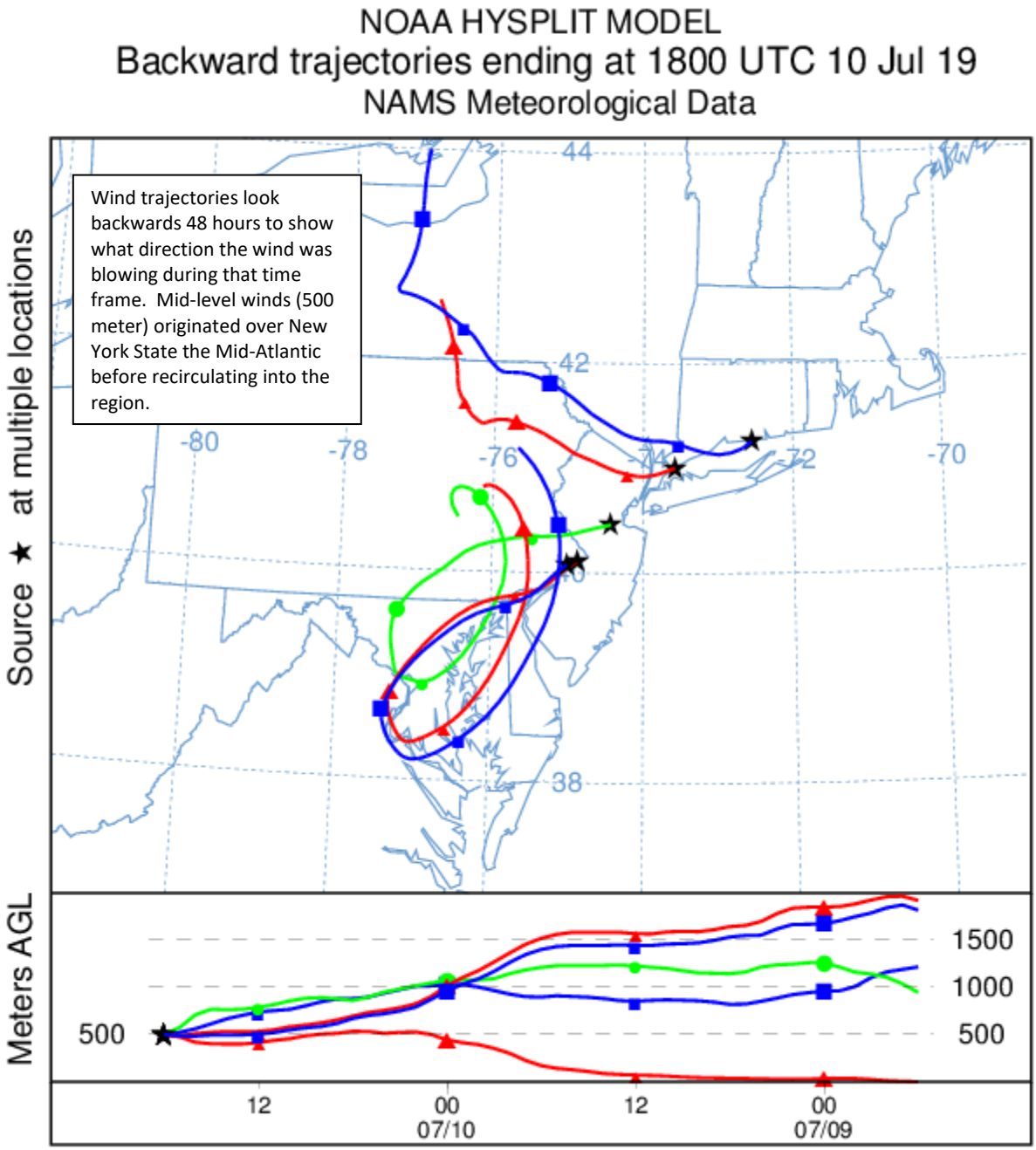


Figure 4. 48-hour Back Trajectories for July 10, 2019 at 1500 meters

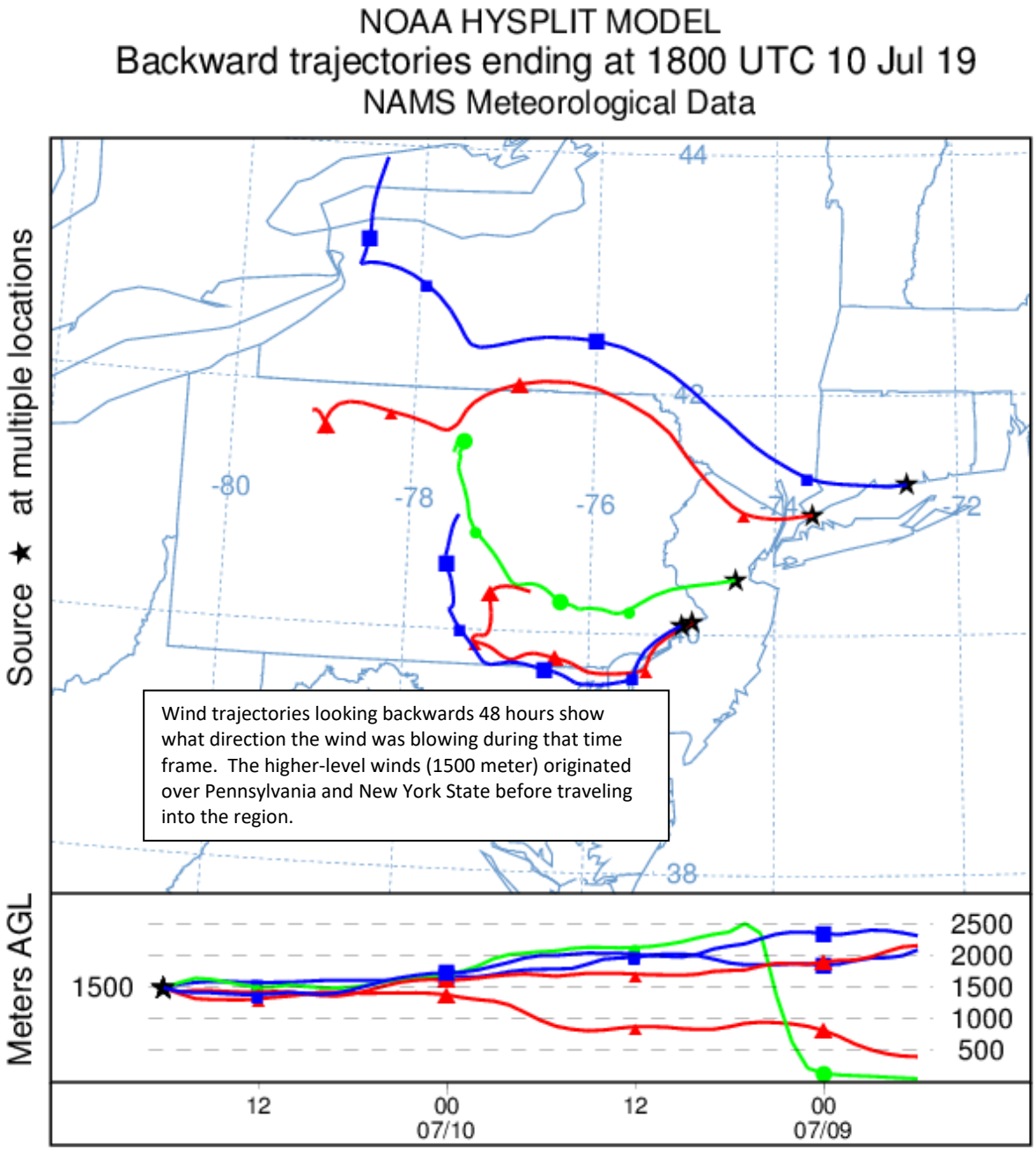
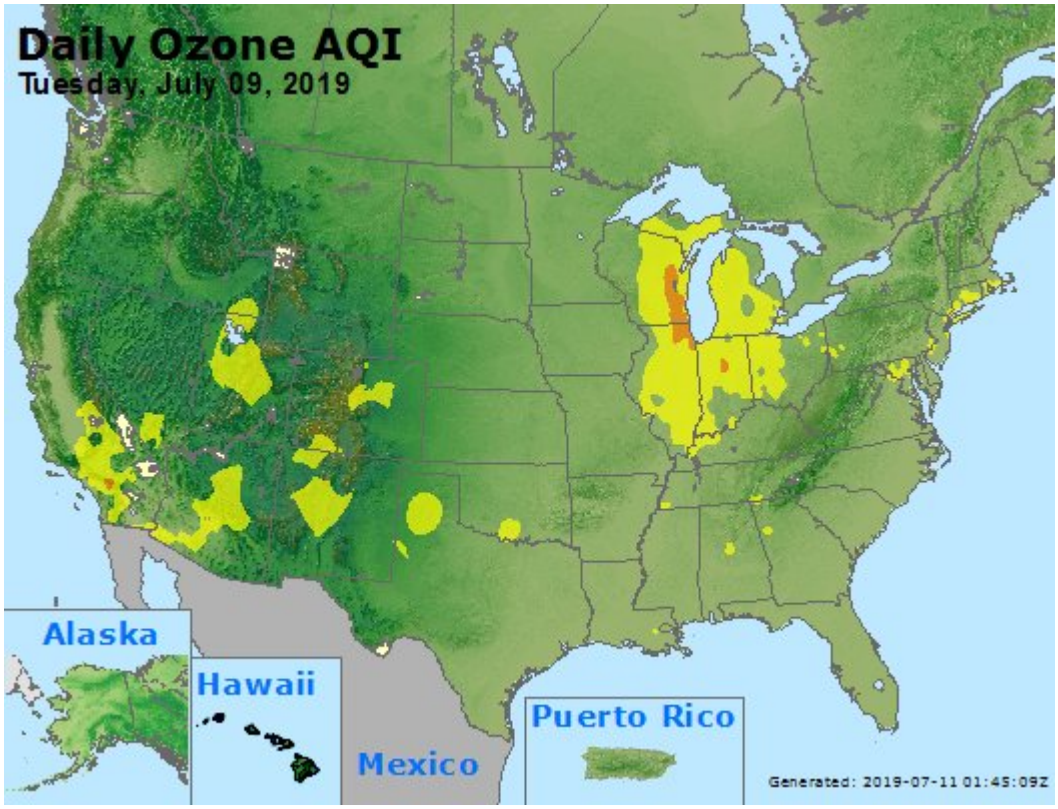


Figure 5. Ozone Air Quality Index for the United States on July 9, 2019



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.