Ozone National Ambient Air Quality Standard Health Exceedances on August 8, 2018

Exceedance Locations and Levels

On Wednesday, August 8, 2018, there was one (1) exceedance 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 8, 2018

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	58
Bayonne	68
Brigantine	51
Camden Spruce St	69
Chester	50
Clarksboro	67
Colliers Mills	65
Columbia	47
Flemington	44
Leonia	74
Millville	52
Monmouth University	54
Newark Firehouse	61
Ramapo	45
Rider University	57
Rutgers University	64
Washington Crossing*	59
TOTAL EXCEEDANCES	1

*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 six (6) 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 8, 2018

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	57
CT	Greenwich	84
CT	Madison-Beach Road	64
CT	Middletown-CVH-Shed	66

CT	New Haven	72
CT	Stratford	78
CT	Westport	84
DE	BCSP (New Castle Co.)	52
DE	BELLFNT2 (New Castle Co.)	62
DE	KILLENS (Kent Co.)	54
DE	LEWES (Sussex Co.)	58
DE	LUMS 2 (New Castle Co.)	61
DE	MLK (New Castle Co.)	64
DE	SEAFORD (Sussex Co.)	53
MD	Fair Hill	57
NY	Babylon	63
NY	Bronx - IS52	60
NY	CCNY	68
NY	Holtsville	55
NY	Pfizer Lab	65
NY	Queens	67
NY	Riverhead	60
NY	Rockland Cty	49
NY	White Plains	74
NY	Fresh Kills	66
PA	BRIS (Bucks Co.)	80
PA	CHES (Delaware Co.)	No Data
PA	NEWG (Chester Co.)	49
PA	NORR (Montgomery Co.)	54
PA	LAB (Philadelphia Co.)	39
PA	NEA (Philadelphia Co.)	68
PA	NEW (Philadelphia Co.)	58
	TOTAL EXCEEDANCES	6

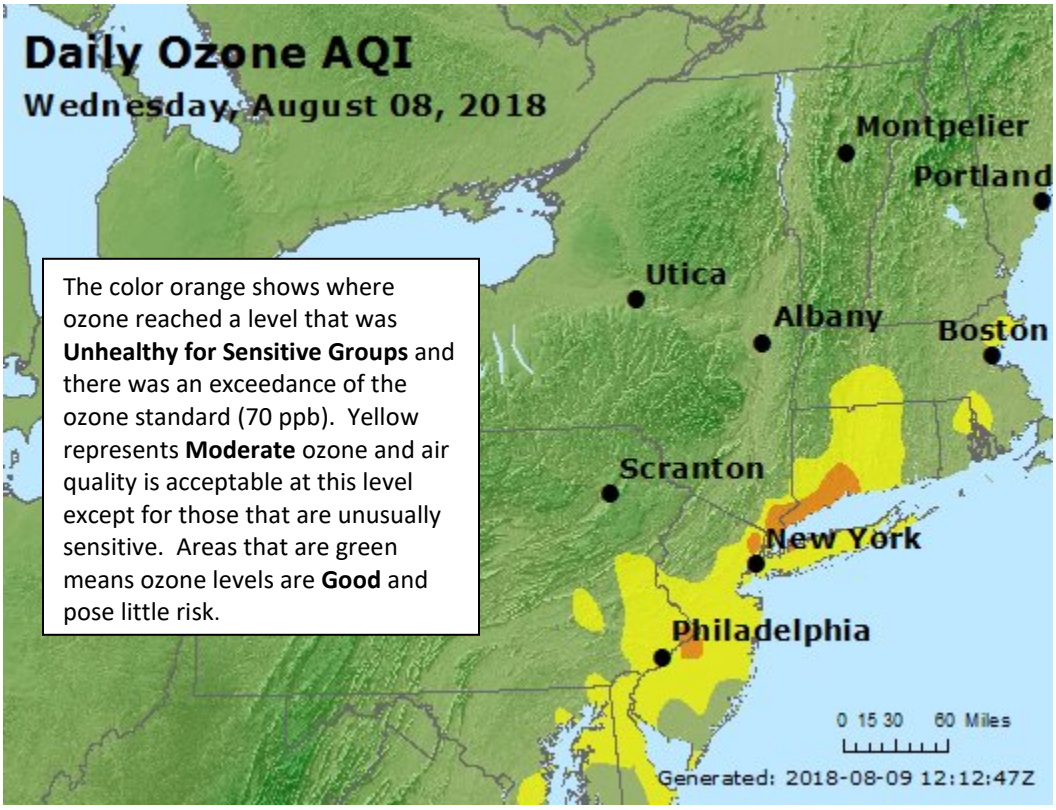
The number of days in 2018 on which exceedances of the ozone NAAQS were recorded for all the states is summarized in Table 3. Figure 1 shows graphically the regions ozone concentrations on August 8, 2018.

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 8, 2018 NAAQS = 70 ppb
Connecticut	18

Delaware	8
Maryland	6
New Jersey	19
New York	17
Pennsylvania	13

Figure 1. Ozone Air Quality Index for August 8, 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

Light surface winds and multiple days of hot, sunny weather allowed for locally generated emissions to be transported from Long Island into northern New Jersey and southern Connecticut, as shown in the surface trajectories in Figure 2. In addition, a surface trough created a mechanism for polluted air from the Ohio River Valley to mix down to the surface combining with local emissions generated during the day. The combination of these features led to exceedances in the northern nonattainment area and in Bristol, PA on August 8th, 2018.

An approaching cold front over the Great Lakes was tracking eastward throughout the day on August 8th and was expected stall west of the nonattainment area before pushing through the Garden State in the evening hours. Ahead of the front, hazy, hot, and humid conditions persisted for several days in a row. Sunny skies, warm temperatures, and favorable conditions for ozone formation were observed as a result from the remains of high pressure drifting farther eastward. A pre-frontal surface trough was draped across the nonattainment area stretching through the New York City metropolitan area and southern Connecticut. In addition, a weak surface low developed over top of central New Jersey fueling isolated showers and thunderstorms to central New Jersey in the late afternoon. Light converging surface winds resulting from these two features in the lower Hudson Valley likely allowed for pollutants to accumulate in and around the New York City metropolitan area.

Based on meteorological conditions, the observed exceedances on August 8th can be attributed to multiple days of moderate/isolated USG ozone levels throughout the northeastern United States in combination with locally generated emissions being transported into/throughout the nonattainment area.

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 8, 2018. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. Seven (7) 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	Greenwich	84
CT	New Haven	72
CT	Stratford	78
CT	Westport	84
NJ	Leonia	74
NY	White Plains	74
PA	Bristol	80

Back trajectories for the August 8th exceedances show that air aloft traveled through industrialized areas into a region that experienced scattered moderate to isolated USG ozone levels for a third day. In addition, localized transport at the surface and supporting weather conditions allowed ozone levels to be further enhanced throughout the nonattainment area.

Surface level back trajectories (Figure 2) originated along the Mid-Atlantic coast before traveling northward to their destinations. Trajectories affecting the Hudson Valley and Connecticut coastline

remained over the ocean through the overnight hours of August 7th and 8th before passing over Long Island, Long Island Sound and portions of the NYC metropolitan area through arrival. Meanwhile, trajectories affecting northern New Jersey and southeastern Pennsylvania traveled through the Chesapeake Bay region and well as near the Wilmington/Philadelphia metropolitan regions prior to arrival. It is worth note that in both scenarios, winds slowed significantly at the surface in the last 6-12 hours of its path and therefore were able to pick of emissions from cars, trucks, and industry along the way. Mid-level back trajectories (Figure 3) originated further west over the Ohio River Valley. Steered by an approaching upper level trough of low pressure, air traveled east-northeast across Pennsylvania. Trajectories affecting the northern nonattainment area then passed through northern New Jersey, the NYC metropolitan area, as well as portions of Long Island/Long Island Sound while the trajectory affecting southeastern Pennsylvania passed through the Philadelphia metropolitan region prior into arrival. Upper-level back trajectories (Figure 4) originated in the Great Lakes region and traveled generally eastward through the Ohio River Valley and Pennsylvania before diverging. Similar to the mid-level back trajectories, upper-level trajectories for the northern nonattainment area passed through northern New Jersey and the NYC metro area while the Philadelphia metropolitan area is what affected the southernmost trajectory into arrival.

Figure 5 below shows the national ozone concentrations observed on August 7th, the day prior to this ozone exceedance episode. As shown in the figure, coastal locations in the northeastern United States experienced scattered moderate to isolated USG levels on this day. Back trajectories suggest that air aloft traveled through regions of industry into an area that saw elevated ozone levels for a third day in a row. These influences along with localized transport and supporting weather conditions, enhanced ozone levels throughout the nonattainment area.

Figure 2. 48-hour Back Trajectories for August 8, 2018 at 10 meters

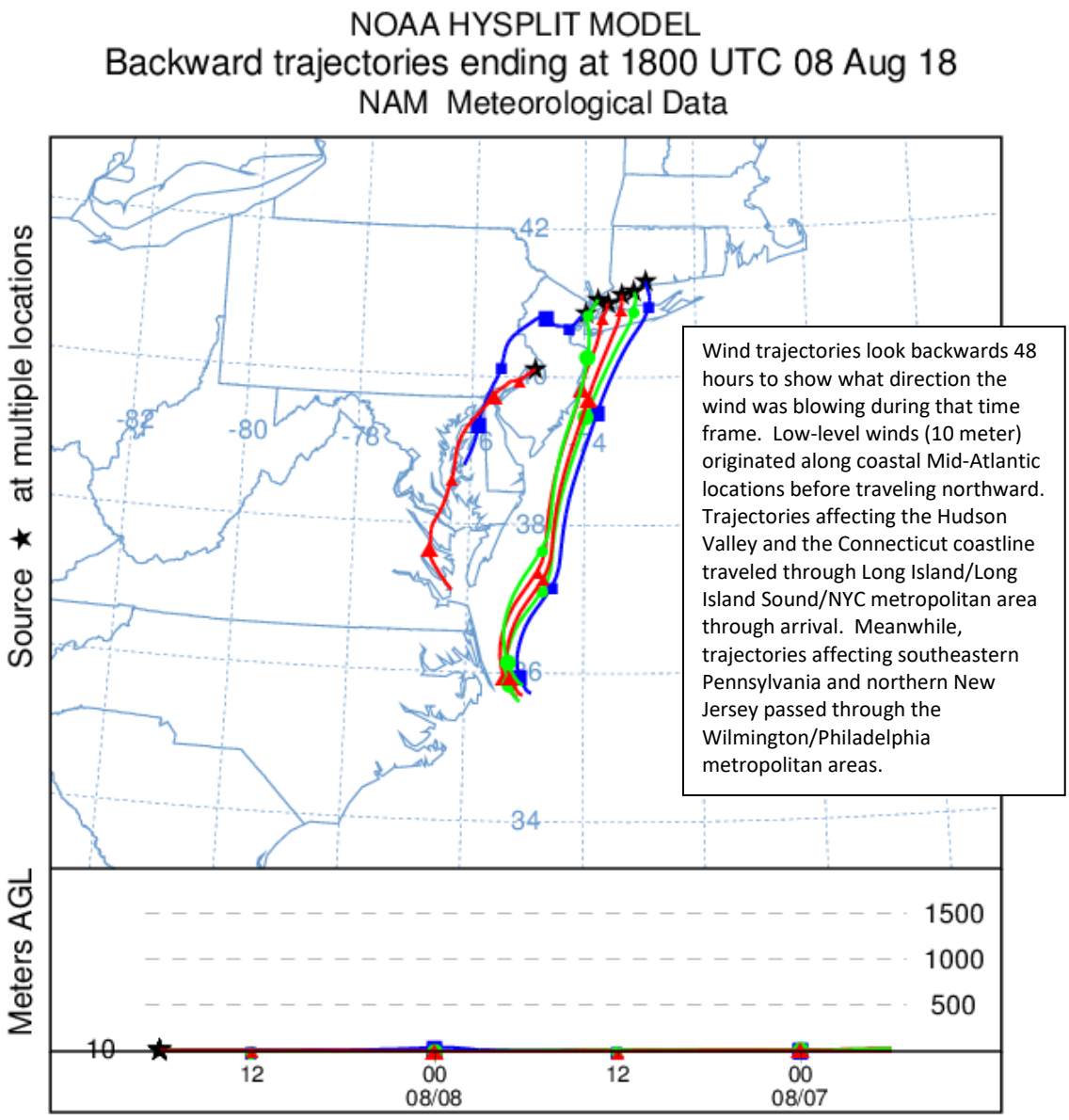


Figure 3. 48-hour Back Trajectories for August 8, 2018 at 500 meters

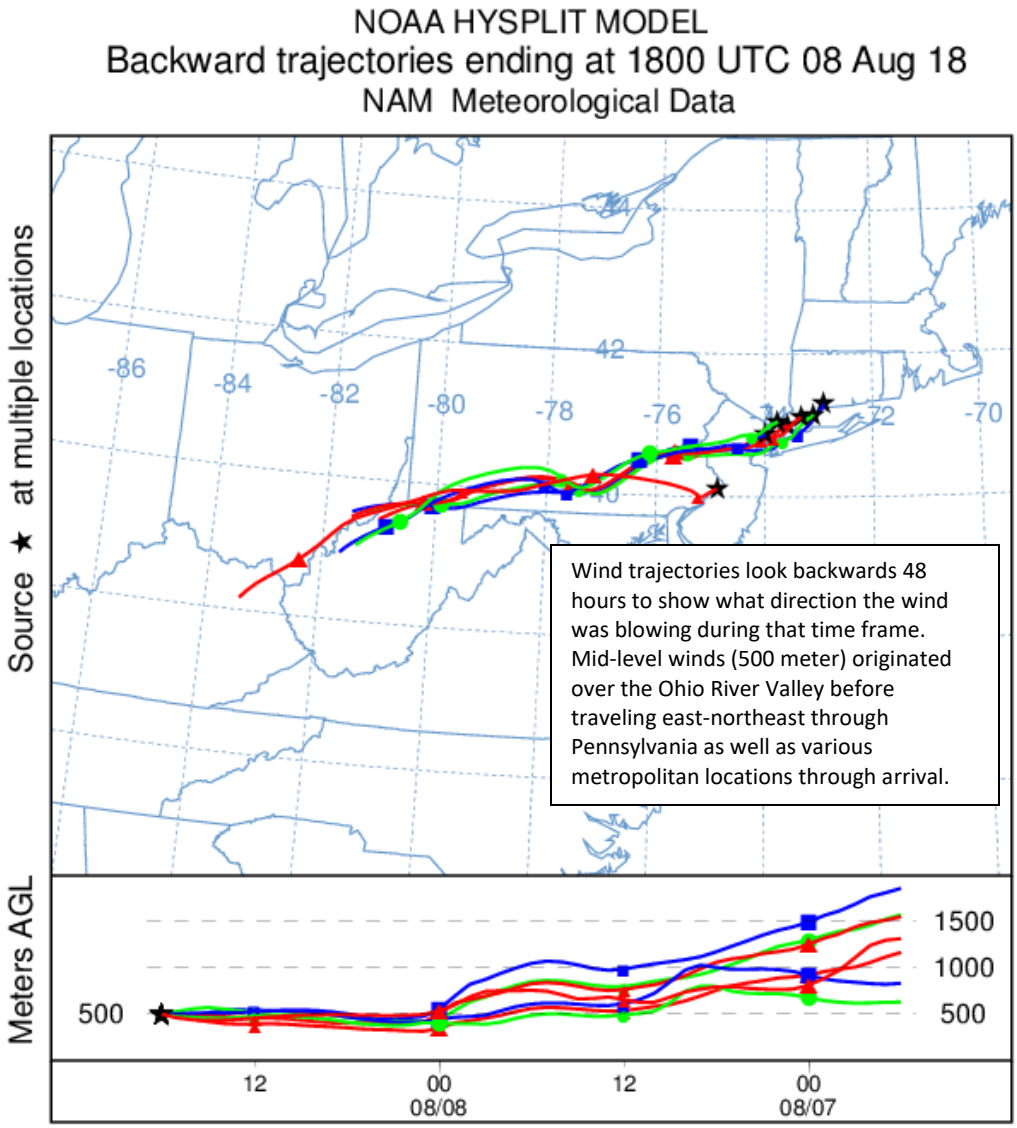


Figure 4. 48-hour Back Trajectories for August 8, 2018 at 1500 meters

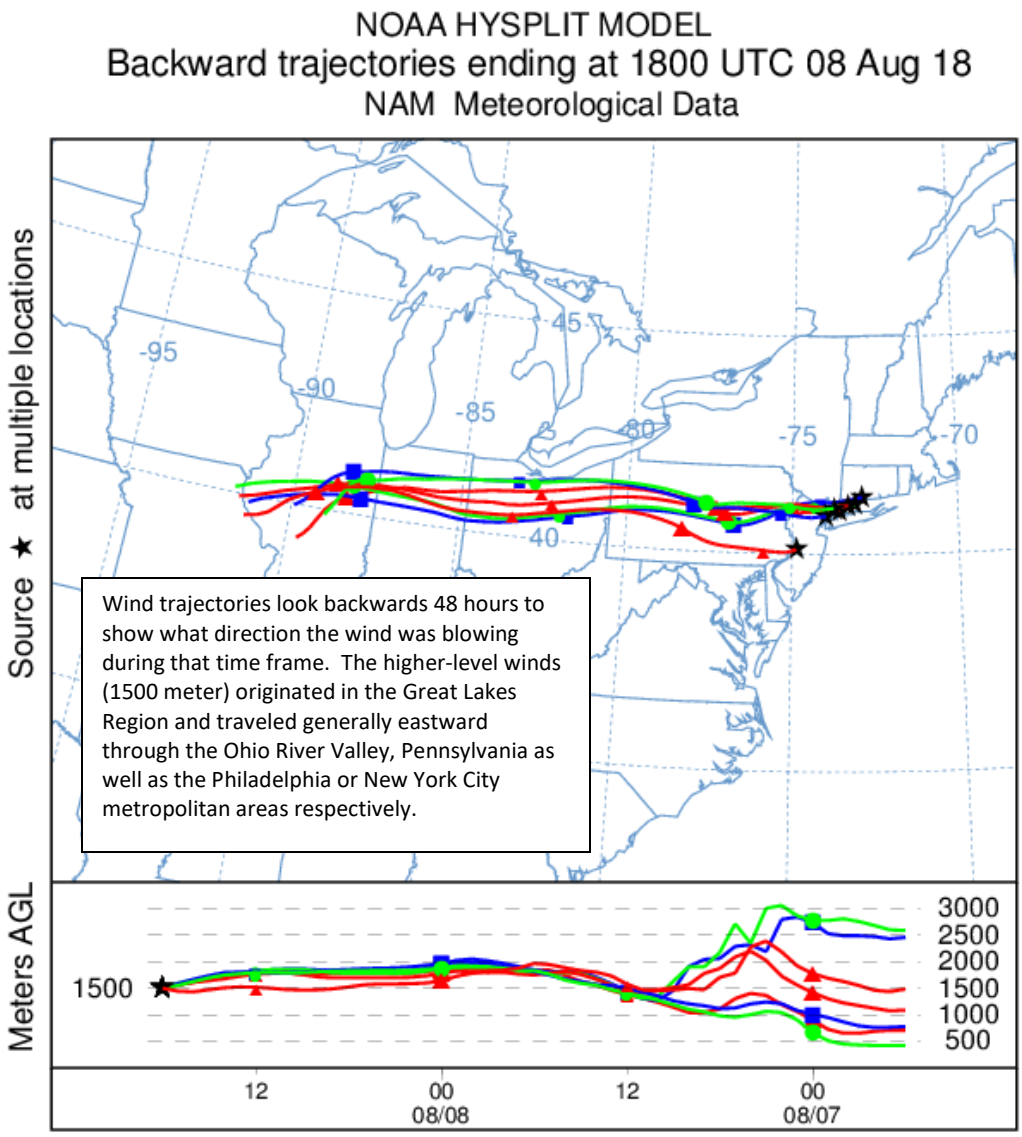
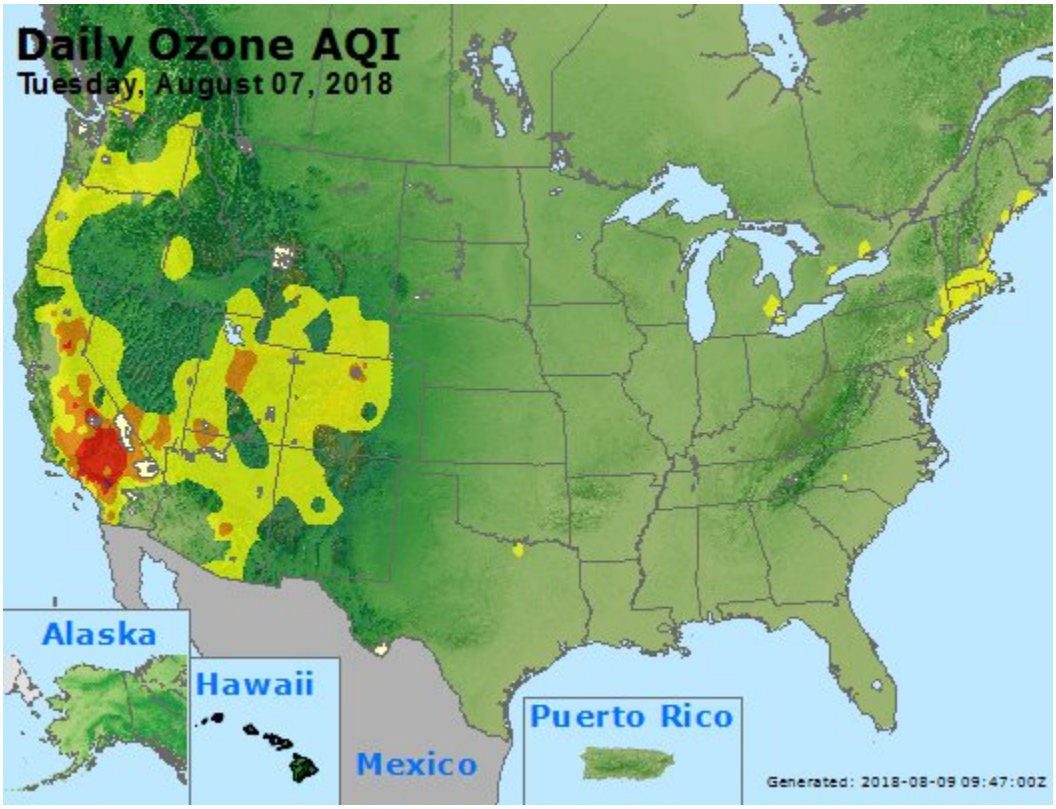


Figure 5. Ozone Air Quality Index for the United States on August 7, 2018



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.