Ozone National Ambient Air Quality Standard Health Exceedances on July 10, 2018

Exceedance Locations and Levels

On Tuesday, July 10, 2018, there were twelve (12) 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 July 10, 2018

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	82
Bayonne	78
Brigantine	56
Camden Spruce St	80
Chester	77
Clarksboro	84
Colliers Mills	83
Columbia	70
Flemington	86
Leonia	81
Millville	68
Monmouth University	68
Newark Firehouse	80
Ramapo	65
Rider University	80
Rutgers University	78
Washington Crossing*	83
TOTAL EXCEEDANCES	12

*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 twenty-nine (29) 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 July 10, 2018

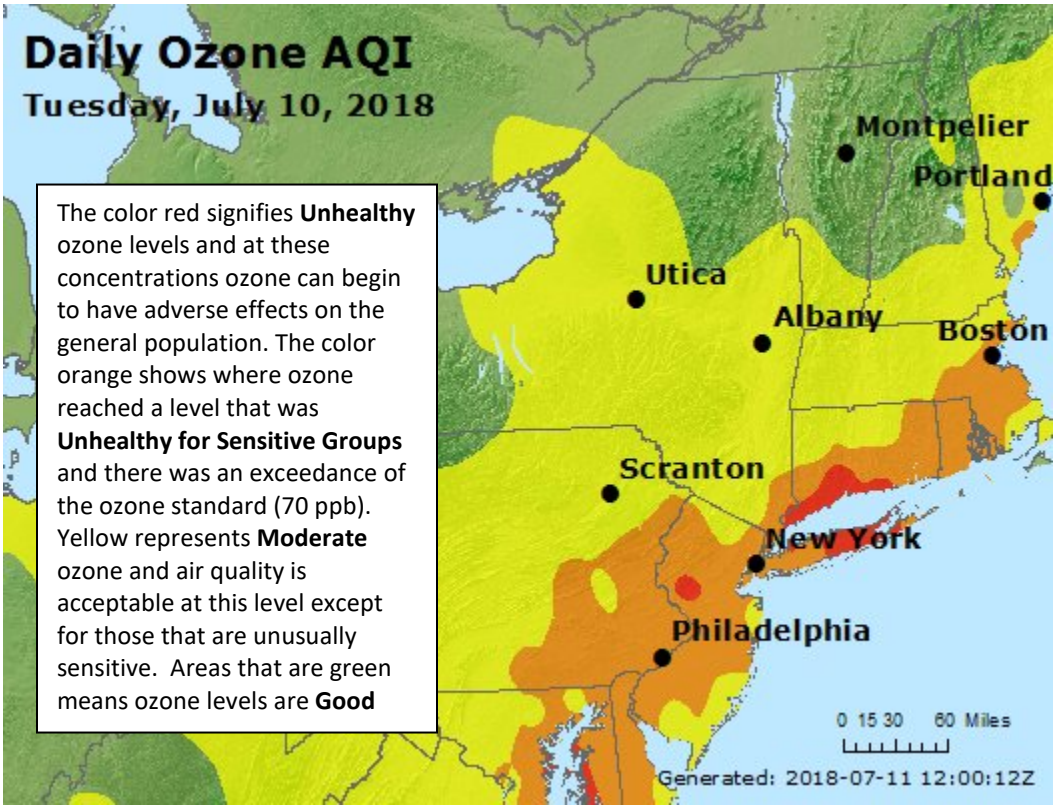
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	70
CT	Greenwich	95
CT	Madison-Beach Road	86
CT	Middletown-CVH-Shed	77
CT	New Haven	88
CT	Stratford	99
CT	Westport	94
DE	BCSP (New Castle Co.)	79
DE	BELLFNT2 (New Castle Co.)	85
DE	KILLENS (Kent Co.)	80
DE	LEWES (Sussex Co.)	67
DE	LUMS 2 (New Castle Co.)	77
DE	MLK (New Castle Co.)	78
DE	SEAFORD (Sussex Co.)	82
MD	Fair Hill	72
NY	Babylon	82
NY	Bronx - IS52	81
NY	CCNY	77
NY	Holtsville	86
NY	Pfizer Lab	81
NY	Queens	82
NY	Riverhead	86
NY	Rockland Cty	65
NY	White Plains	72
NY	Fresh Kills	78
PA	BRIS (Bucks Co.)	84
PA	CHES (Delaware Co.)	83
PA	NEWG (Chester Co.)	74
PA	NORR (Montgomery Co.)	79
PA	LAB (Philadelphia Co.)	79
PA	NEA (Philadelphia Co.)	81
PA	NEW (Philadelphia Co.)	81
	TOTAL EXCEEDANCES	29

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 July 10, 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 – July 10, 2018 NAAQS = 70 ppb
Connecticut	11
Delaware	7
Maryland	6
New Jersey	14
New York	12
Pennsylvania	11

Figure 1. Ozone Air Quality Index for July 10, 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

High pressure ridging weakened over the region on Tuesday July 10th as a cold front slowly approached from the northwest, passing through the nonattainment area in the evening and overnight hours. Ahead of this front, a surface trough developed over New Jersey early in the day before, and extended northeast over Long Island and Connecticut during the evening hours. The slow progress of the abovementioned front provided the opportunity for abundant sunshine throughout the region for most of the day, causing temperatures to reach the 90s. Winds were generally light and ranged from the westerly direction over New Jersey and Connecticut to southwesterly over portions of Long Island.

In addition, Hurricane Chris was strengthening off the Carolina coast on Tuesday and slowly moved north-northeastward throughout the day. Sinking motion north of this system could have been an additional mechanism of atmospheric mixing, especially in coastal locations.

All these weather conditions, in combination with multiple air masses, provided the vertical mixing that added to an already polluted atmosphere and produced elevated ozone levels.

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 July 10, 2018. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. Eleven (11) monitoring stations with an 8-hr ozone exceedance were used to run back trajectories. The selected sites and the maximum 8-hr ozone level recorded are listed in Table 4 below:

Table 4. 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	95
CT	Stratford	99
DE	BELLFNT2 (New Castle Co.)	85
NJ	Ancora State Hospital	82
NJ	Camden - Spruce St	80
NJ	Clarksboro	84
NJ	Colliers Mills	83
NJ	Flemington	86
NJ	Rider University	80
NY	Riverhead	86
PA	BRIS (Bucks Co.)	84

Surface level trajectories (Figure 2) originated in a variety of locations. Some trajectories originated over the ocean while others originated over Delaware, Virginia, and Ohio. Trajectories at the surface had a large influence of localized transport as they generally remained within the region for the duration of their path. In addition, localized trajectories contributed to the high ozone levels observed on July 10th due to the local ozone observed the previous day on July 9th (shown Figure 5). Surface air changed directions several times and slowly traveled at ground level up the I-95 corridor, picking up emissions from cars, trucks, and industry along the way. Mid-level trajectories (Figure 3) originated in Indiana and Ohio and traveled eastward through the Ohio River Valley where they may have picked up emissions from industry. Air at the mid-levels then passed through portions of Pennsylvania before traveling to their endpoints, many of which had unhealthy ozone levels the previous day. Upper level trajectories (Figure 4) originated in Michigan and Ohio and traveled over Lake Erie and through Northeast Pennsylvania, where they may have picked up additional emissions from industry. Trajectories at the upper levels also passed over the metropolitan areas of Philadelphia and New York before reaching their destinations. Air at the upper levels remained aloft for the duration of their path. Figure 5 shows the national ozone concentrations observed the previous day on July 9th, 2018.

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

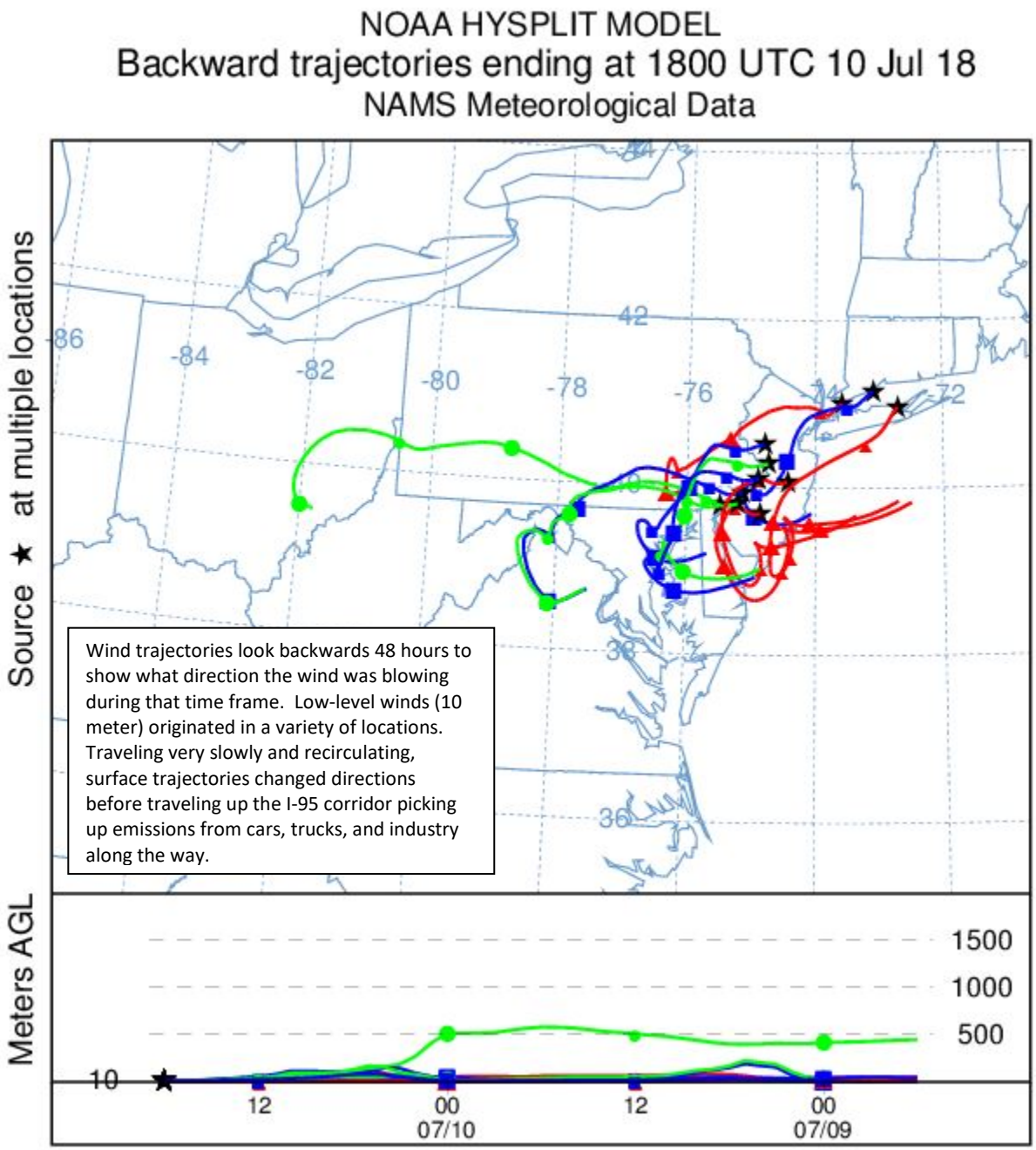


Figure 3. 48-hour Back Trajectories for July 10, 2018 at 500 meters

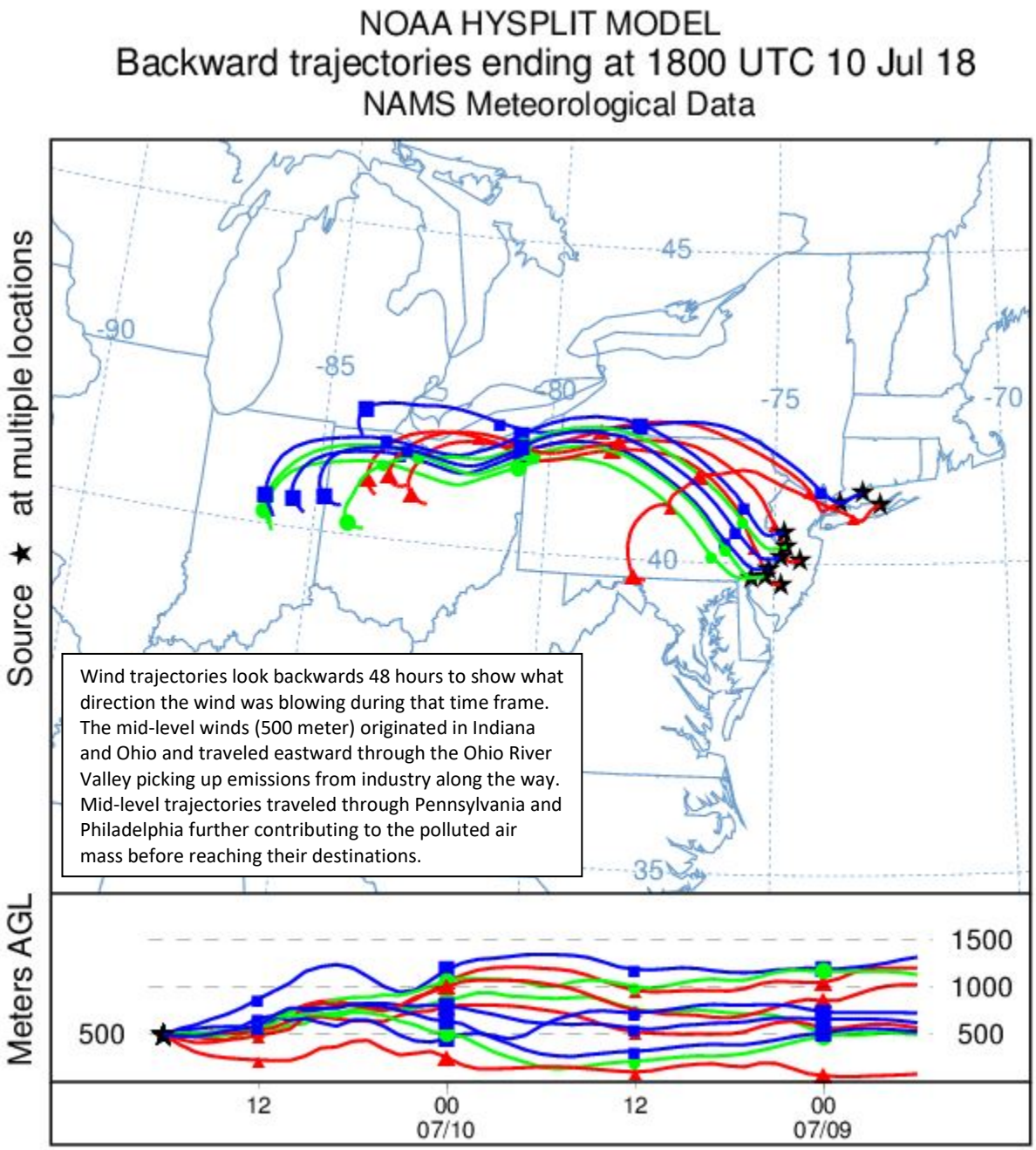


Figure 4. 48-hour Back Trajectories for July 10, 2018 at 1500 meters

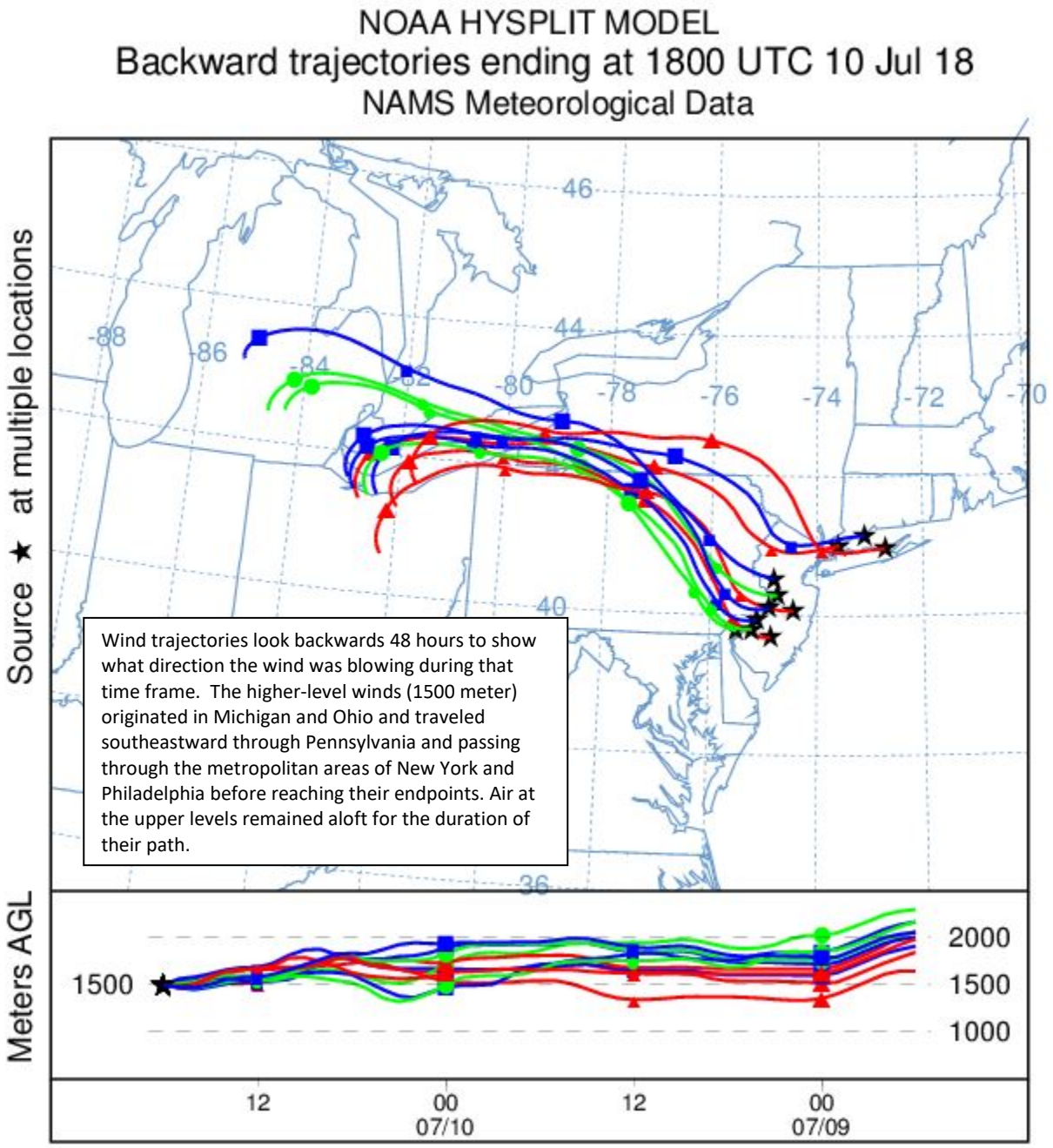
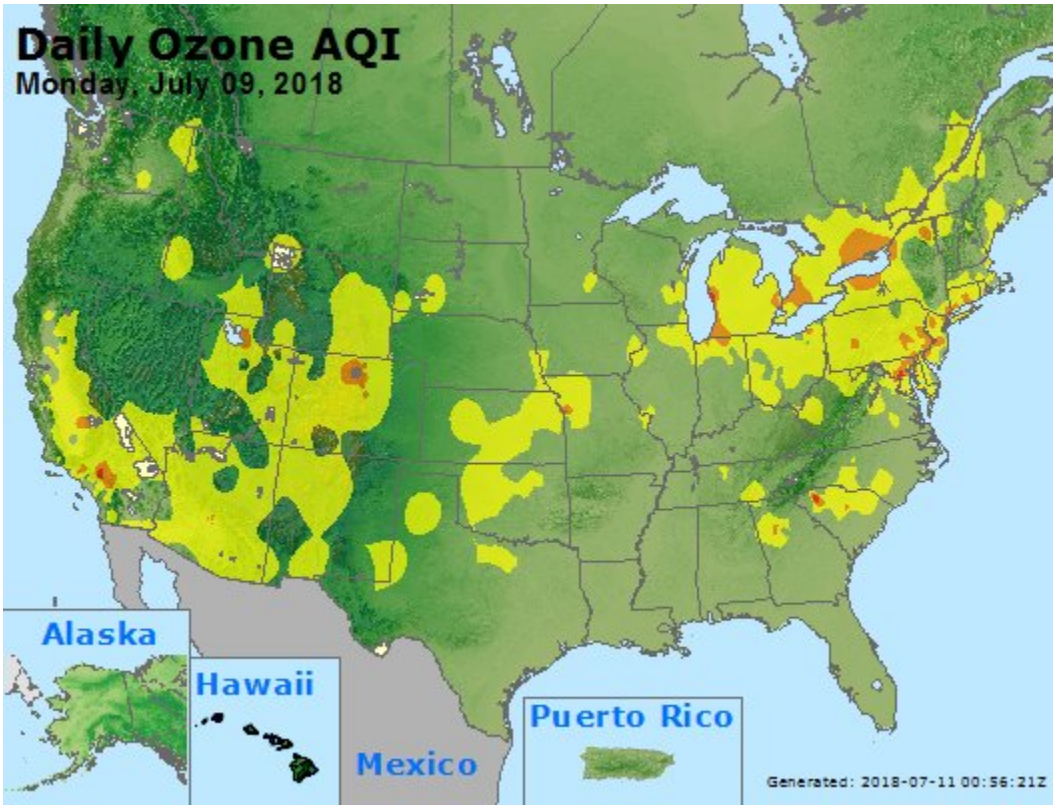


Figure 5. Ozone Air Quality Index for the United States on July 9, 2018



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.