Ozone National Ambient Air Quality Standard Health Exceedances on September 23, 2019

Exceedance Locations and Levels

On Monday, September 23, 2019, 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 Ozone Concentrations on 9/23/2019

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	56
Bayonne	65
Brigantine	36
Camden Spruce St	62
Chester	53
Clarksboro	53
Colliers Mills	52
Columbia	No Data
Flemington	57
Leonia	62
Millville	54
Monmouth University	42
Newark Firehouse	64
Ramapo	55
Rider University	66
Rutgers University	70
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. Ozone Concentrations at Out-of-State Monitoring Stations in New Jersey's Ozone Non-Attainment Areas on 9/23/2019

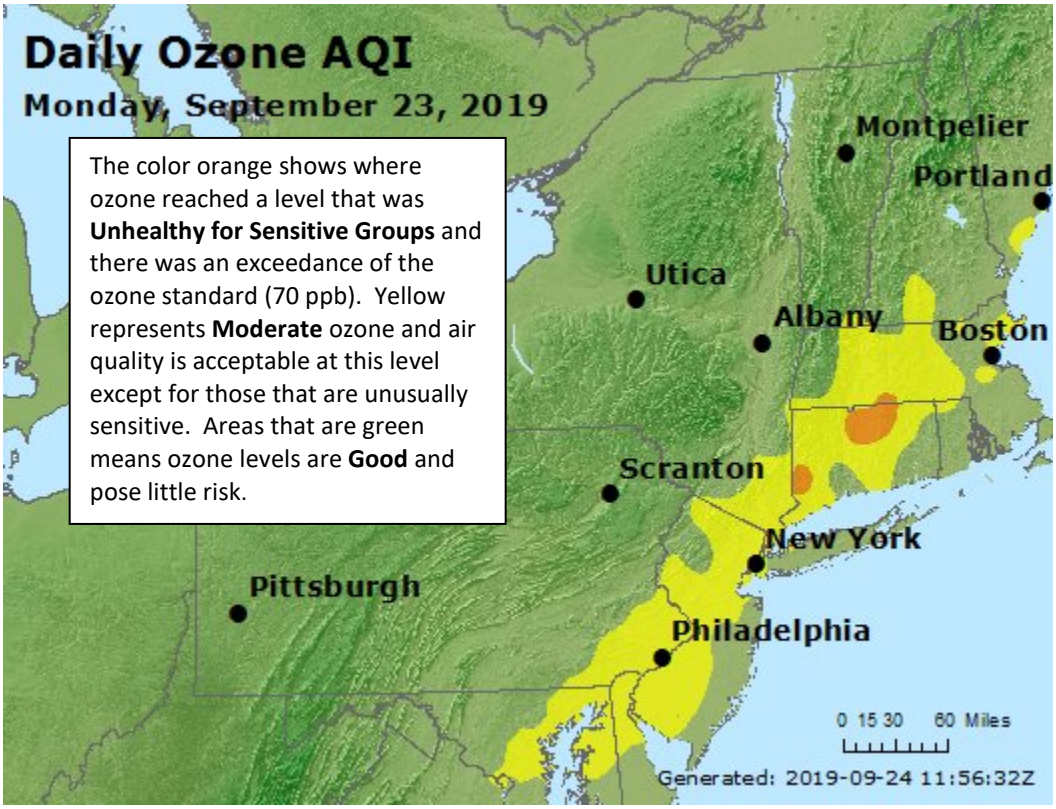
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	71
CT	Greenwich	62
CT	Madison-Beach Road	54
CT	Middletown-CVH-Shed	64
CT	New Haven	49
CT	Stratford	56
CT	Westport	60
DE	BCSP (New Castle Co.)	63
DE	BELLFNT2 (New Castle Co.)	67
DE	KILLENS (Kent Co.)	53
DE	LEWES (Sussex Co.)	49
DE	LUMS 2 (New Castle Co.)	65
DE	MLK (New Castle Co.)	67
DE	SEAFORD (Sussex Co.)	50
MD	Fair Hill	67
NY	Babylon	46
NY	Bronx - IS52	61
NY	CCNY	61
NY	Fresh Kills	64
NY	Holtsville	45
NY	Pfizer Lab	No Data
NY	Queens	50
NY	Riverhead	No Data
NY	Rockland Cty	59
NY	White Plains	58
PA	BRIS (Bucks Co.)	65
PA	CHES (Delaware Co.)	62
PA	NEWG (Chester Co.)	66
PA	NORR (Montgomery Co.)	57
PA	LAB (Philadelphia Co.)	62
PA	NEA (Philadelphia Co.)	68
PA	NEW (Philadelphia Co.)	50
	TOTAL EXCEEDANCES	1

The number of days in 2019 on which exceedances of the ozone NAAQS were recorded for all the states within New Jersey's ozone non-attainment areas is summarized in Table 3.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Non-Attainment Areas in 2019

STATE	# of Days NAAQS was Exceeded January 1 – September 23, 2019 NAAQS = 70 ppb
Connecticut	20
Delaware	3
Maryland	3
New Jersey	12
New York	10
Pennsylvania	8

Figure 1. Ozone Air Quality Index for September 23, 2019



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 centered over the Southeastern and Mid-Atlantic United States moved off shore on Monday, September 23rd, as a cold front approached the region from the northwest. Unseasonably warm temperatures, periods of sunshine, and a southwesterly flow enhanced an already polluted airmass allowing for ozone levels to reach the unhealthy for sensitive groups (USG) category in Danbury, CT.

High pressure over much the eastern half of the United States, which dominated our weather pattern for multiple days, gradually weakened on September 23rd. This high pressure moved off-shore late morning as a cold front approached from the northwest. Ahead of this front, light southwest winds became breezy in the early afternoon hours as strong sunshine increased temperatures to near 90 degrees. In addition, a surface trough developed ahead of this front mid-day, extending from southern New England southwestward into the Mid-Atlantic region. This surface trough allowed for vertical motion in the atmosphere allowing any transported ozone aloft to mix down, enhancing already increasing levels of ozone at the surface. As the cold front finally reached the non-attainment area in the evening hours, clouds increased, and light rain was observed.

The isolated exceedance in Danbury, CT on September 23rd can be attributed to multiple days of favorable weather conditions throughout the non-attainment area and localized transport within the Mid-Atlantic region.

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 exceedances on September 23, 2019. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone exceedances. One (1) monitoring station with an 8-hour average ozone exceedance was used to run back trajectories. The selected site and 8-hour average 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-hour Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	71

Backward trajectories on September 23rd were influenced by a strong clockwise circulation around high pressure centered over the Mid-Atlantic and off the Mid-Atlantic coast. As high pressure settled in, winds shifted out of the southwest and allowed for transport of previously polluted air from the Mid-Atlantic states and Ohio River Valley into our non-attainment zone. This transport of previously polluted air along with persistent favorable meteorological conditions led to one exceedance of the 8-hour NAAQS in Danbury, Connecticut.

The surface level backward trajectory (Figure 2) originated off the coast of North Carolina and traveled in a primarily northerly direction up the Mid-Atlantic coast. As the air mass traveled north, it turned slightly to the northeast under the dominant high pressure circulation. As the air mass entered our non-attainment zone, it passed through the I-95 corridor and New York City metropolitan area, picking

up emissions from cars, trucks, local industry, and power plants along the way, which may have included peak-demand electric generating units (EGUs).

The mid-level trajectory (Figure 3) originated over central South Carolina and moved in a clockwise direction around a center of high pressure, passing over most of North Carolina, Virginia, Maryland, southeastern Pennsylvania, and the New York City metropolitan area before arriving at its destination in Danbury. This air mass traversed urban areas such as Richmond, Washington D.C., Baltimore, and New York City, picking up additional emissions from local industry and power plants along the way. The upper-level trajectory (Figure 4) originated over northern Georgia and followed a clockwise circulation around the center of high pressure through the heavily industrialized Ohio River Valley, transporting additional emissions from local industry and power plants to the region. As the air mass moved northeastward, it experienced a strong sinking motion under the high-pressure influence, causing polluted air aloft to mix down to an increasingly polluted surface.

Figure 5 shows the national Air Quality Index observed on September 22nd, the day prior to the exceedance event. As shown in the figure, areas in the Ohio river valley, Mid Atlantic, and southeastern United States reached the moderate category, along with moderate to unhealthy for sensitive groups (USG) category in our non-attainment zone the day prior to the exceedance. Favorable meteorological conditions persisted throughout much of the eastern half of the United States for 3 to 4 days prior to the exceedance event, causing pollutants to build at the surface throughout the weekend. The transport of previously polluted air and persistent favorable ozone conditions led to one exceedance at Danbury.

Figure 2. 48-hour Back Trajectories for September 23, 2019 at 10 meters

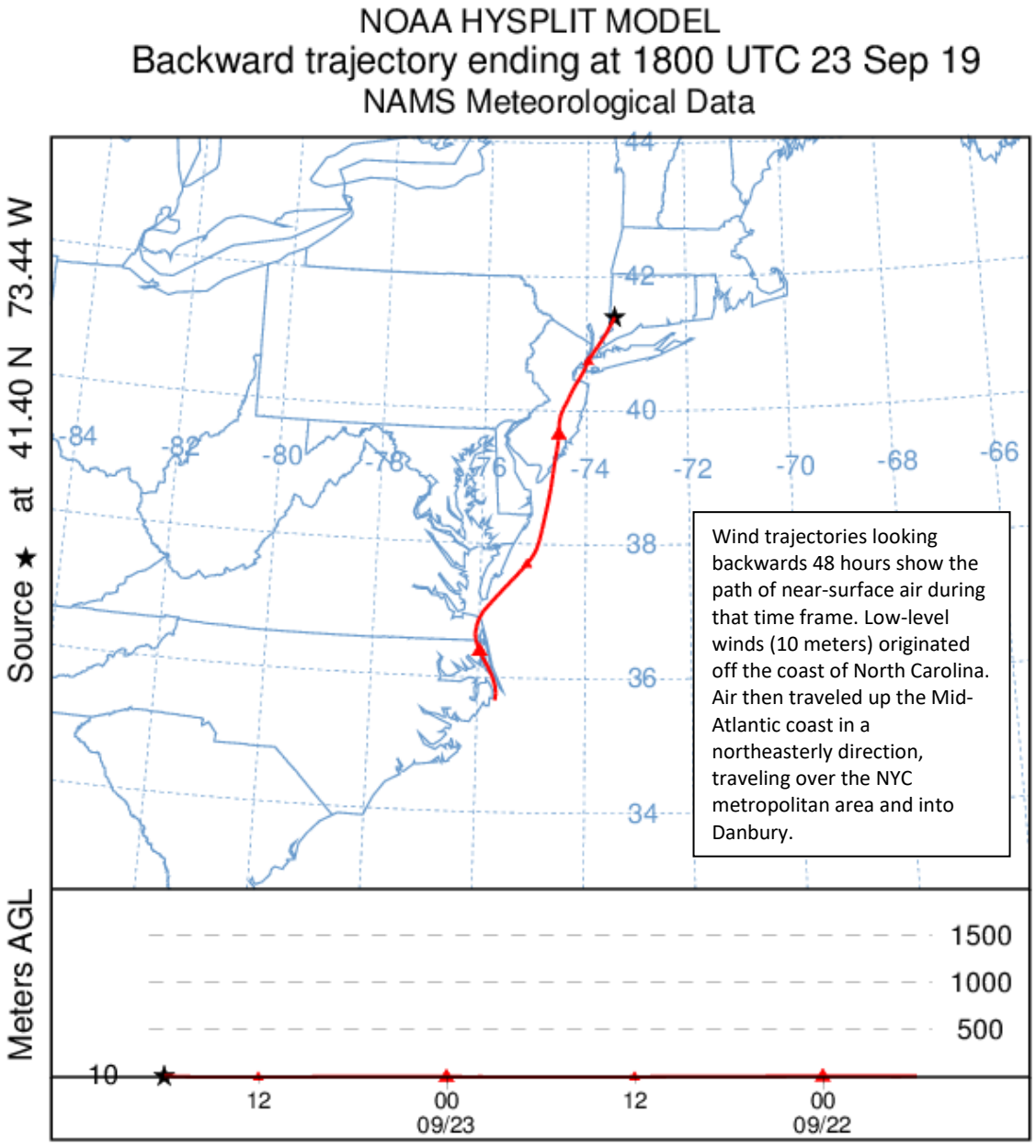


Figure 3. 48-hour Back Trajectories for September 23, 2019 at 500 meters

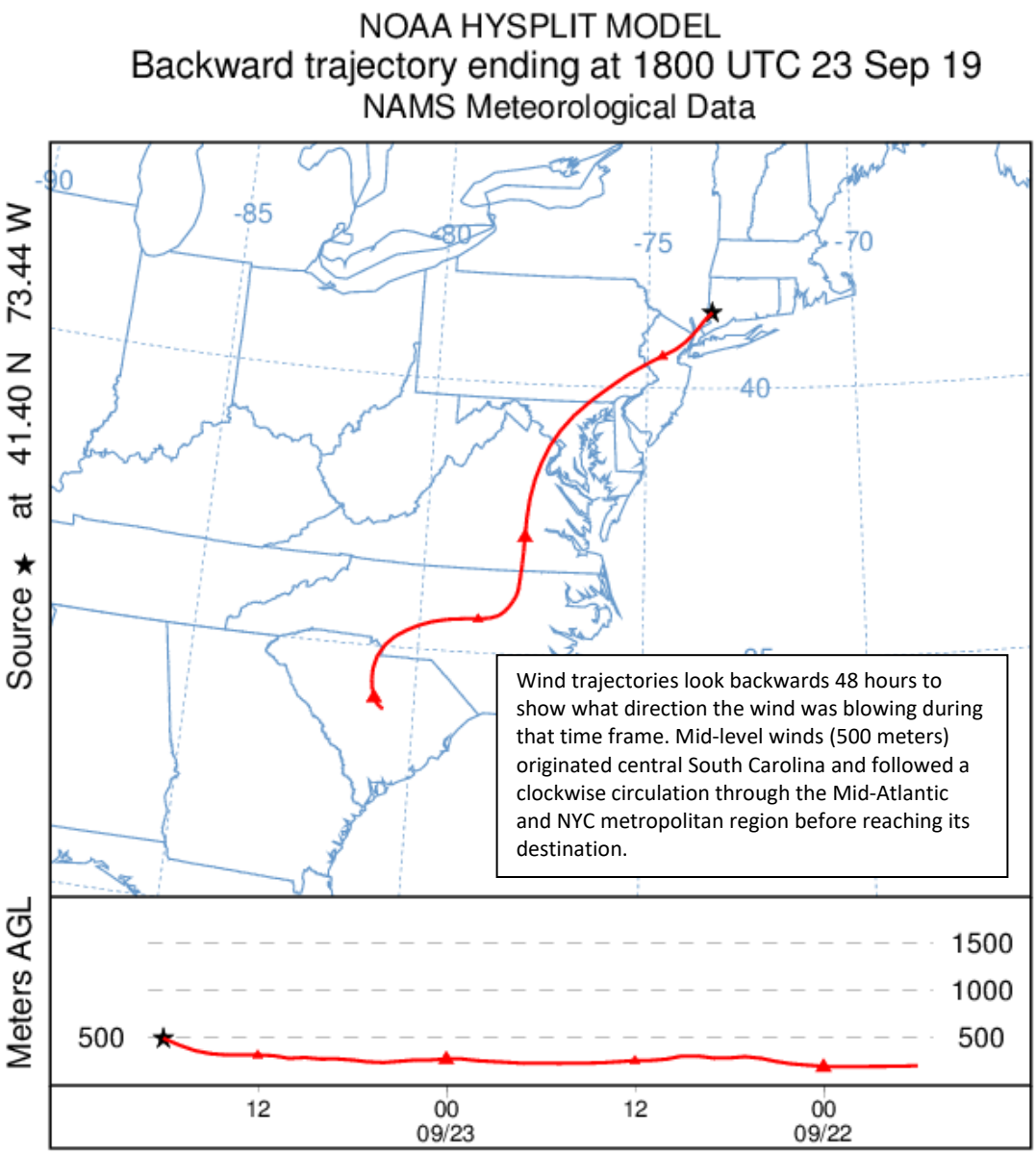


Figure 4. 48-hour Back Trajectories for September 23, 2019 at 1500 meters

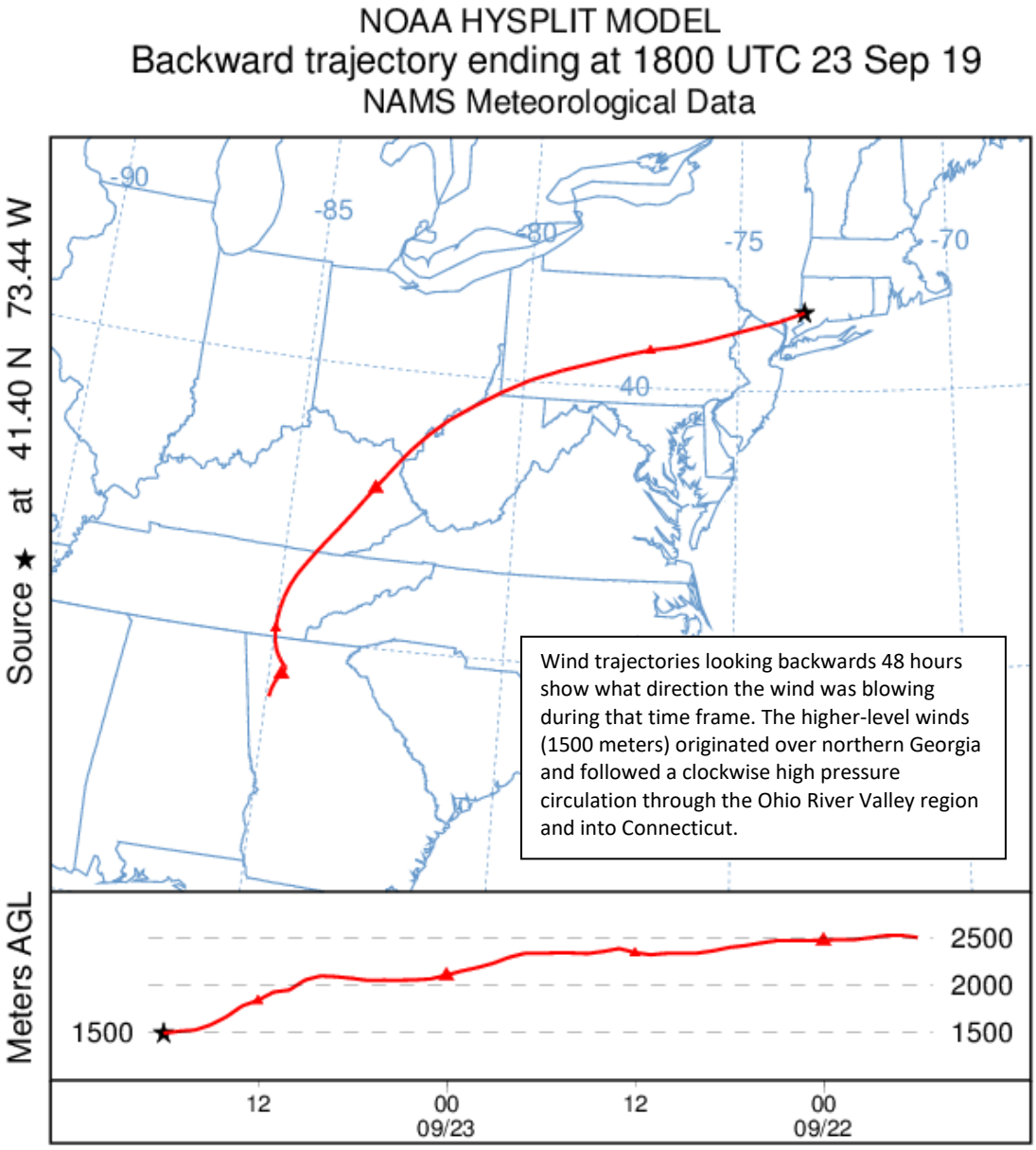
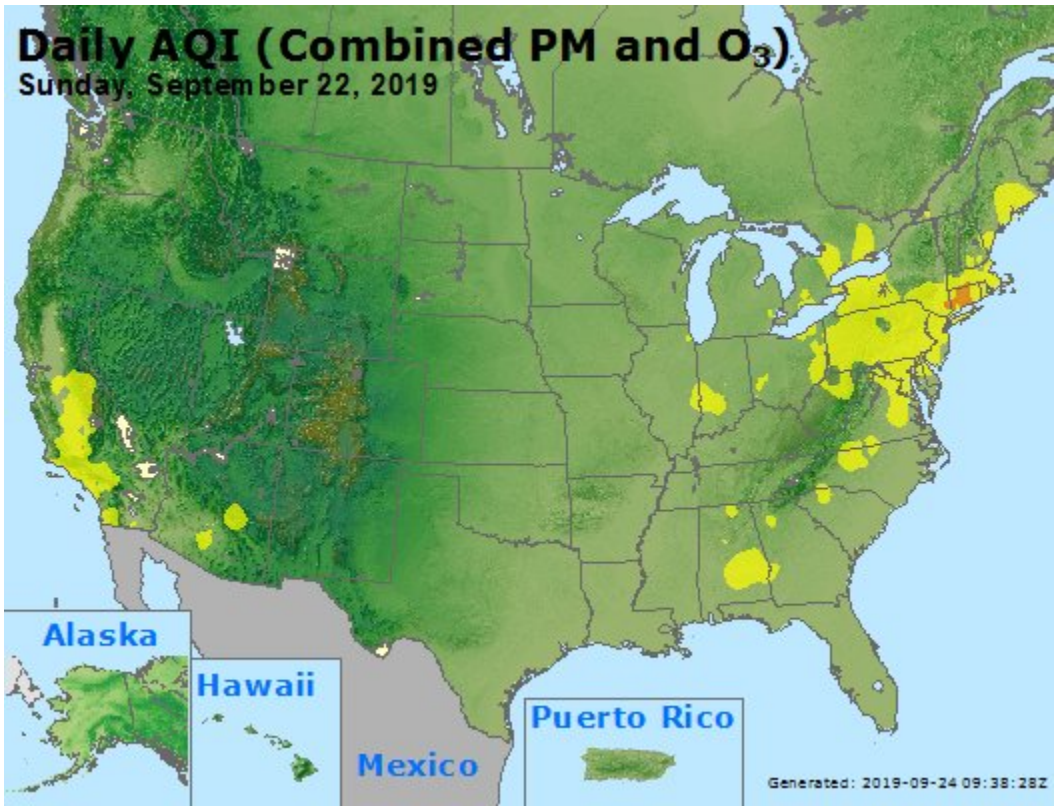


Figure 5. Combined Air Quality Index for the United States on September 22, 2019



Source: www.airnow.gov

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.