Ozone National Ambient Air Quality Standard Health Exceedances on July 4, 2019

Exceedance Locations and Levels

On Thursday, July 4, 2019, there were two (2) 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 7/4/2019

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	55
Bayonne	56
Brigantine	51
Camden Spruce St	54
Chester	61
Clarksboro	44
Colliers Mills	54
Columbia	53
Flemington	50
Leonia	71
Millville	55
Monmouth University	61
Newark Firehouse	57
Ramapo	77
Rider University	51
Rutgers University	60
Washington Crossing*	56
TOTAL EXCEEDANCES	2

*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 7/4/2019

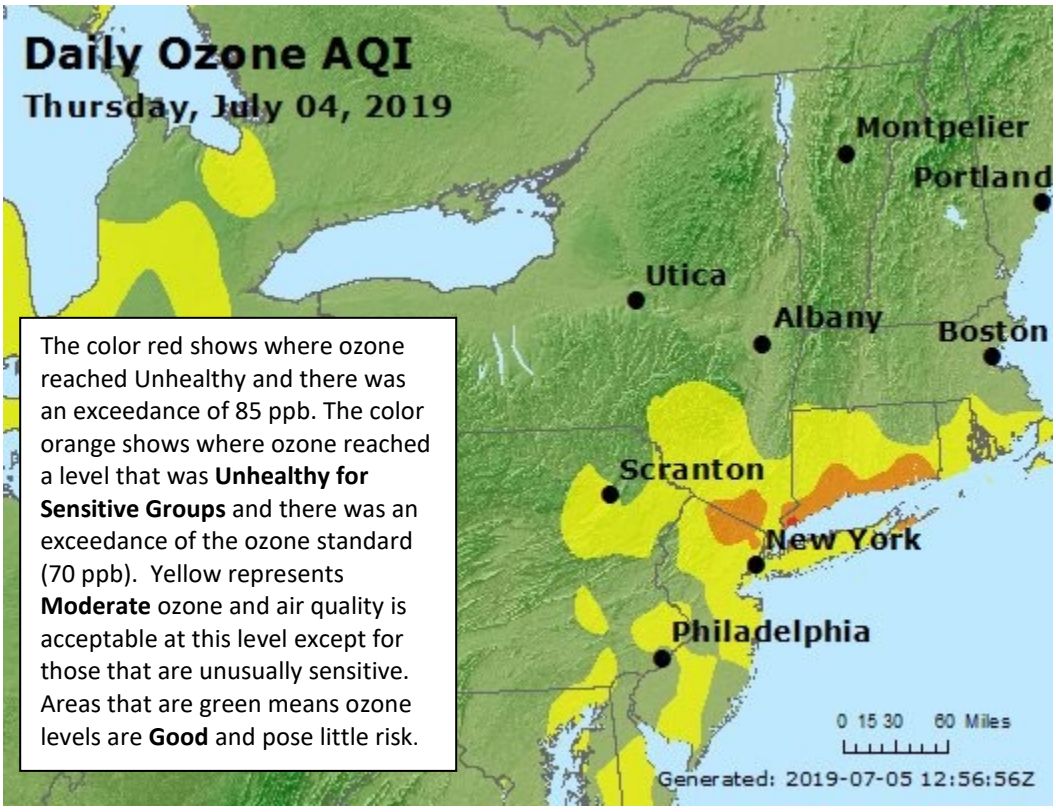
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	65
CT	Greenwich	86
CT	Madison-Beach Road	77
CT	Middletown-CVH-Shed	64
CT	New Haven	72
CT	Stratford	82
CT	Westport	84
DE	BCSP (New Castle Co.)	47
DE	BELLFNT2 (New Castle Co.)	49
DE	KILLENS (Kent Co.)	59
DE	LEWES (Sussex Co.)	52
DE	LUMS 2 (New Castle Co.)	50
DE	MLK (New Castle Co.)	53
DE	SEAFORD (Sussex Co.)	57
MD	Fair Hill	56
NY	Babylon	58
NY	Bronx - IS52	68
NY	CCNY	62
NY	Fresh Kills	56
NY	Holtsville	54
NY	Pfizer Lab	69
NY	Queens	63
NY	Riverhead	64
NY	Rockland Cty	74
NY	White Plains	68
PA	BRIS (Bucks Co.)	53
PA	CHES (Delaware Co.)	47
PA	NEWG (Chester Co.)	56
PA	NORR (Montgomery Co.)	55
PA	LAB (Philadelphia Co.)	No Data
PA	NEA (Philadelphia Co.)	61
PA	NEW (Philadelphia Co.)	53
	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 4, 2019 NAAQS = 70 ppb
Connecticut	6
Delaware	3
Maryland	2
New Jersey	6
New York	6
Pennsylvania	2

Figure 1. Ozone Air Quality Index for July 4, 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 Thursday, July 4, 2019, high pressure over the eastern half of the United States resulted in hot temperatures, mostly sunny skies, and calm southeasterly winds. These favorable meteorological conditions and a previously polluted air mass caused multiple ground-level ozone exceedances in northern New Jersey, the lower Hudson Valley region, and the entire coast-line of Connecticut.

Early on Thursday, multiple high pressure centers were in place in northern New England, southern Ontario, and over the Appalachian Mountains. This broad area of high pressure resulted in temperatures in the upper 80's and low 90's, as well as dewpoints reaching the mid 70's in southern portions of our non-attainment region. As the day progressed, a frontal boundary began to form, stretching from the Great Lakes region down south to the Mid-Atlantic Coast. Additionally, the high pressure over New England began to strengthen, resulting in a predominantly southeasterly wind flow as well as a drier air mass for the northern portions of our non-attainment area. This frontal boundary stalled between the two regions of high pressure, allowing upper level air to mix down to the surface. Thunderstorms began to develop, increasing cloud cover and inhibiting surface-level ozone production south of the frontal boundary. However, regions to the north remained dry and mostly sunny resulting in prolonged ozone production. The broad region of high pressure, frontal boundary, and favorable meteorological conditions all led to multiple ozone exceedance in our non-attainment 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 exceedances on July 4, 2019. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. Six (6) 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	71
NJ	Ramapo	77
NY	Rockland Cty	74
CT	Greenwich	86
CT	Madison-Beach Road	77
CT	Westport	84

Looking at Figure 2, surface level air from the exceedance locations originated in eastern Pennsylvania, Maryland, and coastal portions of New Jersey. This air mass was transported in a northeasterly direction on July 3rd before turning to the northwest because of the strengthening high pressure off the coast of New England. This previously polluted surface air was transported over Long Island and New York City before reaching their final destinations, picking up additional emissions from cars, trucks, buses, local industry and power plants along the way. Please note that air was not transported a long distance within 48 hours, indicating that the air mass in this region remained stagnant because of calm winds.

At upper levels, air at 500 meters was transported from New York State and New England, following a clockwise rotation around the high-pressure center. This air was recirculated over the metropolitan areas of Connecticut, Long Island, and New York City before arriving at the exceedance locations. At 1500 meters, the air mass originated in the Eastern Great Lakes region and followed a similar clockwise rotation around the high pressure. Both figures 3 and 4 show that air at upper levels mixed down to the surface under the high-pressure influence.

Figure 5 shows the national air quality observed on July 3, the day prior to the localized air quality exceedances. As shown in the Ozone AQI map, the majority of the East Coast region experienced moderate air quality the day before. This polluted stagnant surface air was recirculated into the region by light southeasterly winds. Figure 6 provides at detailed view of the previous day's ozone AQI values. The air mass over Long Island was heavily polluted from the day before and was not being transported anywhere because of the calm conditions. The Hysplit runs show that air at all levels was transported over Long Island before reaching their exceedance locations.

Figure 2. 48-hour Back Trajectories for July 4, 2019 at 10 meters

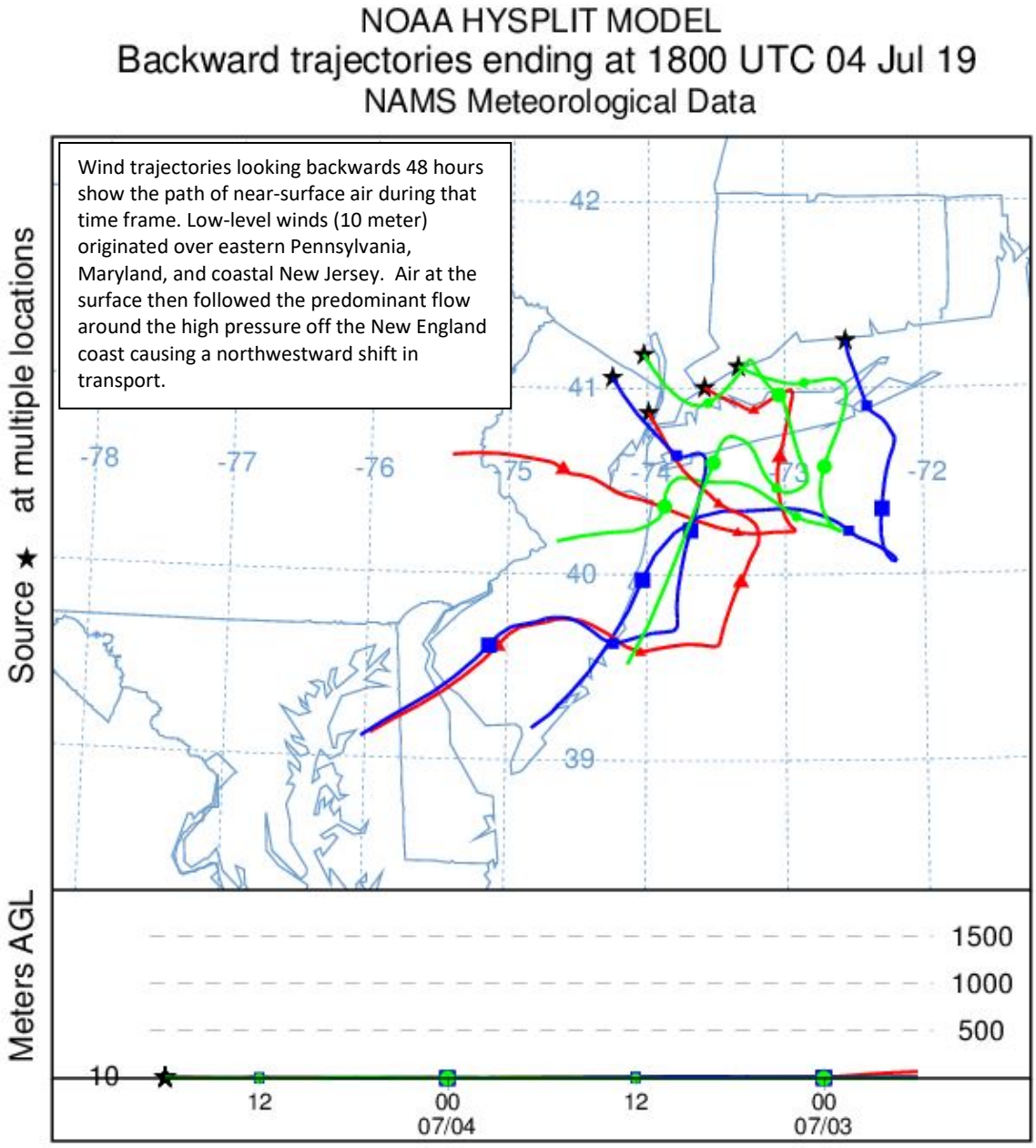


Figure 3. 48-hour Back Trajectories for July 4, 2019 at 500 meters

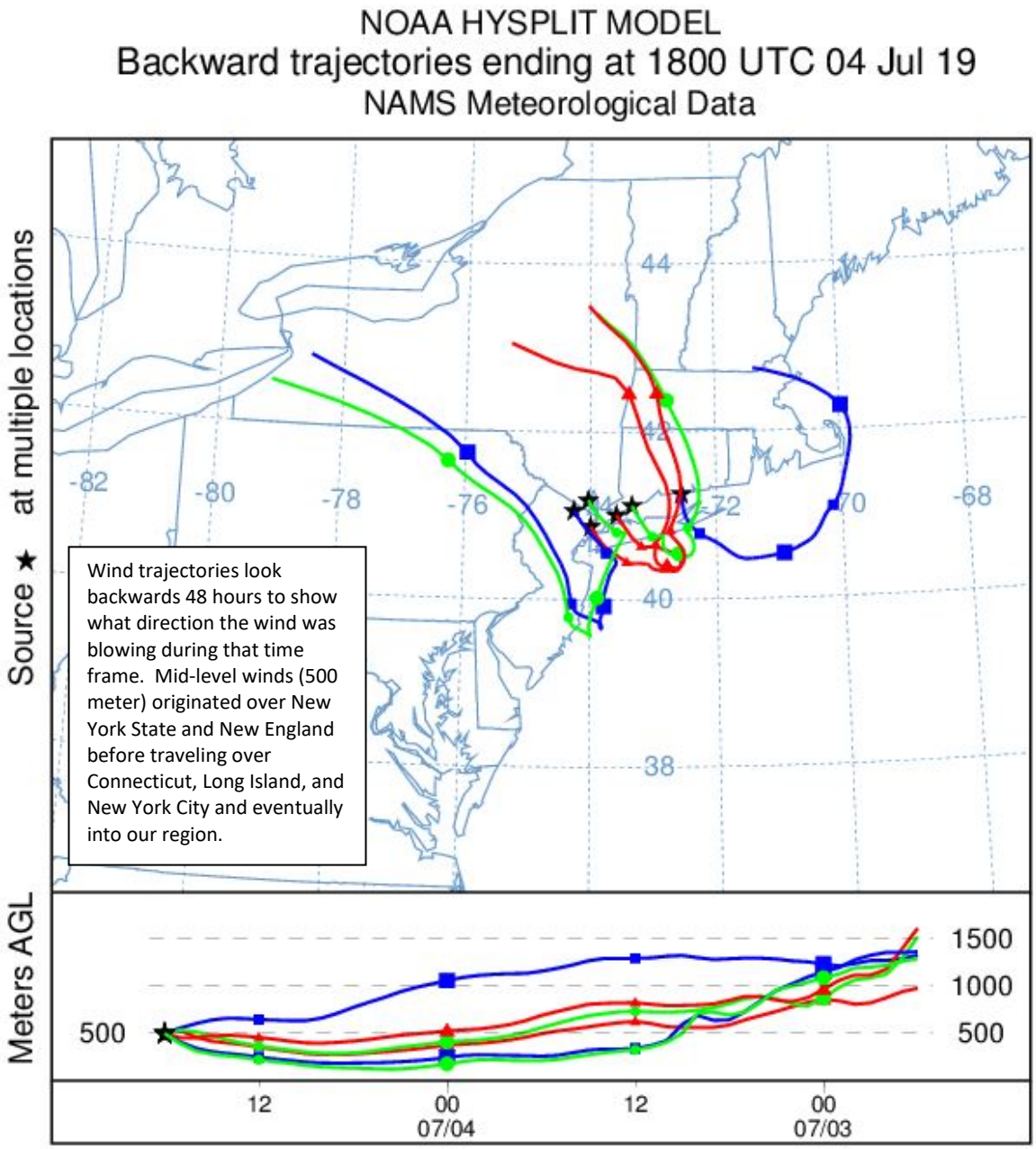


Figure 4. 48-hour Back Trajectories for July 4, 2019 at 1500 meters

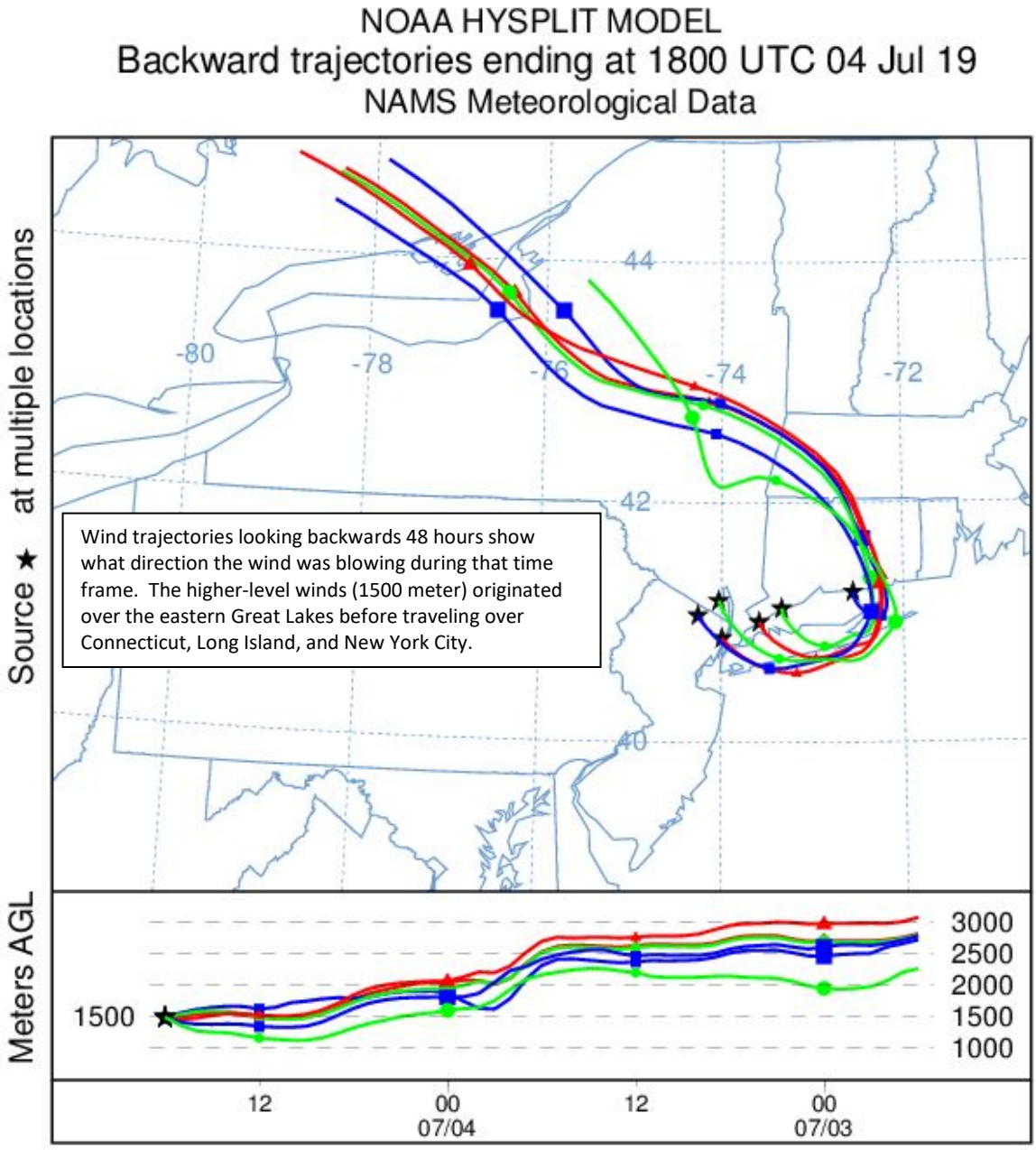


Figure 5. Ozone Air Quality Index for the United States on July 3, 2019

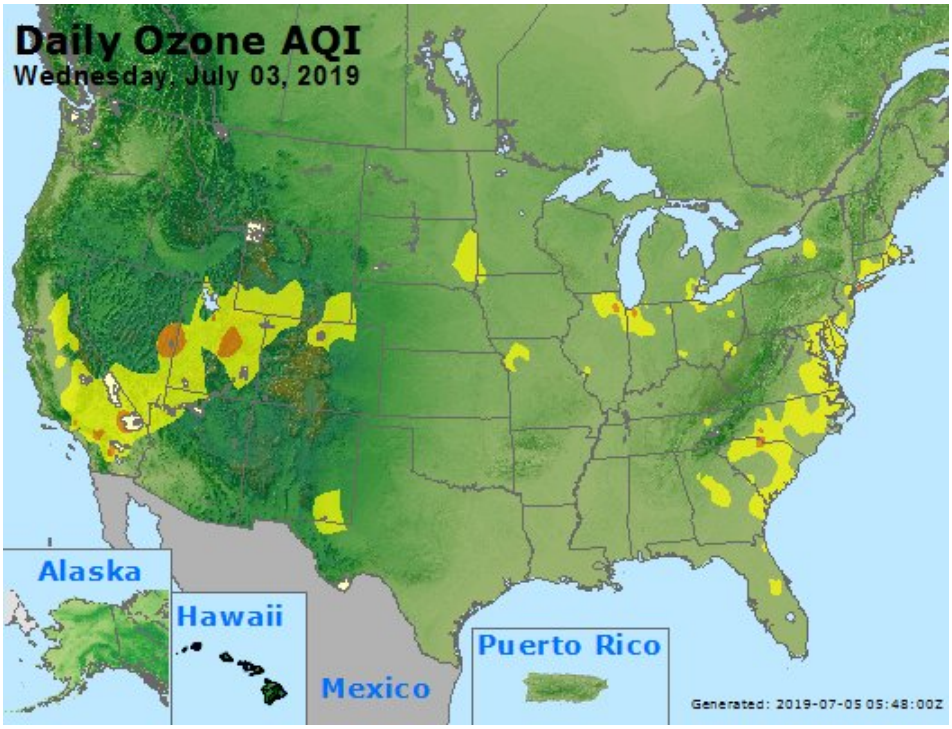
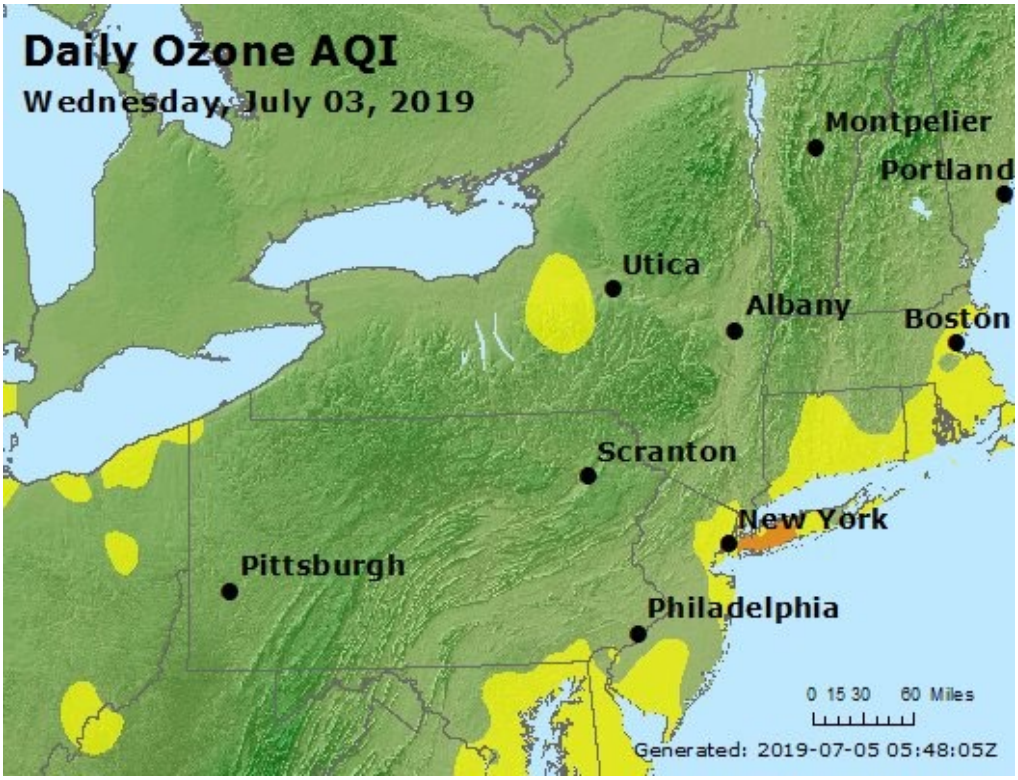


Figure 6. Ozone Air Quality Index for Northeastern United States on July 3, 2019



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.