Ozone National Ambient Air Quality Standard Health Exceedances on July 22, 2017

Exceedance Locations and Levels

On Saturday, July 22, 2017, there were two (2) 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 22, 2017

STATION	Daily Maximum 8-Hr Average (ppb)
Bayonne	75
Camden Spruce St	76

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 22, 2017, in New Jersey was 93 ppb at the Camden Spruce St station, which is below the 1-hour ozone NAAQS of 120 ppb.

Saturday marks the 12th day in 2017 on which exceedances of the 70 ppb ozone NAAQS of 2015 were recorded in New Jersey. By the 22nd of July in 2016, there were seventeen (17) 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 22, 2017 NAAQS = 70 ppb	# of Days NAAQS was Exceeded January 1 - July 22, 2016 NAAQS = 70 ppb	# of Days NAAQS was Exceeded January 1 - July 22, 2015 NAAQS = 75 ppb
New Jersey	12	16	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 eleven (11) exceedances of the 70 ppb ozone NAAQS of 2015 recorded on Saturday, July 22, 2017 (See Table 3):

Table 3: Ozone NAAQS Exceedances at other Monitoring Stations in New Jersey's Ozone Nonattainment Areas on July 22, 2017

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
DE	BCSP (New Castle Co.)	73
DE	MLK (New Castle Co.)	71

NY	CCNY	73
NY	IS52	81
NY	Pfizer Lab	79
NY	Queens	79
NY	Susan Wagner	72
PA	BRIS (Bucks Co.)	79
PA	CHES (Delaware Co.)	76
PA	NEA (Philadelphia Co.)	72
PA	NEW (Philadelphia Co.)	77

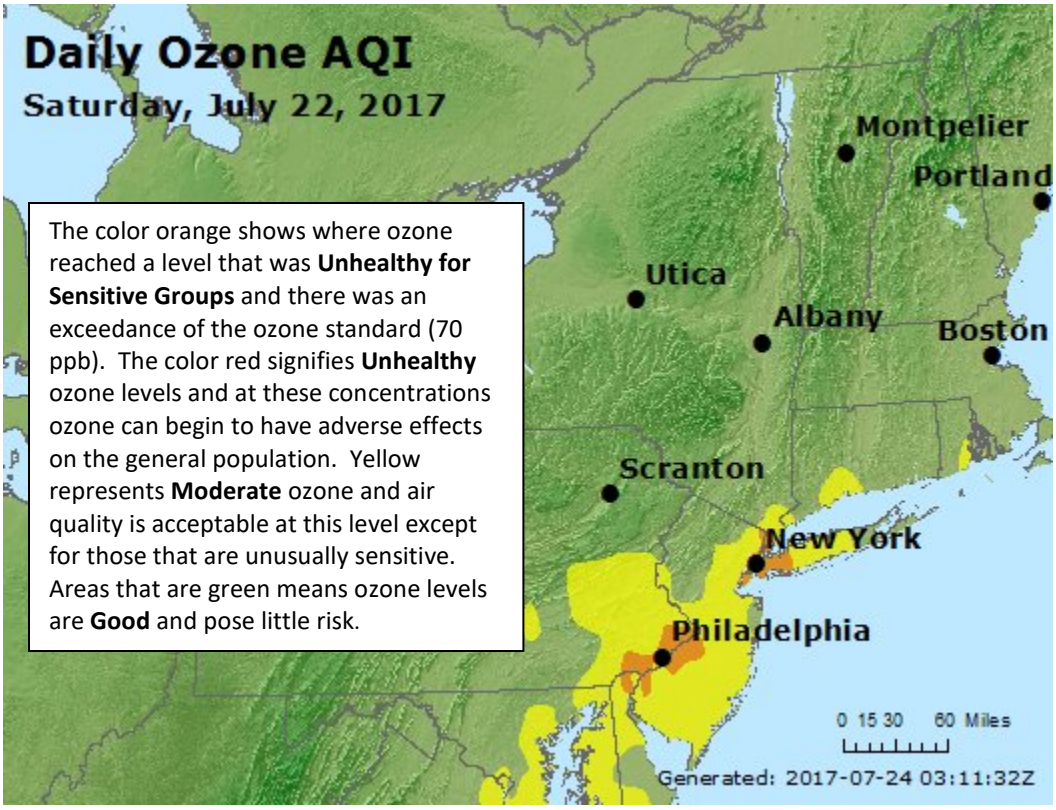
Six (6) stations exceeded the 75 ppb ozone NAAQS of 2008, but none exceeded the 84 ppb ozone NAAQS of 1997. The highest 1-hour average ozone concentration recorded was 104 ppb at the IS52 station in New York, which is below the 1-hour ozone NAAQS of 120 ppb.

Saturday marks the 12th day in 2017 on which exceedances of the 70 ppb ozone NAAQS of 2015 were recorded for New York, the 11th day for Pennsylvania and the 7th day Delaware. The number of days for Connecticut remains at seventeen (17), and seven (7) days for Maryland (See Table 4). Figure 1 shows graphically the region's ozone concentrations on July 22, 2017.

Table 4: Number of Ozone Exceedances by State

STATE	# of Days NAAQS was Exceeded January 1 - July 22, 2017 NAAQS = 70 ppb
Connecticut	17
Delaware	7
Maryland	7
New Jersey	12
New York	12
Pennsylvania	11

Figure 1. Ozone Air Quality Index for July 22, 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

Meteorological data from across the region shows temperatures by mid-day had peaked in the low 90s with mostly to partly cloudy skies. Winds at the surface remained light and variable throughout day while frequently changing direction due to a center of low pressure overhead of New Jersey. Two stationary fronts were draped over the northeast causing air to become stagnant and recirculate throughout the day. In addition, a low-pressure surface trough was present extending from New Jersey southward triggering evening showers and thunderstorms. During the summer, these features can exacerbate ozone concentrations at the surface leading to an exceedance at the nearby monitors.

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 22, 2017. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. Ten (10) 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

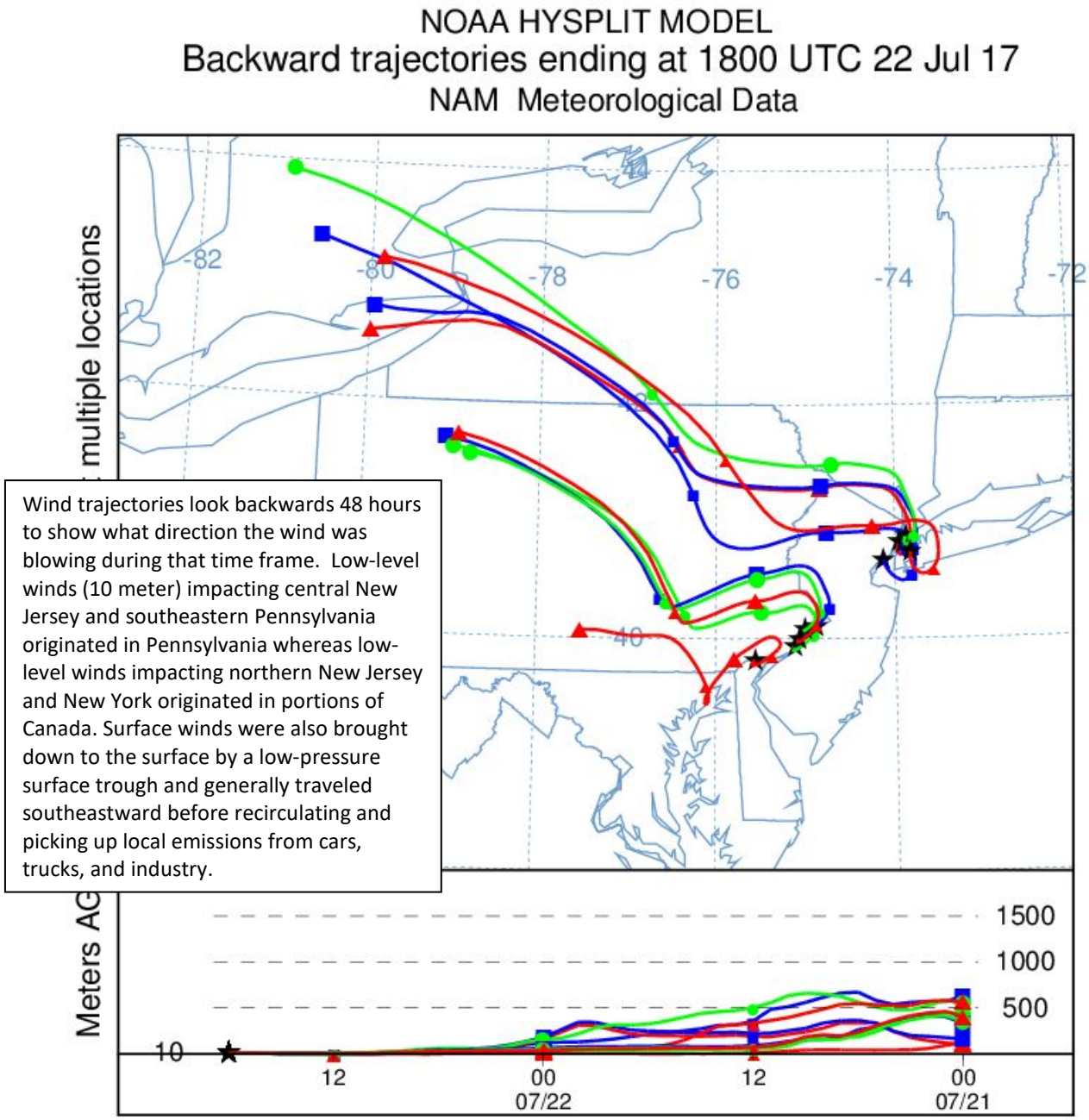
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
DE	BCSP	73
NJ	Bayonne	75
NJ	Camden Spruce Street	76
NY	CCNY	73
NY	IS52	81
NY	Pfizer Lab	79
NY	Queens	79
PA	BRIS	79
PA	NEA	72
PA	NEW	77

Surface level back trajectories (Figure 2) show winds originated west-northwest of the exceedance monitors in various locations of Pennsylvania and Canada. Surface winds traveled through New York and Pennsylvania before traveling westward into New Jersey. Due to the center of low pressure overhead of New Jersey, surface winds were recirculated around the affected monitors before causing an exceedance in the late afternoon. Winds at the surface originated at 500m and were mixed down to the surface bringing any polluted air to ground level. Later, low-level winds traveled along the surface and picked up local emissions from cars, trucks, and industry. Mid-level back trajectories (Figure 3) generally originated in Michigan and the Great Lakes and were brought down to 500m from higher elevations. Any polluted air aloft would have been mixed down to lower elevations at the mid-level and combined with local emissions from cars, trucks, and industry. The upper level winds (Figure 4) followed a similar transport pathway as the mid-level winds. Originating in Michigan, upper level winds traveled southeastward through Lake Erie and Pennsylvania while remaining aloft for the duration of the trajectory path.

It should be noted that a widespread wildfire smoke plume was traveling eastward from fires burning in western Canada. This plume traveling at higher elevations may have been mixed down to the surface and enhanced the formation of ground-level ozone across the region. Further evaluation will be required to determine if wildfire smoke was a contributing factor to the high ozone in New Jersey's nonattainment area on July 22, 2017.

Figure 5 and 5a below show graphically the national ozone concentrations on July 20th and July 21th that contributed to the exceedance on July 22, 2017.

Figure 2. 48-hour Back Trajectories for July 22, 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 and southeastern Pennsylvania originated in Pennsylvania whereas low-level winds impacting northern New Jersey and New York originated in portions of Canada. Surface winds were also brought down to the surface by a low-pressure surface trough and generally traveled southeastward before recirculating and picking up local emissions from cars, trucks, and industry.

Figure 3. 48-hour Back Trajectories for July 22, 2017 at 500 meters

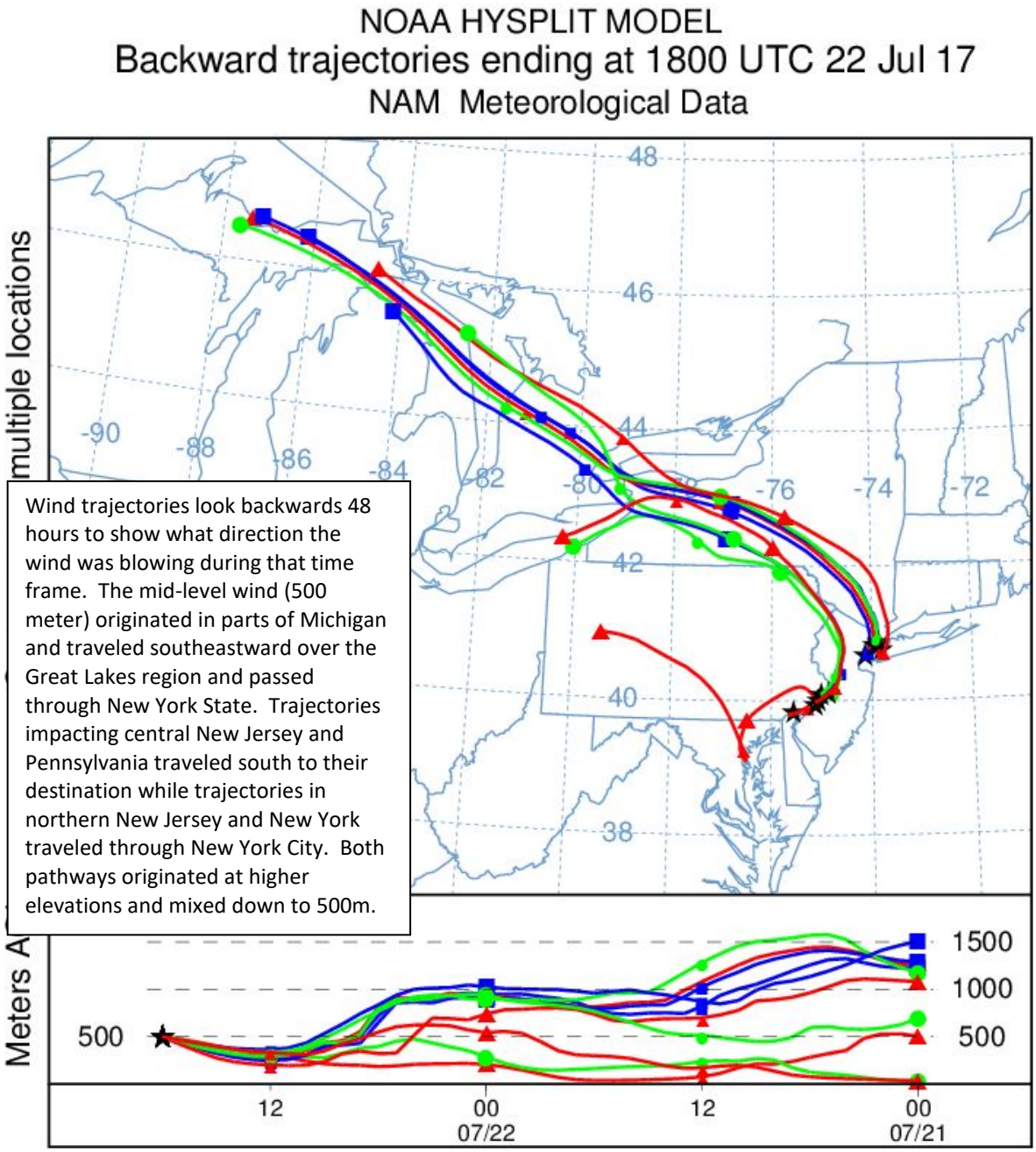


Figure 4. 48-hour Back Trajectories for July 22, 2017 at 1500 meters

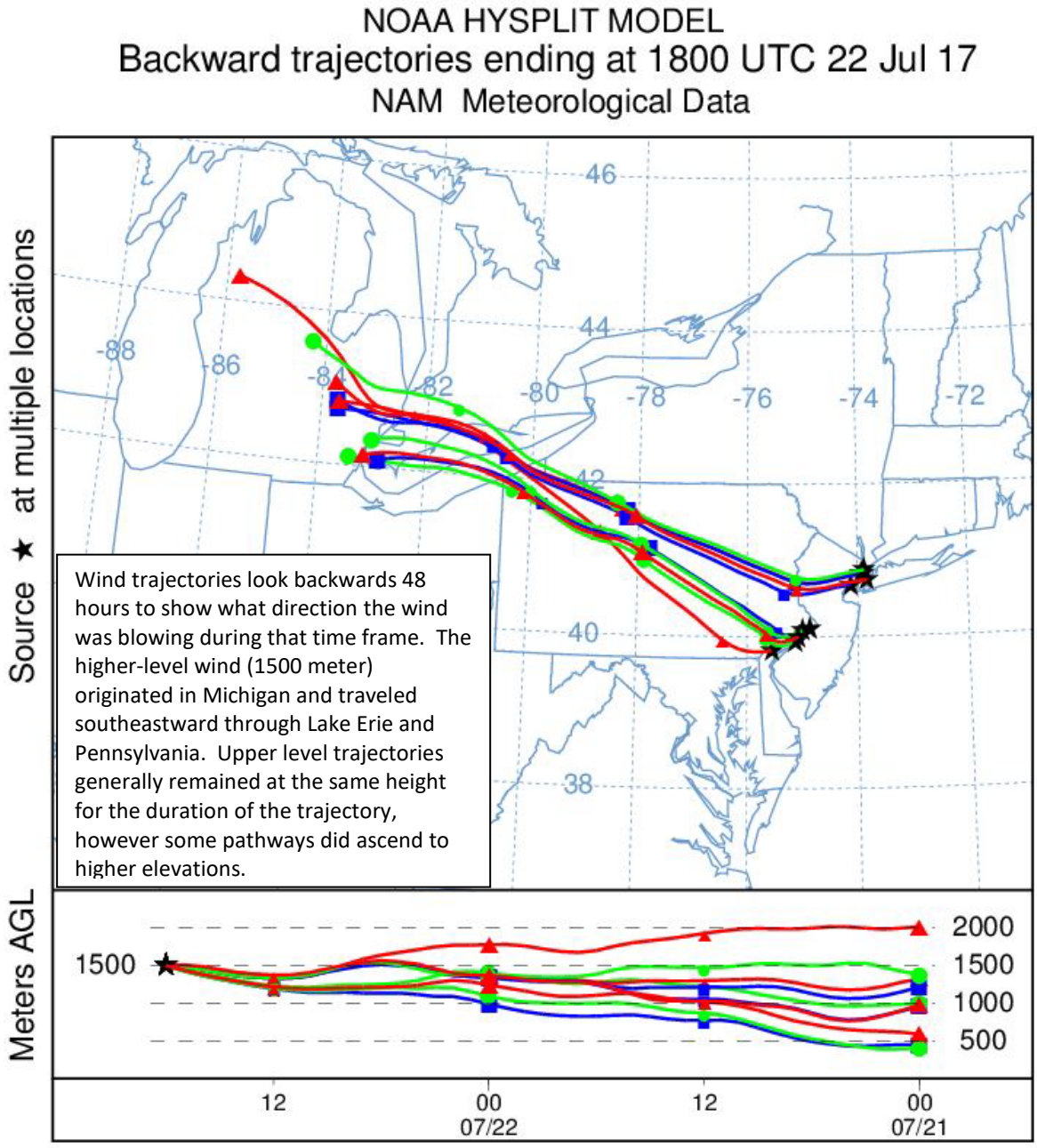


Figure 5. Ozone Air Quality Index for the United States on July 20, 2017

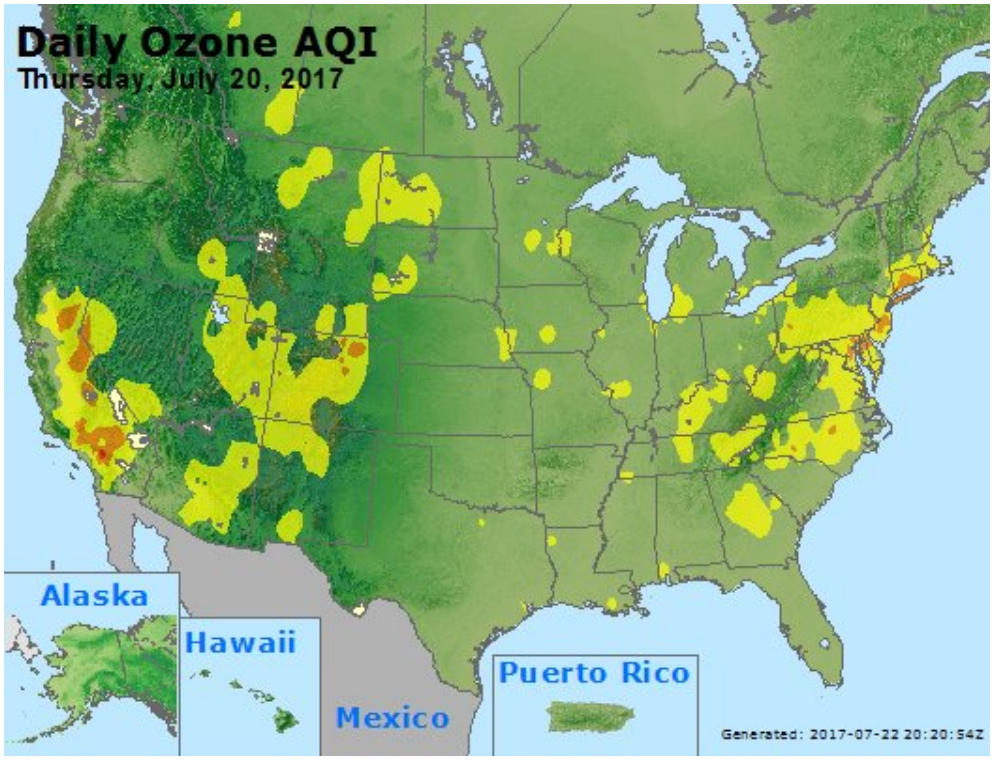
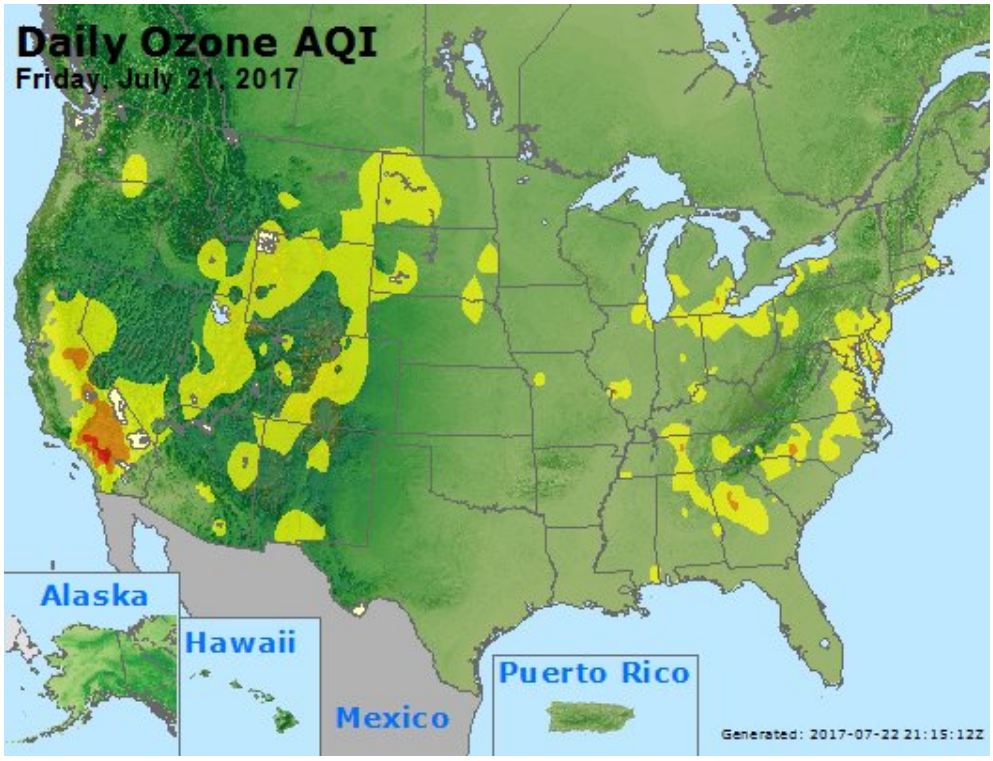


Figure 5a. Ozone Air Quality Index for the United States on July 21, 2017



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.