

Ozone National Ambient Air Quality Standard Health Exceedances on August 7, 2018

Exceedance Locations and Levels

On Tuesday, August 7, 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 7, 2018

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	44
Bayonne	64
Brigantine	31
Camden Spruce St	41
Chester	51
Clarksboro	41
Colliers Mills	42
Columbia	45
Flemington	57
Leonia	69
Millville	36
Monmouth University	39
Newark Firehouse	69
Ramapo	48
Rider University	58
Rutgers University	61
Washington Crossing*	66
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 was one (1) exceedance 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 7, 2018

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	72
CT	Greenwich	64

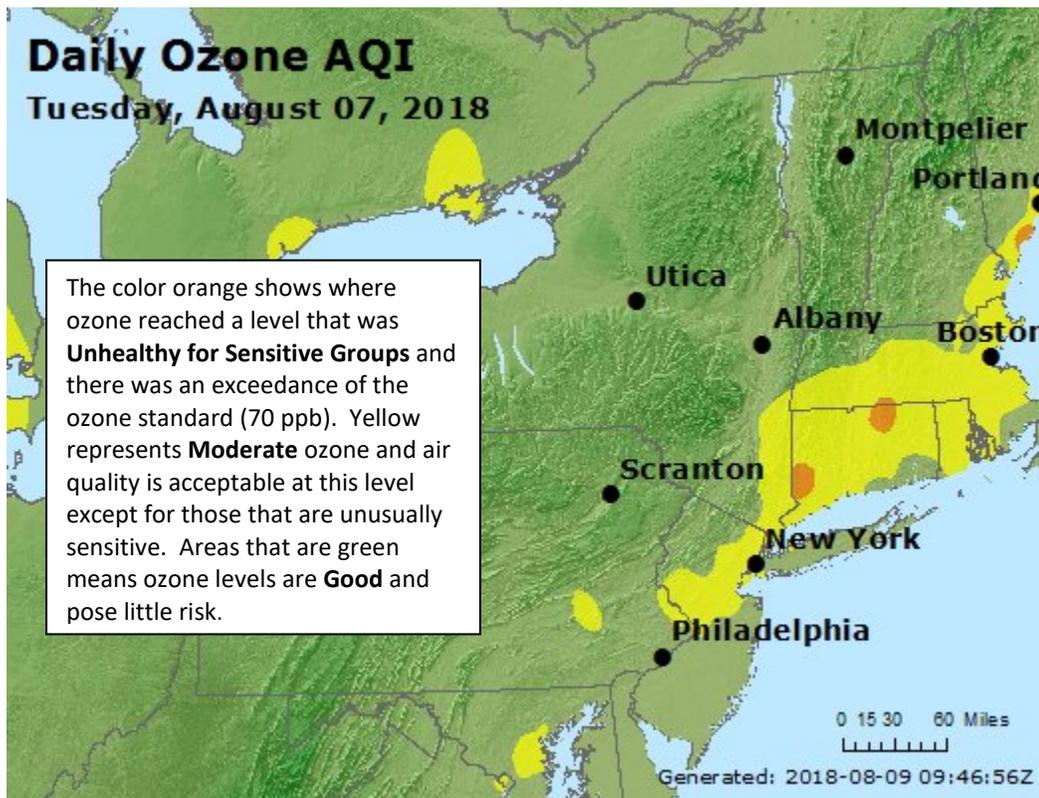
CT	Madison-Beach Road	52
CT	Middletown-CVH-Shed	67
CT	New Haven	60
CT	Stratford	61
CT	Westport	67
DE	BCSP (New Castle Co.)	42
DE	BELLFNT2 (New Castle Co.)	44
DE	KILLENS (Kent Co.)	38
DE	LEWES (Sussex Co.)	37
DE	LUMS 2 (New Castle Co.)	42
DE	MLK (New Castle Co.)	45
DE	SEAFORD (Sussex Co.)	42
MD	Fair Hill	42
NY	Babylon	42
NY	Bronx - IS52	48
NY	CCNY	58
NY	Holtsville	39
NY	Pfizer Lab	54
NY	Queens	50
NY	Riverhead	45
NY	Rockland Cty	53
NY	White Plains	62
NY	Fresh Kills	58
PA	BRIS (Bucks Co.)	52
PA	CHES (Delaware Co.)	44
PA	NEWG (Chester Co.)	41
PA	NORR (Montgomery Co.)	50
PA	LAB (Philadelphia Co.)	44
PA	NEA (Philadelphia Co.)	52
PA	NEW (Philadelphia Co.)	47
	TOTAL EXCEEDANCES	1

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 7, 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 7, 2018 NAAQS = 70 ppb
Connecticut	17
Delaware	8
Maryland	6
New Jersey	18
New York	16
Pennsylvania	12

Figure 1. Ozone Air Quality Index for August 7, 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

A combination of high pressure influence and vertical motion associated with afternoon/evening thunderstorms across the northern nonattainment area, which allowed any ozone aloft to mix down to the surface enhancing an already polluted air mass, supported an isolated exceedance in Danbury, CT on August 7th.

High pressure was noted over the northeastern United States on this day ahead of a weakening cold front approaching from the northwest. This front stalled just east of the nonattainment area in the evening hours. Radar imagery shows that associated showers and thunderstorms were widespread across the region during this time, ahead of the frontal boundary.

Weather observations show that periods of fog cleared by mid-morning. Partly to mostly cloudy skies were observed in southern portions of the nonattainment area for much of the day. Meanwhile to the north, sunshine was observed early with increasing cloudiness in the afternoon. Temperatures reached the upper 80s to low 90s while breezy south/southwesterly winds were noted across the region.

As mentioned above, thunderstorms associated with an approaching frontal boundary developed across the forecast area in the afternoon/evening hours. Thunderstorms were first observed in the northern nonattainment area. They were scattered furthest north, in portions of the Hudson Valley and southwestern Connecticut while in northern New Jersey large clusters of storms developed which also led to more dense cloud cover in this area. Vertical motion in the atmosphere allowed any ozone aloft, that was being supported by extended periods of daily sunshine, to be mixed down to the surface. Meanwhile, southern locations saw thunderstorms and periods of rain in the late evening and overnight hours. Despite the presence of vertical motion associated with these particular storms, it is likely that the general cloudiness throughout the day limited ozone production in these areas.

Based on this weather analysis, the recorded isolated Connecticut exceedance on August 7th can be attributed to multiple days of moderate/scattered USG ozone levels throughout the northeastern United States in combination with localized southwesterly transport and a mechanism to bring ozone aloft down to the surface.

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 7, 2018. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. One (1) monitoring station with an 8-hr ozone exceedance was used to run back trajectories. The selected site and the maximum 8-hr ozone level recorded is 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	Danbury	72

Backward trajectories show that air at all three levels shown (Figure 2 – 4) traveled through regions that saw moderate air quality the day preceding the high ozone event. Localized transport in combination with favorable weather conditions likely enhanced ozone levels at the surface in the northern nonattainment area.

Back trajectories at the low level (Figure 2) originated in the Chesapeake Bay and traveled through Delaware and southern New Jersey before reaching the central portions of the I-95 corridor. At this time, air traveled very slowly through Long Island and southern portions of the New York City metropolitan area. This area recorded Unhealthy and USG air quality the previous day. Air at the surface remained at the surface for the duration of its path picking up emissions from cars, trucks, and industry along the way. Air at the mid-levels (Figure 3) originated in northern Virginia where it traveled slowly around the Washington D.C. metropolitan area which saw moderate levels of ozone the day prior to the exceedance. Air at the mid-levels traveled through Maryland and southeastern Pennsylvania including the city of Lancaster and the Philadelphia suburbs where moderate ozone was also recorded the preceding day. The trajectory then passed through New Jersey and the New York City metropolitan area before reaching its destination in Connecticut. Air at the upper levels (Figure 3) originated in western Pennsylvania near Pittsburgh where there are several large industrial units and traveled through portions of the state that saw moderate air quality the day prior. Upper air trajectories then traveled through northern New Jersey and the New York City metropolitan area to its destination.

Figure 5 shows the national ozone concentrations observed on August 6th, 2018, the day prior to the ozone exceedance in Connecticut. As shown in the figure, scattered moderate ozone levels were observed throughout the state of Pennsylvania and Maryland where trajectories originated. In addition, USG ozone levels were also recorded in the New York City metropolitan area and Long Island where trajectories passed prior to reaching their destinations. From the Figures shown below, it is likely that localized transport in combination with favorable weather conditions enhanced ozone levels at the surface on August 7th.

Figure 2. 48-hour Back Trajectories for August 7, 2018 at 10 meters

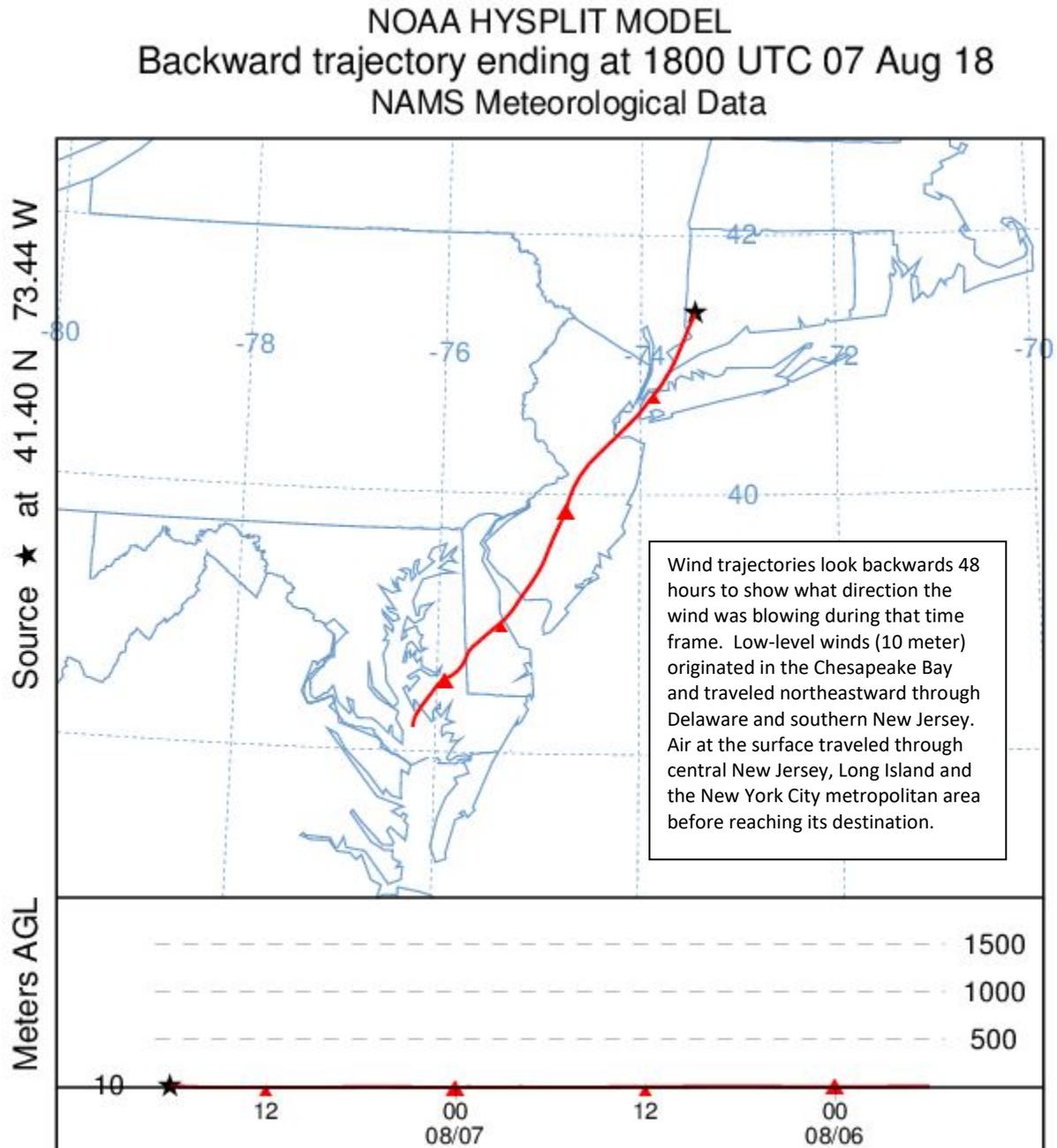


Figure 3. 48-hour Back Trajectories for August 7, 2018 at 500 meters

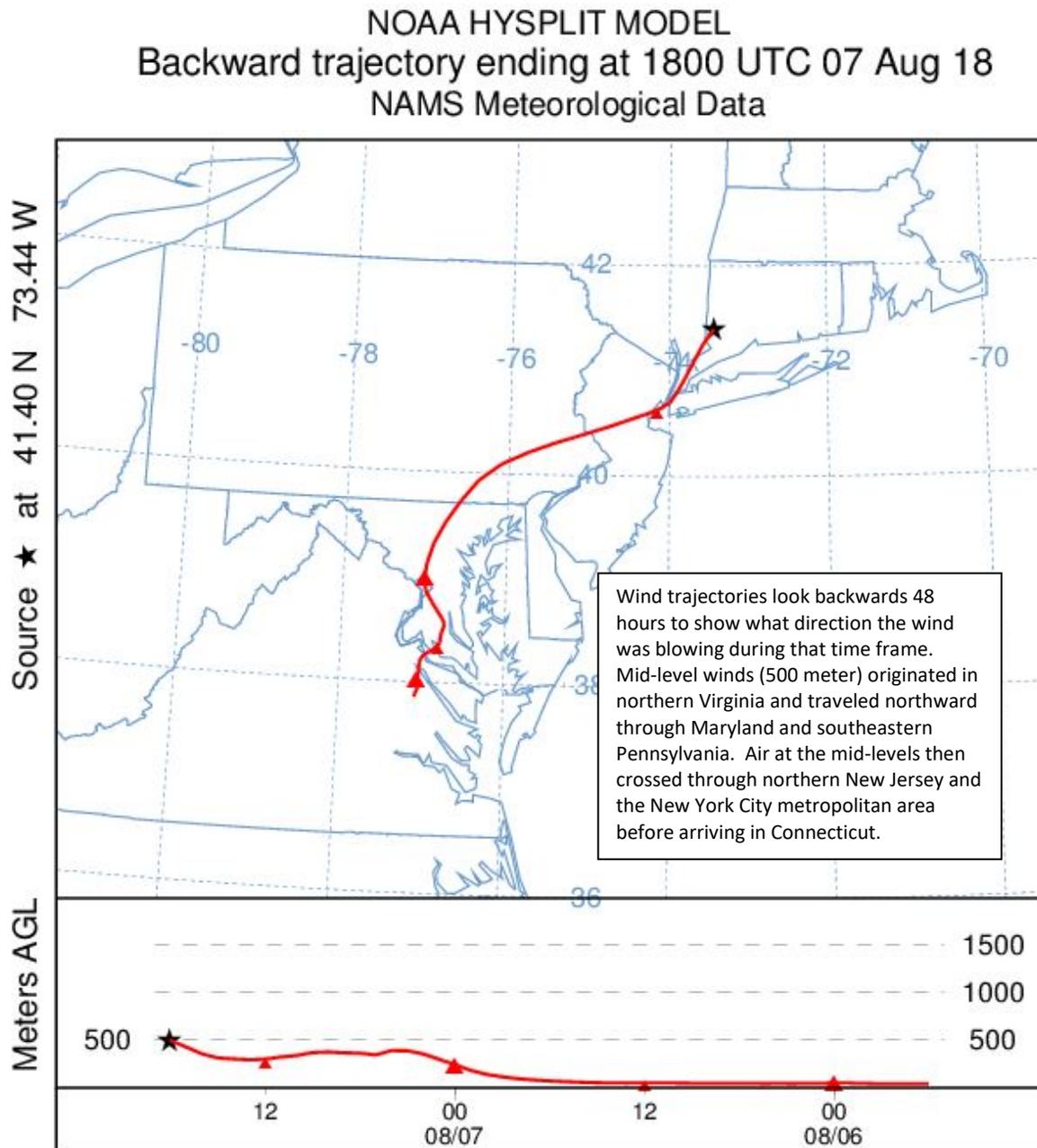


Figure 4. 48-hour Back Trajectories for August 7, 2018 at 1500 meters

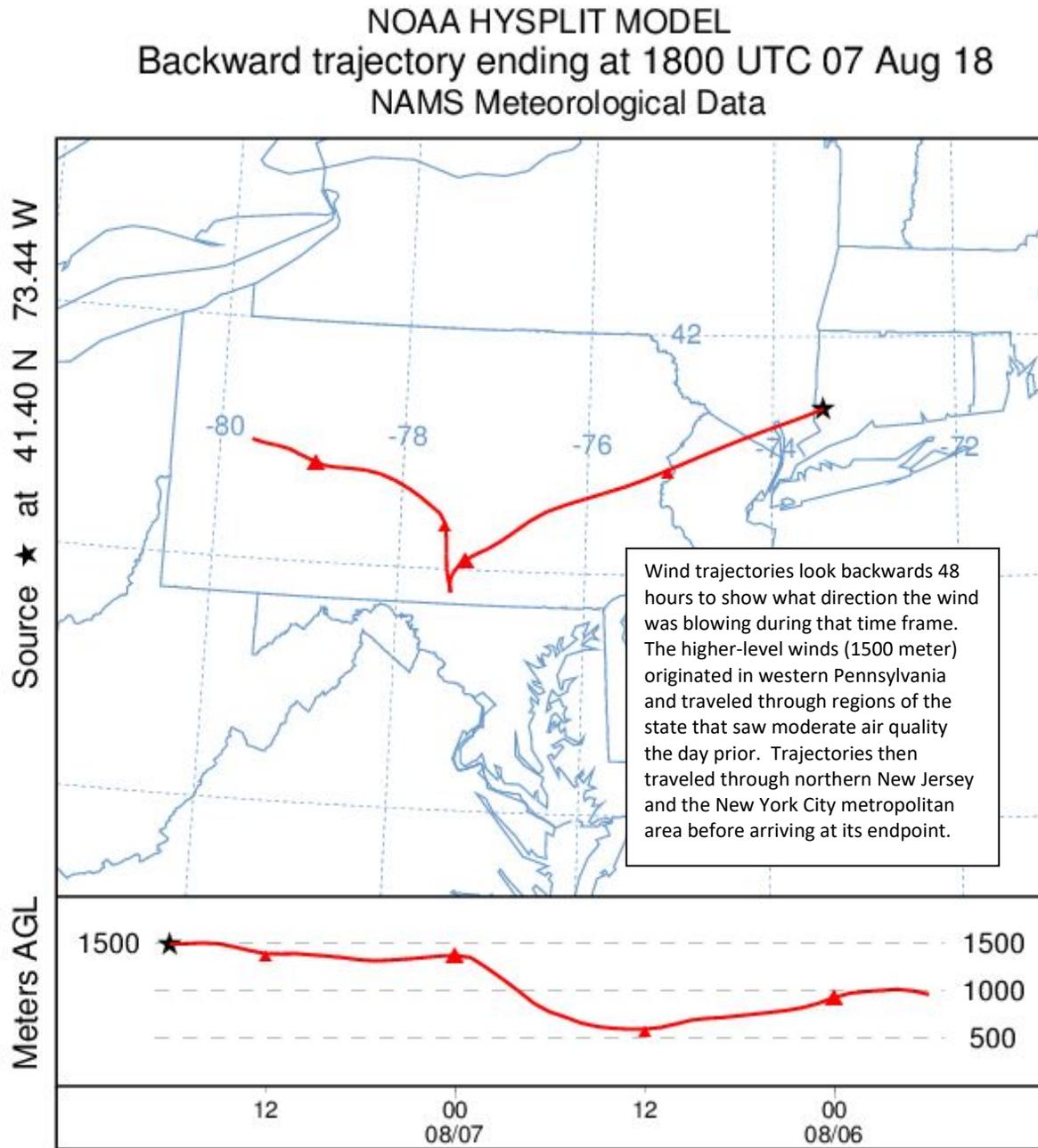


Figure 5. Ozone Air Quality Index for the United States on August 6, 2018



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.