Ozone National Ambient Air Quality Standard Health Exceedances on July 20, 2017

Exceedance Locations and Levels

On Thursday, July 20, 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 20, 2017

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	73
Clarksboro	71
Colliers Mills	77

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 20, 2017, in New Jersey was 81 ppb at the Colliers Mills station, which is below the 1-hour ozone NAAQS of 120 ppb.

Thursday marks the 11th day in 2017 on which exceedances of the 70 ppb ozone NAAQS of 2015 were recorded in New Jersey. By the 20th 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 20, 2017 NAAQS = 70 ppb	# of Days NAAQS was Exceeded January 1 - July 20, 2016 NAAQS = 70 ppb	# of Days NAAQS was Exceeded January 1 - July 20, 2015 NAAQS = 75 ppb
New Jersey	11	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 ten (10) exceedances of the 70 ppb ozone NAAQS of 2015 recorded on Thursday, July 20, 2017 (See Table 3):

Table 3: Ozone NAAQS Exceedances at other Monitoring Stations in New Jersey's Ozone Nonattainment Areas on July 20, 2017

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Greenwich	84
CT	Madison-Beach Road	76
CT	Middletown	76
CT	New Haven	79
CT	Stratford	81
CT	Westport	90
NY	Babylon	77
NY	Holtsville	71
NY	Queens	73
PA	BRIS (Bucks Co.)	74

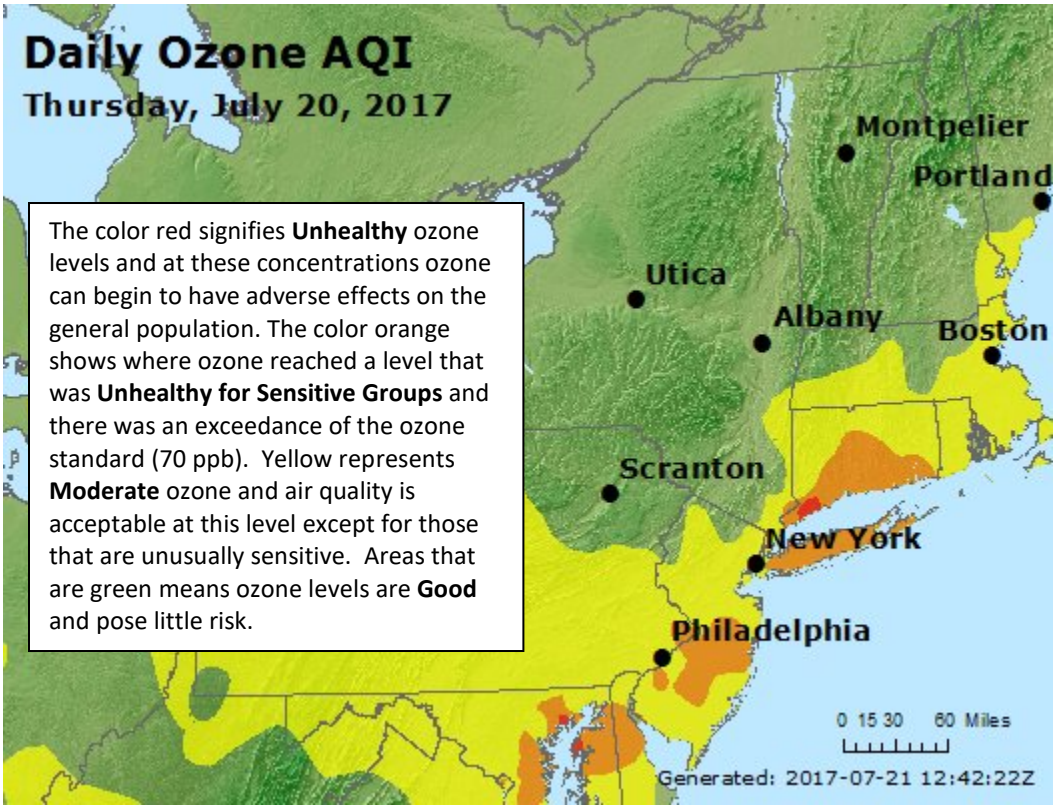
Seven (7) stations exceeded the 75 ppb ozone NAAQS of 2008, and one exceeded the 84 ppb ozone NAAQS of 1997. The highest 1-hour average ozone concentration recorded was 110 ppb at the Westport station in Connecticut, which is below the 1-hour ozone NAAQS of 120 ppb.

Thursday marks the 16th day in 2017 on which exceedances of the 70 ppb ozone NAAQS of 2015 were recorded for Connecticut, the 11th day for New York, and the 10th day for Pennsylvania. The number of days for Maryland remains at seven (7), and five (5) days for Delaware (See Table 4). Figure 1 shows graphically the region's ozone concentrations on July 20, 2017.

Table 4: Number of Ozone Exceedances by State

STATE	# of Days NAAQS was Exceeded January 1 - July 20, 2017 NAAQS = 70 ppb
Connecticut	17
Delaware	5
Maryland	7
New Jersey	11
New York	11
Pennsylvania	10

Figure 1. Ozone Air Quality Index for July 20, 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

High Pressure remained over much of the eastern United States while a surface trough extended from New England south through the Hudson Valley, northern New Jersey, and eastern Pennsylvania into the Mid-Atlantic Region. Looking further, a weakening frontal boundary approached the area from the northwest late in the day, triggering evening showers and thunderstorms throughout the Northeast.

In Connecticut, sunny skies were observed for much of the day before evening clouds and rain impacted the region. Temperatures reached the low 90s with winds generally light and variable becoming more southwest/west in southwestern Connecticut throughout the day. Meanwhile, sunny skies were noted in central Long Island while more cloudy conditions were observed over western portions of the Island. Temperatures were in the low to mid-90s with light winds becoming southwest and west in the evening hours. Further south, central New Jersey and southeastern Pennsylvania experienced, sunny skies (with the exception of the Philadelphia area which tended more cloudy), temperatures were in the mid-90s and winds varied southwest and west.

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 20, 2017. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. Nine (9) 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:

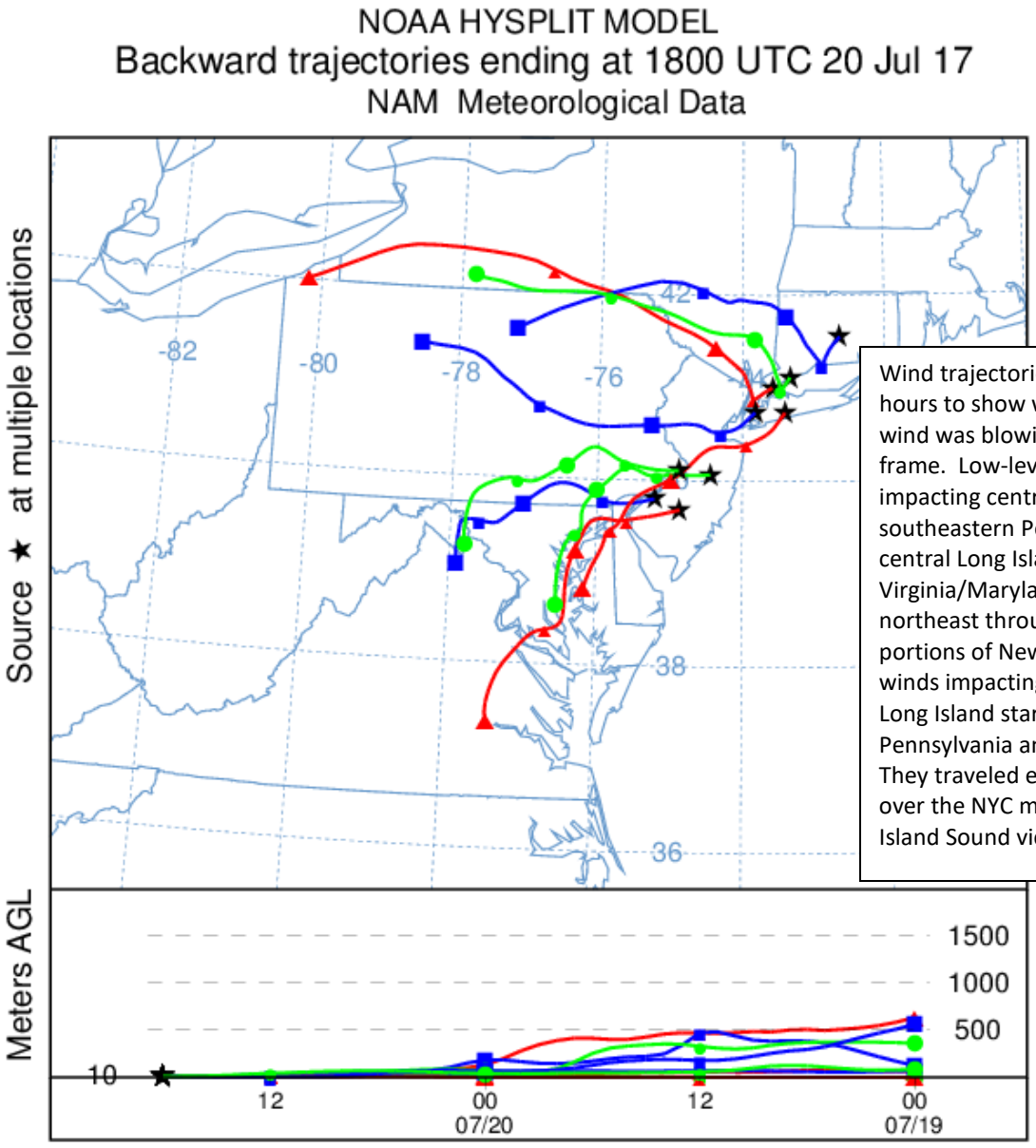
Table 5. Monitoring Stations with 8-hr Ozone Exceedances that Were Selected to Run 48-hr Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Greenwich	84
CT	Middletown	76
CT	Westport	90
NJ	Ancora State Hospital	73
NJ	Clarksboro	71
NJ	Colliers Mills	77
NY	Babylon	77
NY	Queens	73
PA	BRIS (Bucks Co.)	74

Surface level back trajectories (Figure 2) show that elevated ozone at the central/southern New Jersey, southeastern Pennsylvania, and central Long Island monitors originated in Virginia/Maryland and traveled northeastward through portions of Delaware and southern Pennsylvania before reaching their endpoints. These winds remained at the surface for the duration of their path picking up locally generated pollution from cars, trucks, and industry along the way. Meanwhile, air which impacted Connecticut and the Queens monitor, started further west over Pennsylvania and western New York. This air traveled eastward before recirculating in the New York City metropolitan area and Long Island Sound vicinity just prior to arrival. It is also noted that this air started in the mid-levels of the atmosphere and was mix down to the surface in the presence of the abovementioned surface trough. Mid-level back trajectories (Figure 3), show that winds impacting south/central New Jersey, Long Island, and far southwestern Connecticut originated in Ohio and western Pennsylvania before traveling generally eastward through Pennsylvania and portions of New Jersey to their endpoints. Air impacting central Connecticut originated in central New York, traveled southeastward, and prior to arrival, recirculated over the Long Island Sound. Finally, the mid-level back trajectory which impacted the Westport, CT monitor shows origins much further north. This air originated in the upper atmosphere over southeastern Ontario, Canada and slowly descended to the 500m level as it traveled southeastward to its destination. Looking further, upper-level back trajectories (Figure 4) originated in the Great Lakes/Ohio River Valley region and simply traveled eastward to their endpoints.

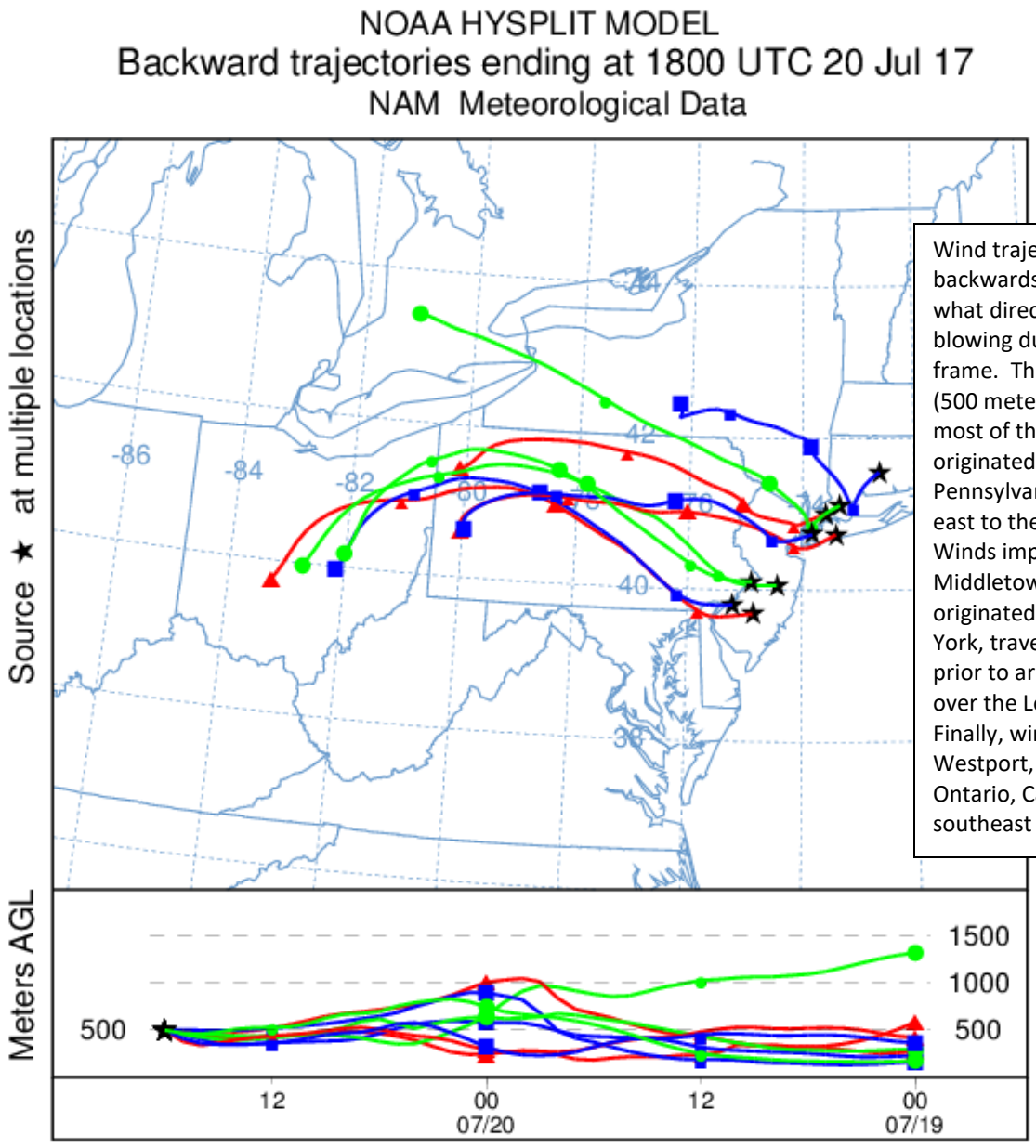
Figure 5 and 5a below show graphically the national ozone concentrations on July 18th and July 19th that contributed to the exceedance on July 20, 2017.

Figure 2. 48-hour Back Trajectories for July 20, 2017 at 10 meters



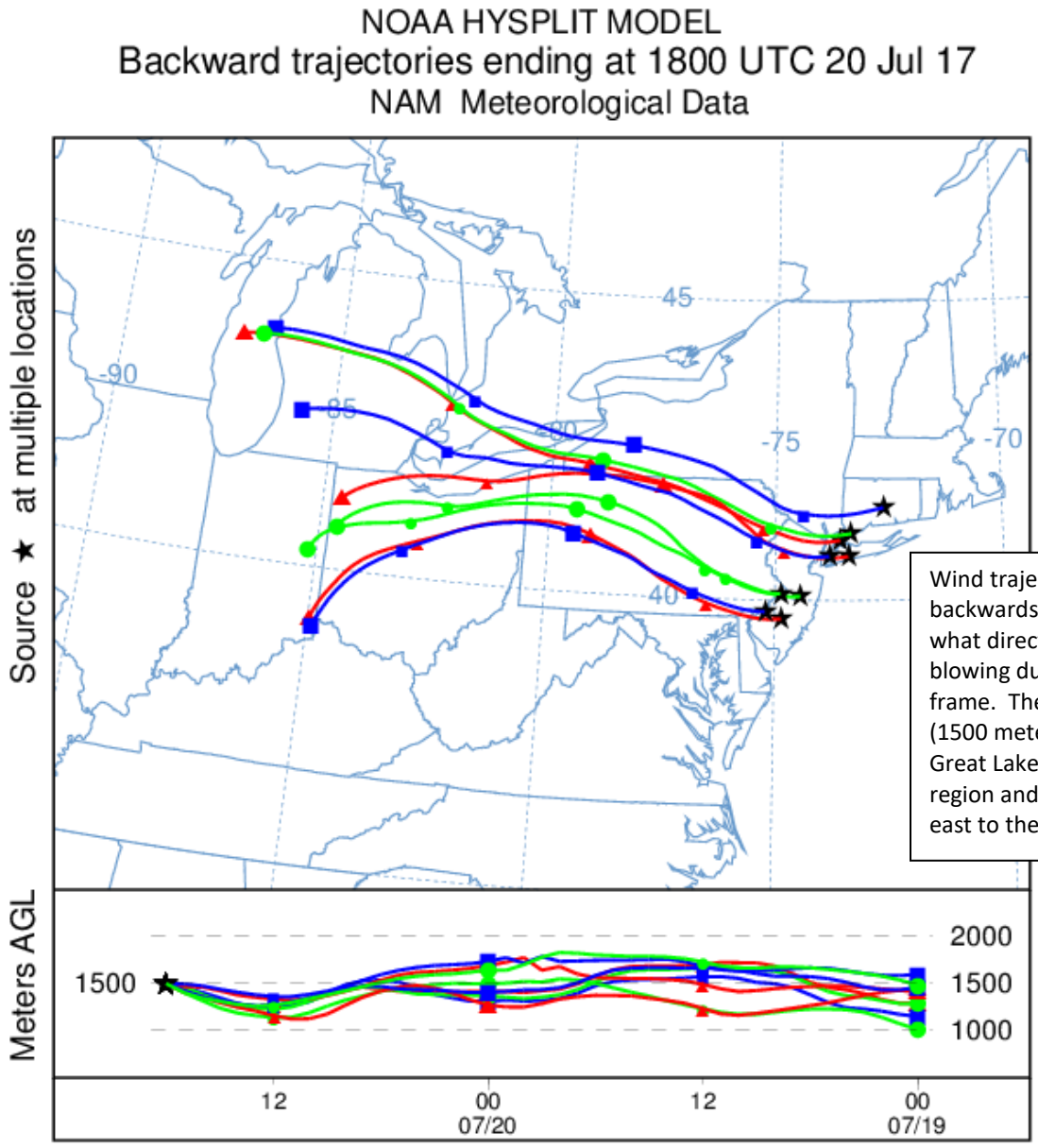
Wind trajectories look backwards 48 hours to show what direction the wind was blowing during that time frame. Low-level winds (10 meter) impacting central New Jersey, southeastern Pennsylvania and central Long Island, originated in Virginia/Maryland and traveled northeast through Pennsylvania and portions of New Jersey. Meanwhile, winds impacting Connecticut and Long Island started further west over Pennsylvania and western New York. They traveled east and recirculated over the NYC metro area/ Long Island Sound vicinity prior to arrival.

Figure 3. 48-hour Back Trajectories for July 20, 2017 at 500 meters



Wind trajectories look backwards 48 hours to show what direction the wind was blowing during that time frame. The mid-level wind (500 meter) which impacted most of the affected monitors originated over Ohio/western Pennsylvania and traveled east to their end points. Winds impacting Middletown, CT however, originated in central New York, traveled southeast and prior to arrival recirculated over the Long Island Sound. Finally, winds affecting Westport, CT originated in Ontario, Canada and traveled southeast to its destination.

Figure 4. 48-hour Back Trajectories for July 20, 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) originated in the Great Lakes/Ohio River Valley region and traveled generally east to their destinations.

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

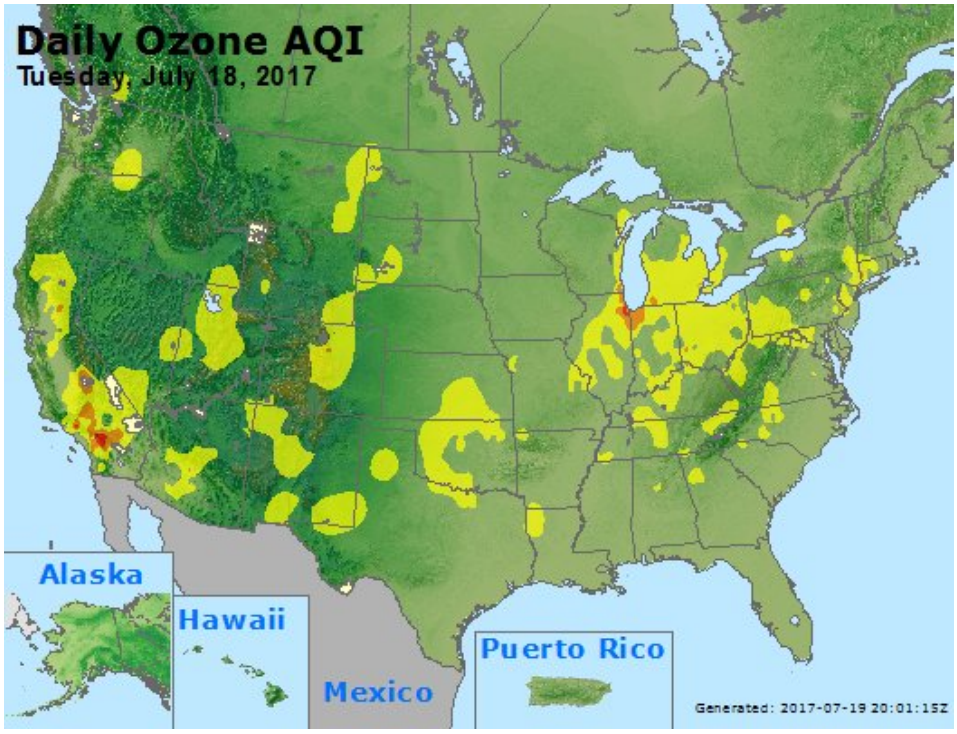
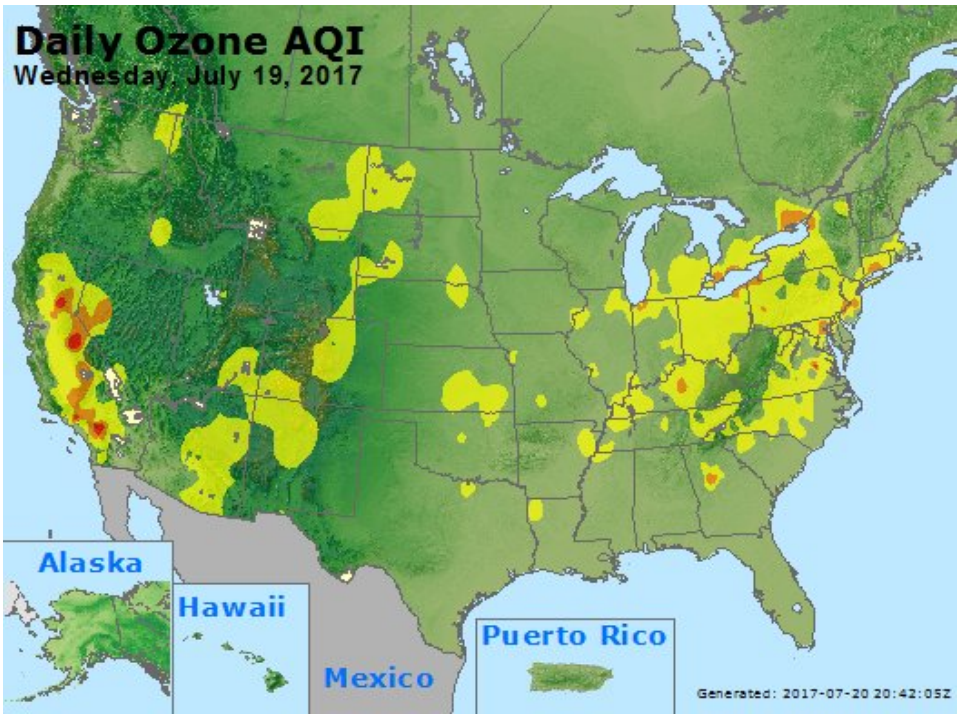


Figure 5a. Ozone Air Quality Index for the United States on July 19, 2017



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.