Ozone National Ambient Air Quality Standard Health Exceedances on August 16, 2018

Exceedance Locations and Levels

On Thursday, August 16, 2018, there were no 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 8-hr Maximum Ozone Concentrations on August 16, 2018

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	56
Bayonne	58
Brigantine	47
Camden Spruce St	66
Chester	58
Clarksboro	61
Colliers Mills	64
Columbia	46
Flemington	65
Leonia	59
Millville	52
Monmouth University	66
Newark Firehouse	62
Ramapo	52
Rider University	58
Rutgers University	65
Washington Crossing*	No Data
TOTAL EXCEEDANCES	0

*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. 8-hr Maximum Ozone Concentrations for Out-of-State Monitoring Stations in New Jersey's Ozone Non-Attainment Areas on August 16, 2018

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	52
CT	Greenwich	61

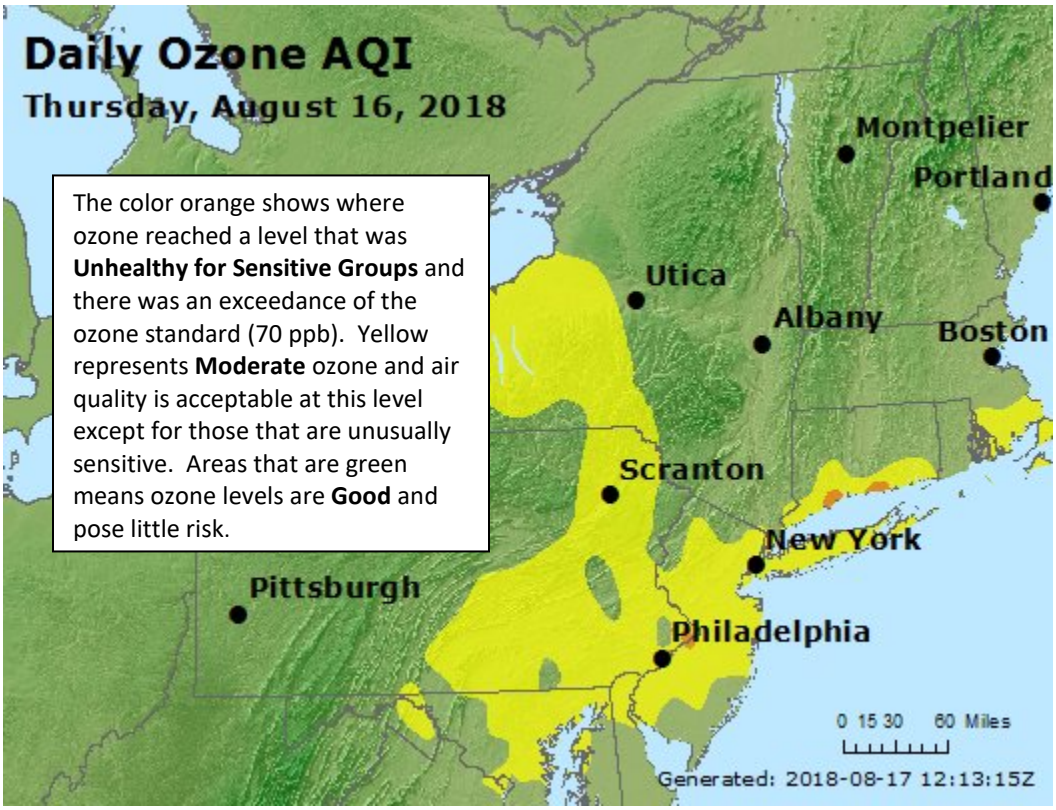
CT	Madison-Beach Road	71
CT	Middletown-CVH-Shed	47
CT	New Haven	50
CT	Stratford	71
CT	Westport	57
DE	BCSP (New Castle Co.)	55
DE	BELLFNT2 (New Castle Co.)	61
DE	KILLENS (Kent Co.)	44
DE	LEWES (Sussex Co.)	46
DE	LUMS 2 (New Castle Co.)	60
DE	MLK (New Castle Co.)	66
DE	SEAFORD (Sussex Co.)	42
MD	Fair Hill	63
NY	Babylon	69
NY	Bronx - IS52	61
NY	CCNY	68
NY	Holtsville	66
NY	Pfizer Lab	57
NY	Queens	64
NY	Riverhead	61
NY	Rockland Cty	46
NY	White Plains	51
NY	Fresh Kills	58
PA	BRIS (Bucks Co.)	71
PA	CHES (Delaware Co.)	62
PA	NEWG (Chester Co.)	57
PA	NORR (Montgomery Co.)	58
PA	LAB (Philadelphia Co.)	41
PA	NEA (Philadelphia Co.)	62
PA	NEW (Philadelphia Co.)	71
	TOTAL EXCEEDANCES	4

The number of days in 2018 on which exceedances of the ozone NAAQS were recorded for all the states is summarized in Table 3. Figure 1 shows graphically the regions ozone concentrations on August 16, 2018.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Non-Attainment Areas in 2018

STATE	# of Days NAAQS was Exceeded January 1 – August 16, 2018 NAAQS = 70 ppb
Connecticut	19
Delaware	8
Maryland	6
New Jersey	19
New York	17
Pennsylvania	14

Figure 1. Ozone Air Quality Index for August 16, 2018



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

Westerly transport from the Great Lakes and Ohio River Valley regions and the presence of wildfire smoke, combined with localized transport and favorable weather conditions for ozone production, led to isolated exceedances in the nonattainment area on Thursday, August 16th.

High pressure covered much of the eastern half of the United States with multiple high pressure centers recorded across the region. This allowed for surface trough development over the Mid-Atlantic, providing for some vertical motion in the atmosphere. Meanwhile, a frontal boundary to the north, associated with a large area of low pressure over the Great Lakes, moved south over northern New England before stalling mid-day. These weather features allowed for mostly to partly sunny skies and temperatures to reach near 90 degrees in the nonattainment area. Winds were light and tended westerly for most of the day as they were steered by the abovementioned frontal boundary and high pressure placement. There was a slight wind shift to the southwest/south later in the day along coastal locations. This change in direction may have allowed cleaner maritime air to impact the area, limiting ozone levels at some of these locations.

In addition to the above, dilute smoke was noted over the northeastern United States for a second day. This smoke, transported into our region from Californian wildfires, may have played an important role in the isolated nature of the exceedances on this day. The NJDEP's Division of Air Quality will continue to evaluate the potential effects this smoke plume may have on the air quality within the state.

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 exceedance August 16, 2018. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. Four (4) monitoring stations with an 8-hr ozone exceedance 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)
CT	Madison- Beach Road	71
CT	Stratford	71
PA	BRIS (Bucks Co.)	71
PA	NEW (Philadelphia Co.)	71

Back trajectories for the August 16th exceedances show westerly transport from the industrialized Great Lakes and Ohio River Valley regions, which saw moderate air quality in the days preceding this episode. This transported air in combination with favorable weather conditions, potential wildfire smoke influence, and localized transport at the surface led to enhanced ozone levels in the nonattainment area on this day.

Surface-level back trajectories (Figure 2) originated over the Great Lakes/Ohio River Valley region. Air impacting the Connecticut coastline traveled east through western New York and the lower Hudson Valley through arrival. Meanwhile, air impacting southeastern Pennsylvania traveled through Ohio, Pennsylvania, and the Philadelphia metropolitan area. It is worth mentioning that in both scenarios, air originated in the mid- to upper-atmosphere in locations of moderate ozone levels. As air traveled east along the abovementioned frontal boundary, it descended to the surface. In the last 12 to 18 hours of travel, this air was able to pick up locally generated urban emissions into arrival.

Mid-level and upper-level back trajectories (Figures 3 & 4) followed very similar paths and traveled through various industrialized locations. Air at both levels originated over the Great Lakes Region. Air influencing the Connecticut coastline traveled through portions of Michigan, southeastern Ontario, New York, and eastern Connecticut to its destination. Meanwhile, air impacting southeastern Pennsylvania traveled through Indiana/Michigan, Ohio, and Pennsylvania through arrival.

Figures 5 and 6 below show the national ozone concentrations observed on August 14th and 15th, the days prior to this ozone exceedance episode. As shown in the figures, the Great Lakes and Ohio River Valley regions saw scattered moderate ozone levels earlier in the week. Back trajectories suggest that this air traveled into the nonattainment area. This influence along with localized transport, supporting weather conditions, and potential wildfire influence allowed for enhanced ozone levels throughout the nonattainment area.

Figure 2. 48-hour Back Trajectories for August 16, 2018 at 10 meters

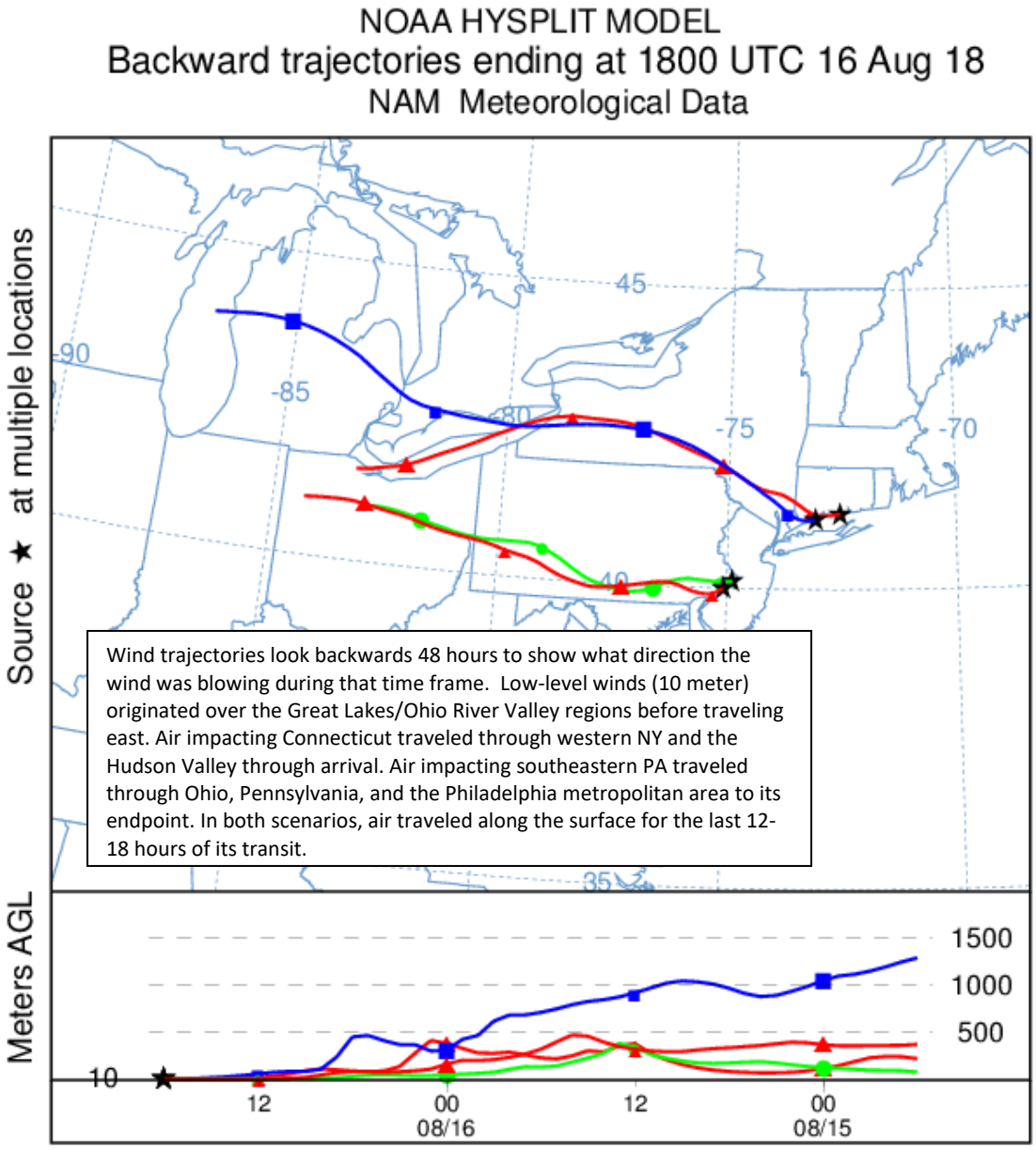


Figure 3. 48-hour Back Trajectories for August 16, 2018 at 500 meters

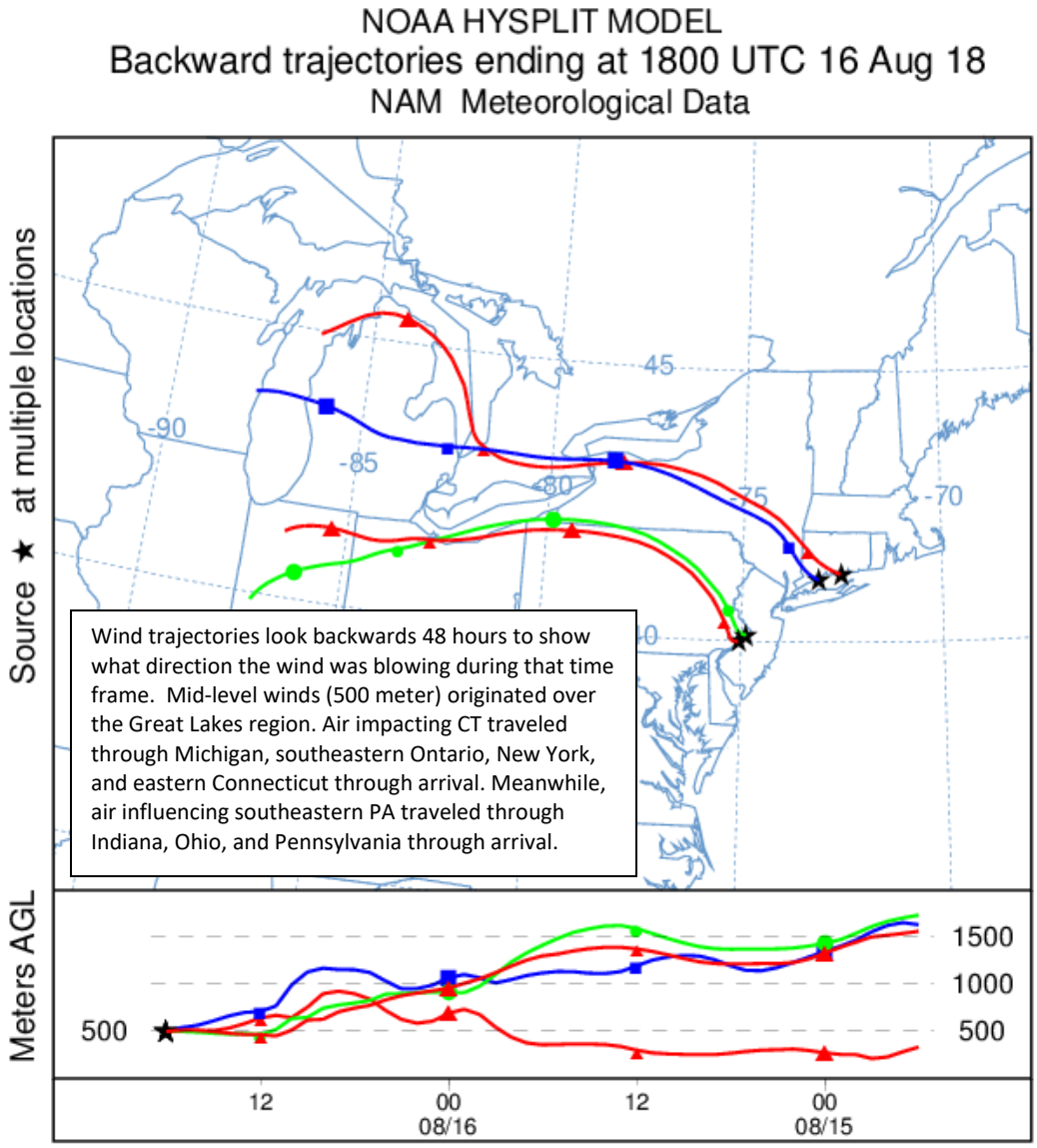


Figure 4. 48-hour Back Trajectories for August 16, 2018 at 1500 meters

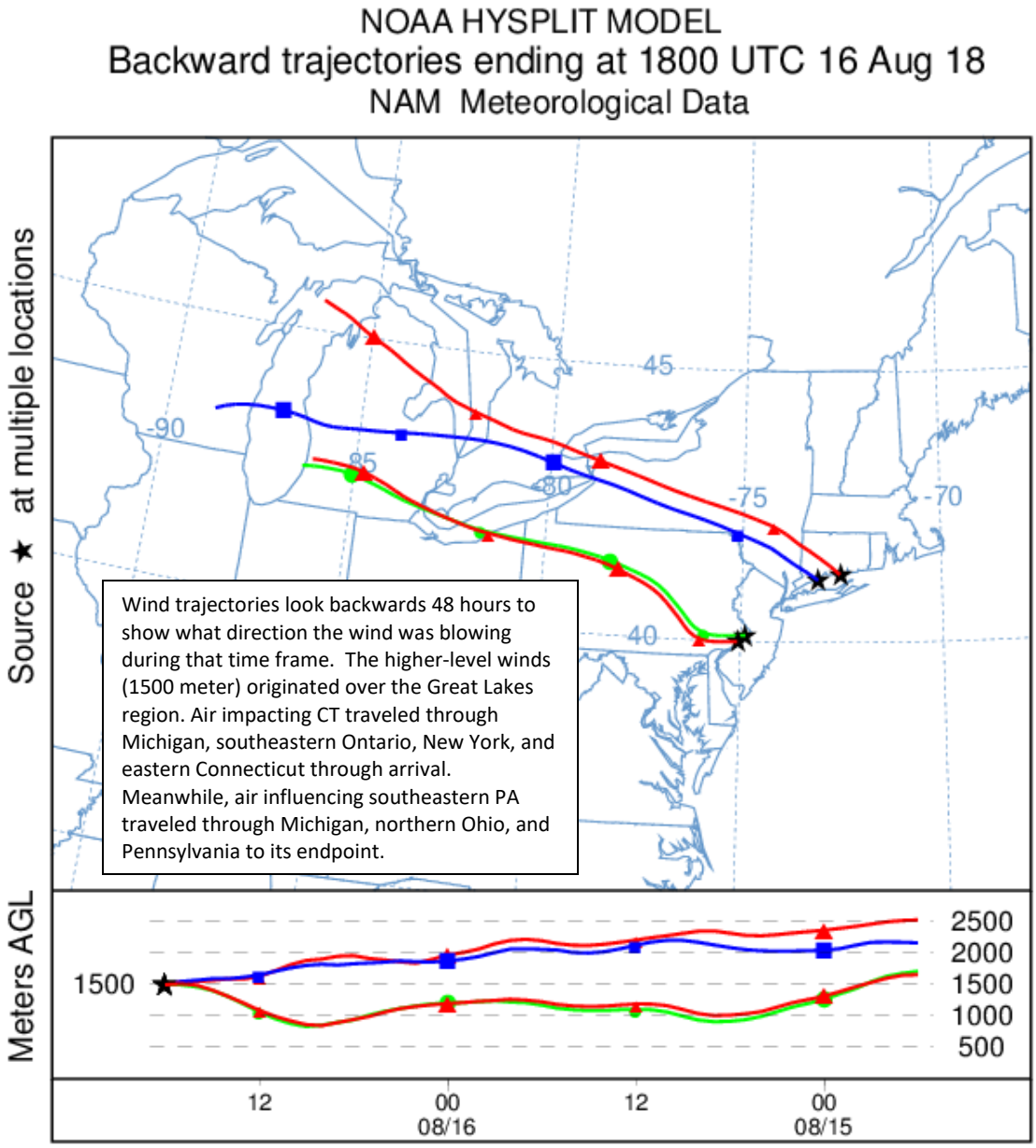


Figure 5. Ozone Air Quality Index for the United States on August 14, 2018

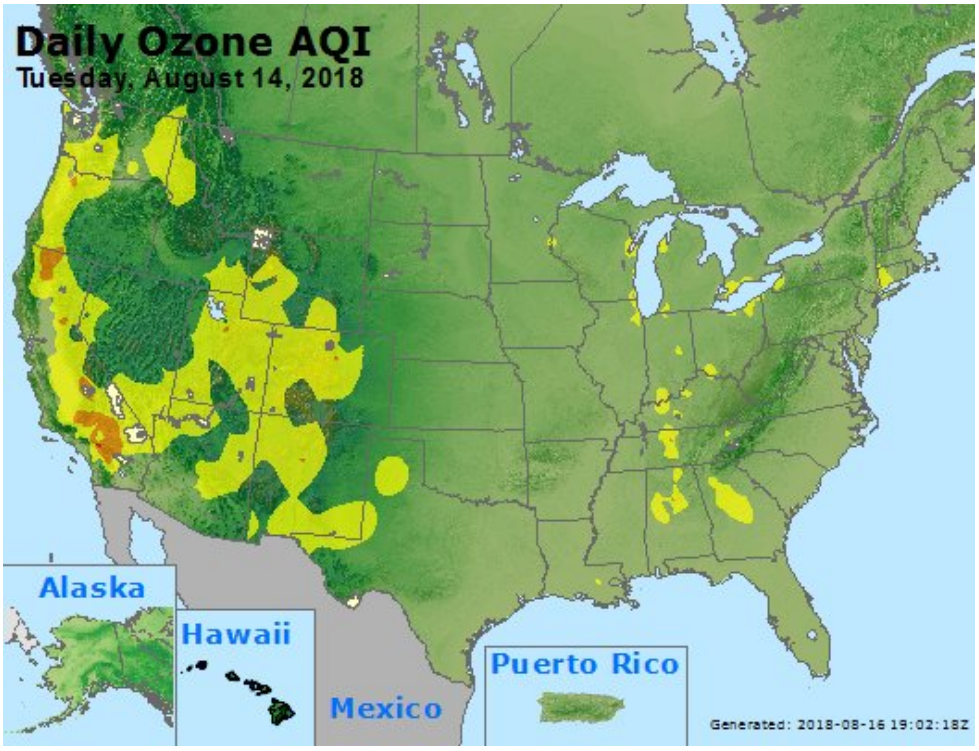
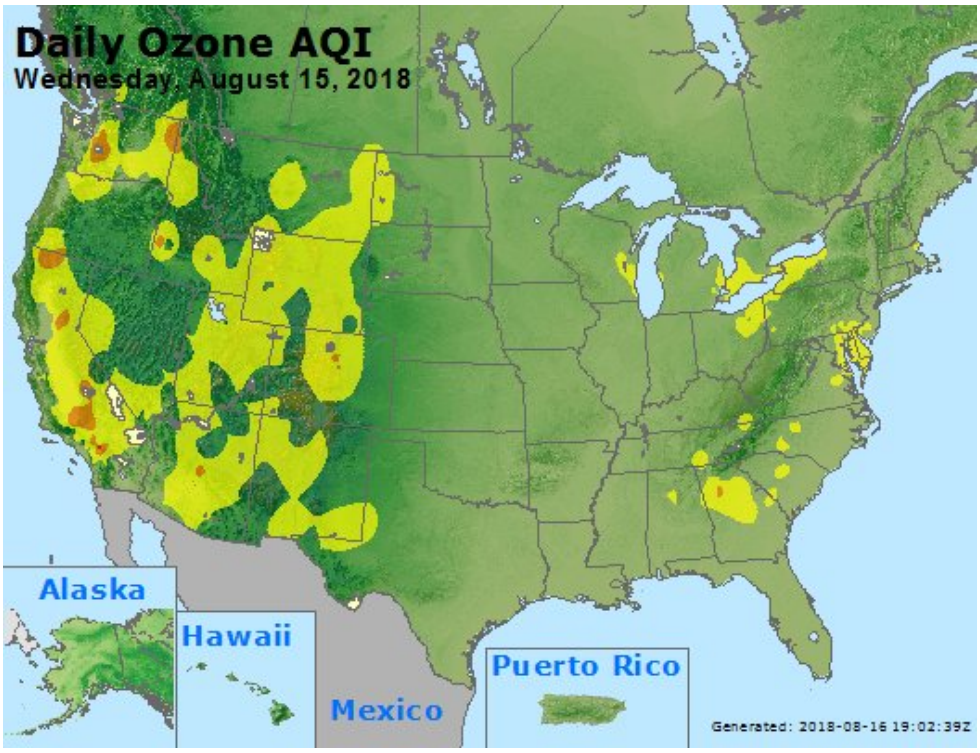


Figure 6. Ozone Air Quality Index for the United States on August 15, 2018



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.