Ozone National Ambient Air Quality Standard Health Exceedances on July 19, 2017

Exceedance Locations and Levels

On Wednesday, July 19, 2017, there were three (3) exceedances in New Jersey of the 8-hour average ozone National Ambient Air Quality Standard (NAAQS) of 70 ppb that became effective in December 2015 (See Table 1):

Table 1. Ozone NAAQS Exceedances in New Jersey on July 19, 2017

STATION	Daily Maximum 8-Hr Average (ppb)
Camden Spruce St	72
Clarksboro	76
Colliers Mills	74

One (1) New Jersey station exceeded the 75 ppb ozone NAAQS of 2008, but none exceeded the 84 ppb ozone NAAQS of 1997. The highest 1-hour average ozone concentration recorded on July 19, 2017, in New Jersey was 89 ppb at the Clarksboro station, which is below the 1-hour ozone NAAQS of 120 ppb.

Wednesday marks the 10th day in 2017 on which exceedances of the 70 ppb ozone NAAQS of 2015 were recorded in New Jersey. By the 19th of July in 2016, there were fifteen (15) days on which ozone exceedances were measured in New Jersey (based on the 70 ppb NAAQS of 2015), and there were seven (7) days by this same date in 2015 (based on the former 75 ppb NAAQS of 2008) (See Table 2).

Table 2: New Jersey Exceedance Count

	# of Days NAAQS was Exceeded January 1 - July 19, 2017 NAAQS = 70 ppb	# of Days NAAQS was Exceeded January 1 - July 19, 2016 NAAQS = 70 ppb	# of Days NAAQS was Exceeded January 1 - July 19, 2015 NAAQS = 75 ppb
New Jersey	10	15	7

There is a group of monitoring stations in designated counties of 5 states, New York, Connecticut, Pennsylvania, Delaware and Maryland, that are included in New Jersey's ozone nonattainment areas. From this group of stations in the neighboring states, there were eight (8) exceedances of the 70 ppb ozone NAAQS of 2015 recorded on Wednesday, July 19, 2017 (See Table 3):

Table 3: Ozone NAAQS Exceedances at other Monitoring Stations in New Jersey's Ozone Nonattainment Areas on July 19, 2017

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Madison-Beach Road	76
CT	Middletown	72
CT	New Haven	74
CT	Stratford	76
CT	Westport	73
PA	BRIS (Bucks Co.)	77
PA	NEA (Philadelphia Co.)	73
PA	NEW (Philadelphia Co.)	74

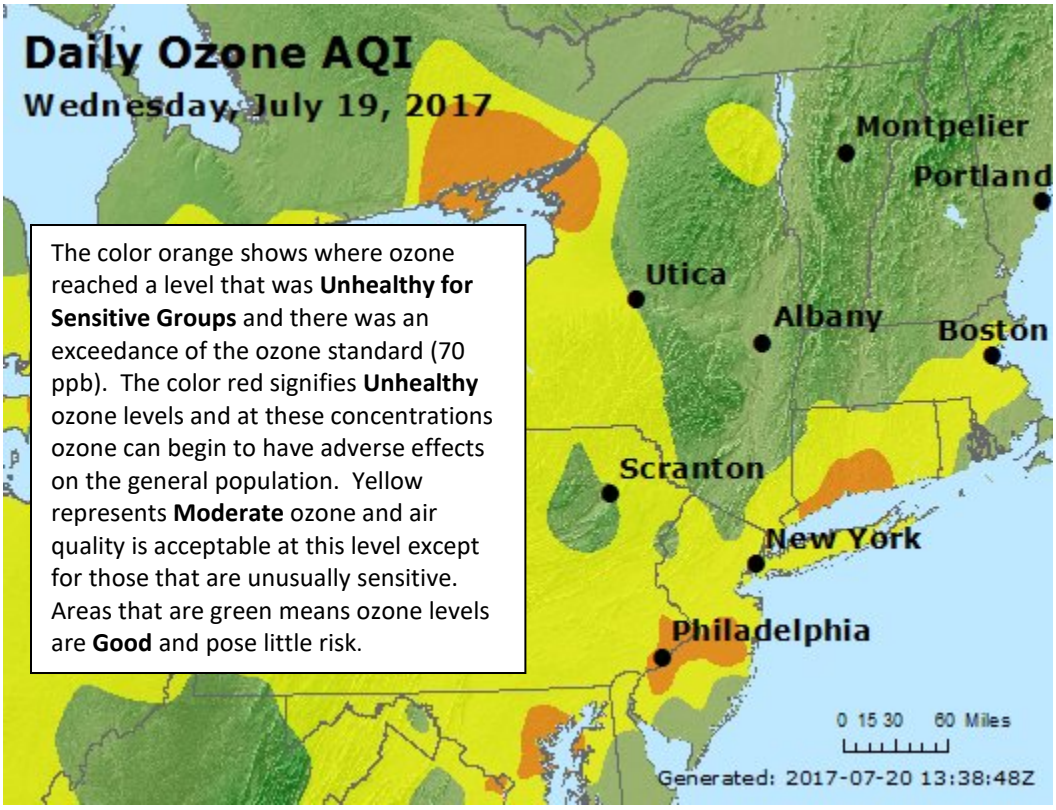
Three (3) stations exceeded the 75 ppb ozone NAAQS of 2008, but none exceeded the 84 ppb ozone NAAQS of 1997. The highest 1-hour average ozone concentration recorded was 106 ppb at the New Haven station in Connecticut, which is below the 1-hour ozone NAAQS of 120 ppb.

Wednesday marks the 16th day in 2017 on which exceedances of the 70 ppb ozone NAAQS of 2015 were recorded for Connecticut and the 9th day for Pennsylvania. The number of days for New York remains at ten (10), with seven (7) days for Maryland, and five (5) days for Delaware (See Table 4). Figure 1 shows graphically the region's ozone concentrations on July 19, 2017.

Table 4: Number of Ozone Exceedances by State

STATE	# of Days NAAQS was Exceeded January 1 - July 19, 2017 NAAQS = 70 ppb
Connecticut	16
Delaware	5
Maryland	7
New Jersey	10
New York	10
Pennsylvania	9

Figure 1. Ozone Air Quality Index for July 19, 2017



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 high pressure system was noted over much of the eastern United States while a surface trough extended from southern New England through New Jersey, eastern Pennsylvania, and into the Mid-Atlantic region. Weather observations throughout the region tended to be similar given the synoptic pattern. Looking closely at specific ozone exceedance locations, most were located east or very close in proximity to the above mentioned surface trough. Southern Connecticut locations observed mostly sunny skies, temperatures in the low to mid 90s and light winds generally from the southwest. Similarly, Central New Jersey experienced sunny skies, temperatures near 90 degrees with light and variable winds. Finally, Eastern Pennsylvania and metropolitan Philadelphia observed mostly sunny skies with more clouds noted in southern regions. Temperatures reached the mid-90s with winds varying southwest to northwest throughout the day.

Where Did the Air Pollution that Caused Ozone Come From?

Figures 2, 3, and 4 show the back trajectories at different wind heights for the monitored exceedances on July 19, 2017. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. Seven (7) monitoring stations with 8-hr ozone exceedance were chosen to run back trajectories. The selected sites and the maximum 8-hr ozone levels recorded are listed in Table 5 below:

Table 5. 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	Madison-Beach Road	76
CT	Middletown	72
CT	Stratford	76
NJ	Camden - Spruce St.	72
NJ	Clarksboro	76
NJ	Colliers Mills	74
PA	BRIS (Bucks Co.)	77

Surface level back trajectories (Figure 2) show that air at the surface traveled along the eastern seaboard and remained at the surface level during the 48 hours preceding this high ozone event. The back trajectories impacting Connecticut originated off the coast of Virginia and traveled northward along the coast and across portions of Long Island and the Long Island Sound before reaching their endpoints. Back trajectories ending in Central New Jersey, Southeastern Pennsylvania, and the Philadelphia metropolitan area also started near coastal Virginia however, traveled through portions of Maryland, Delaware and the Philadelphia region before arrival. In both situations, winds remained at the surface for the duration of the path picking up locally generated pollution from cars, trucks and industry along the way. Most mid-level back trajectories (Figure 3) originated over the Mid-Atlantic region. Trajectories impacting Southeastern Pennsylvania, the Philadelphia metropolitan area and Central New Jersey traveled through Virginia, Maryland and Southern Pennsylvania before reaching their destinations. Meanwhile, trajectories impacting Southern Connecticut traveled through portions of Pennsylvania as well as through the Northern New Jersey and New York City metropolitan area. Finally, upper-level back trajectories (Figure 4) are noted to have had two very different origins. Those trajectories ending in Connecticut, portions of Southeastern Pennsylvania, and Central New Jersey originated in Indiana/Ohio and traveled east across Pennsylvania to their endpoints. Meanwhile, upper-level back trajectories ending in the Philadelphia suburbs originated at the surface over West Virginia and, in the presence of a surface trough, ascended to the upper-levels through arrival as it traveled east through southern Pennsylvania.

Figure 5 and 5a below show graphically the national ozone concentrations on July 17th and July 18th that contributed to the exceedance on July 19, 2017.

Figure 2. 48-hour Back Trajectories for July 19, 2017 at 10 meters

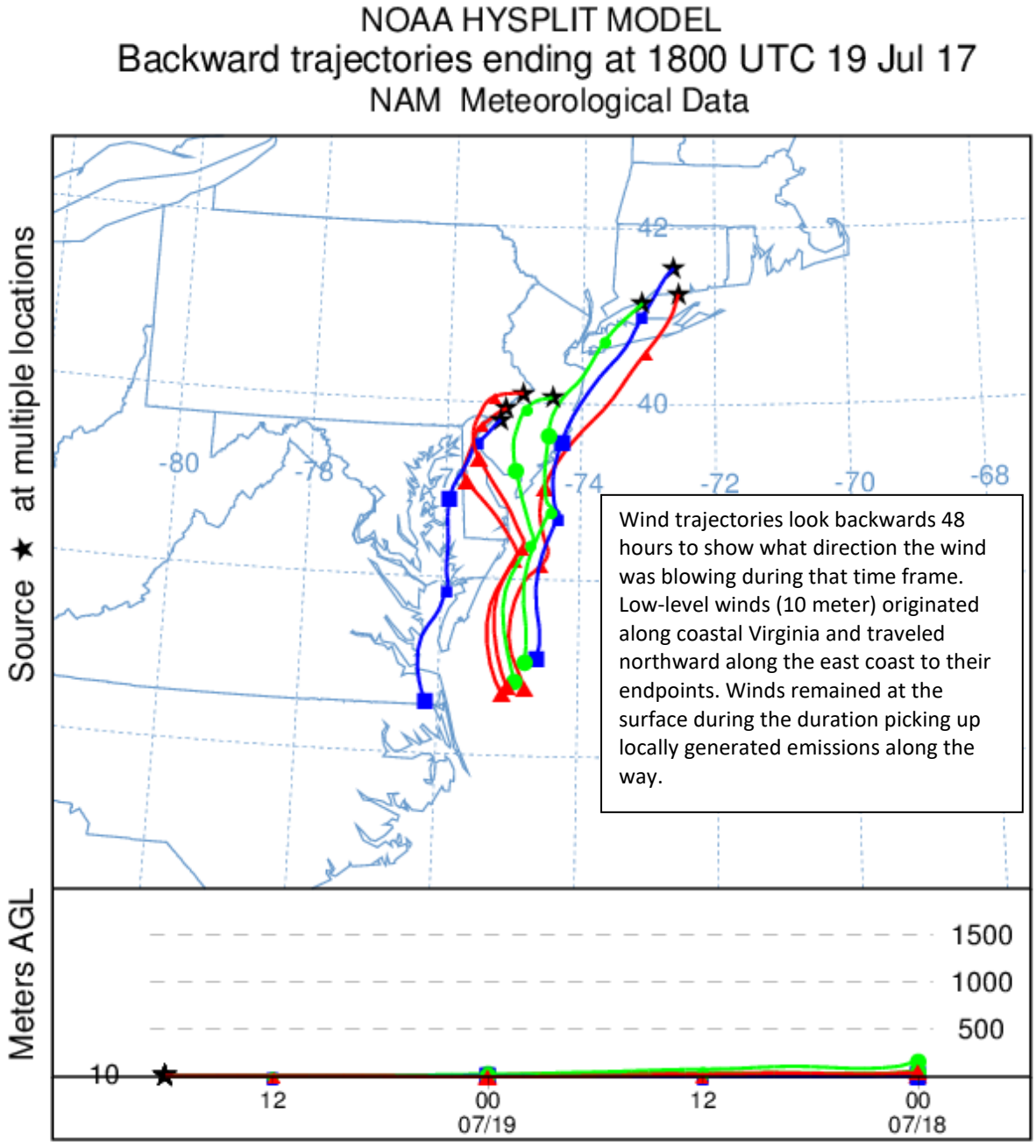


Figure 3. 48-hour Back Trajectories for July 19, 2017 at 500 meters

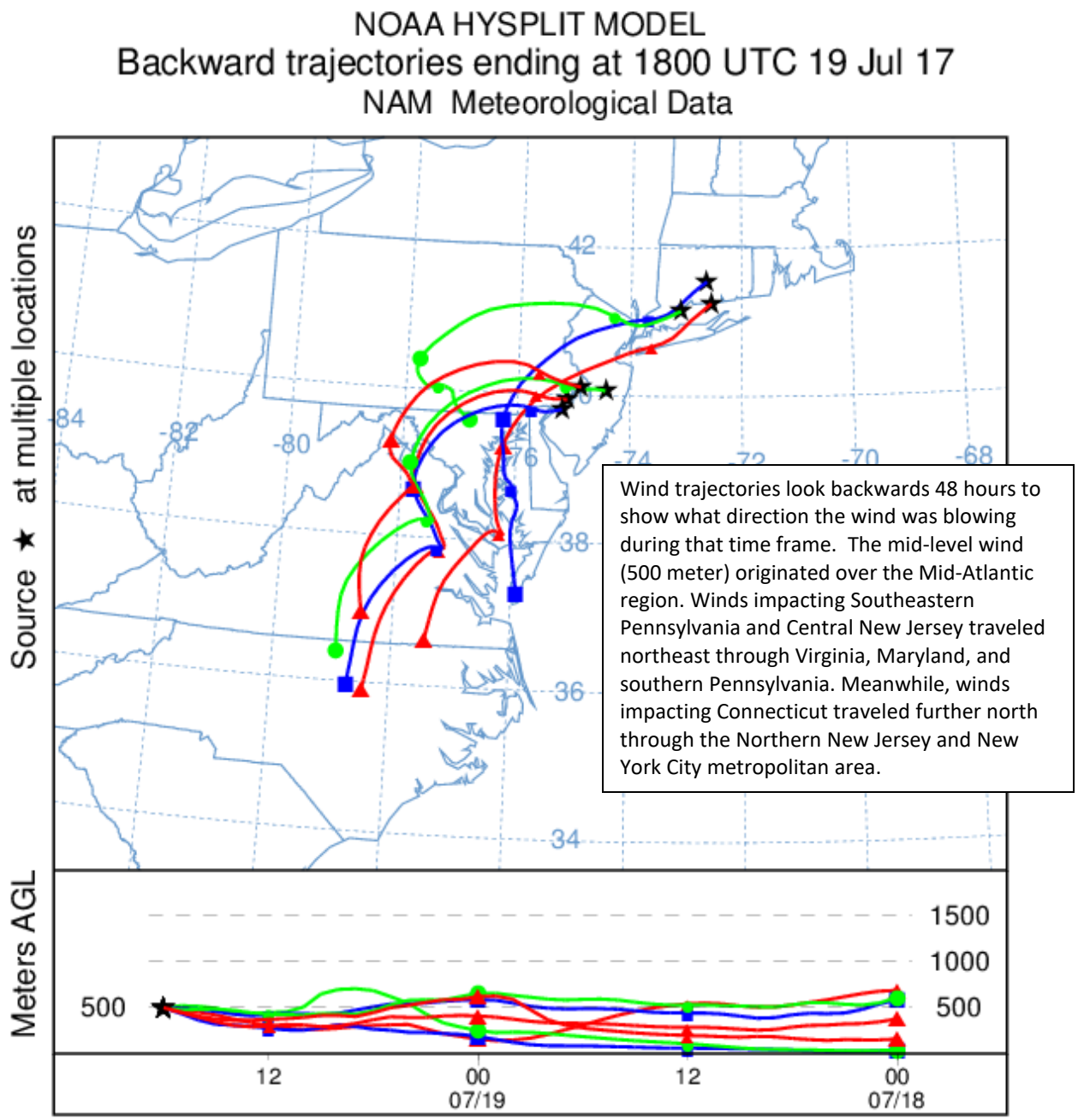
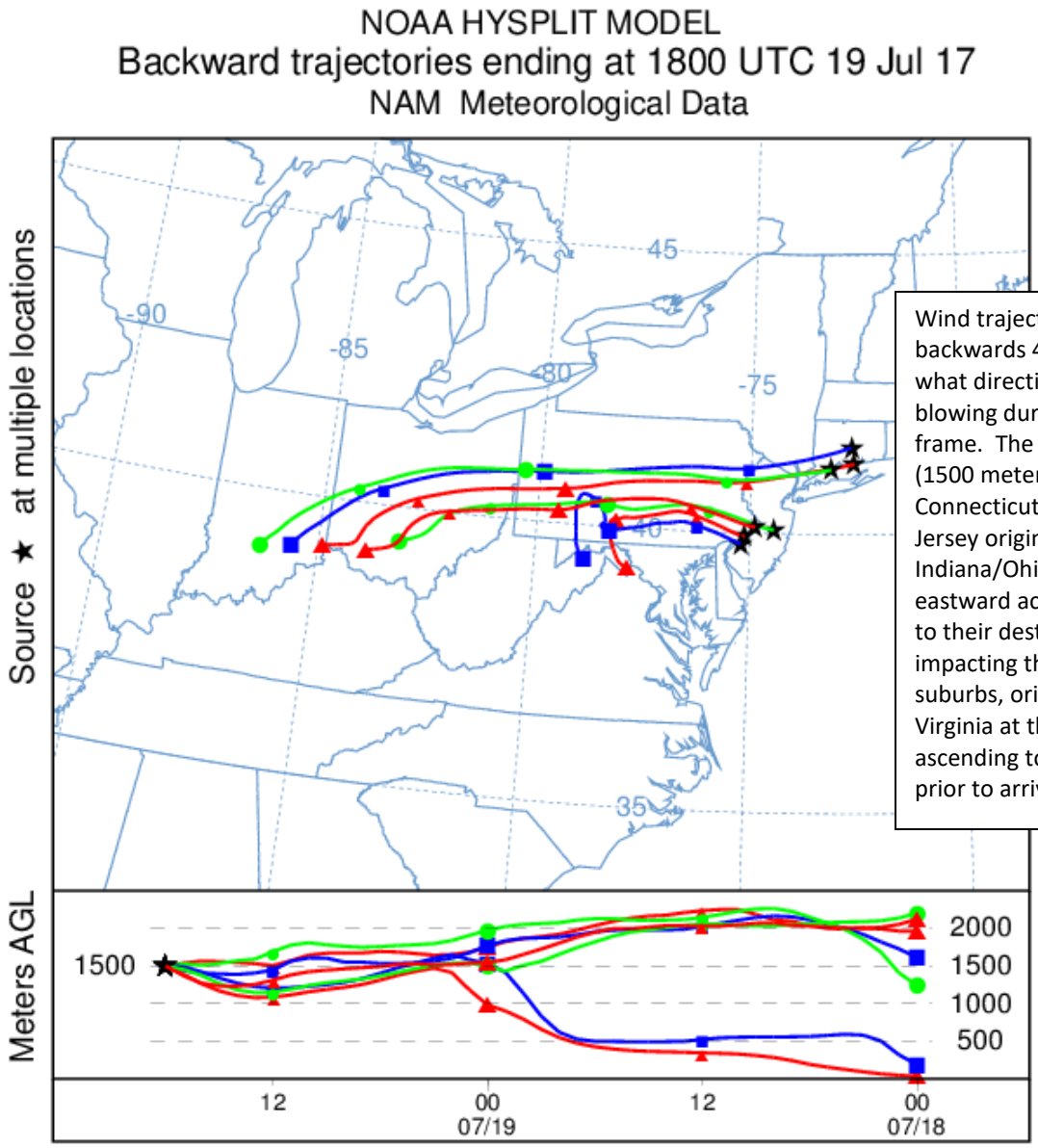


Figure 4. 48-hour Back Trajectories for July 19, 2017 at 1500 meters



Wind trajectories look backwards 48 hours to show what direction the wind was blowing during that time frame. The higher-level wind (1500 meter) impacting Connecticut and Central New Jersey originated in Indiana/Ohio and traveled eastward across Pennsylvania to their destinations. Winds impacting the Philadelphia suburbs, originated in West Virginia at the surface before ascending to the upper-levels prior to arrival.

Figure 5. Ozone Air Quality Index for the United States on July 17, 2017

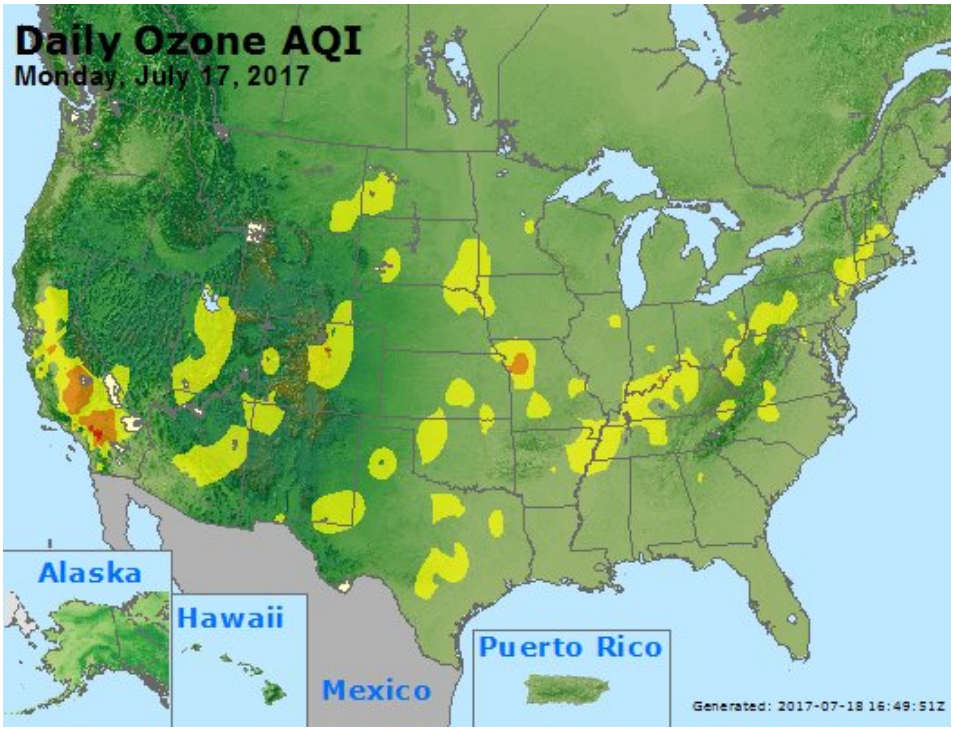
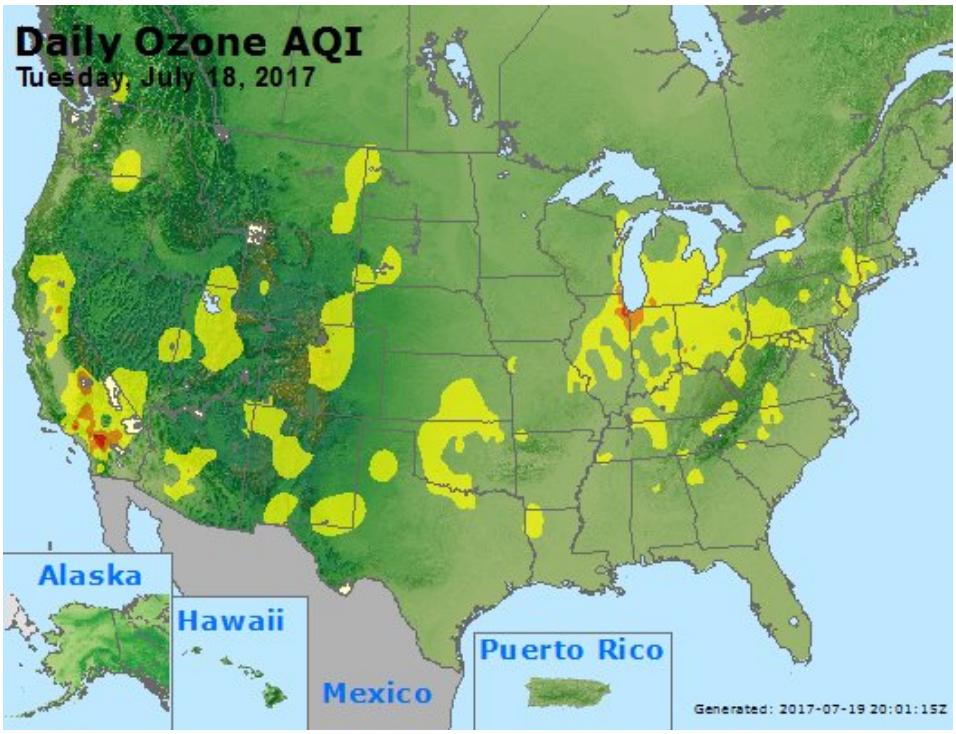


Figure 5a. Ozone Air Quality Index for the United States on July 18, 2017



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.