Ozone National Ambient Air Quality Standard Health Exceedances on September 11, 2019

Exceedance Locations and Levels

On Wednesday, September 11, 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 9/11/2019

STATION	Daily Maximum 8-Hr Average (ppb)
Angora State Hospital	48
Bayonne	46
Brigantine	31
Camden Spruce St	61
Chester	58
Clarksboro	41
Colliers Mills	51
Columbia	49
Flemington	54
Leonia	53
Millville	43
Monmouth University	42
Newark Firehouse	54
Ramapo	57
Rider University	57
Rutgers University	64
Washington Crossing*	61
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 9/11/2019

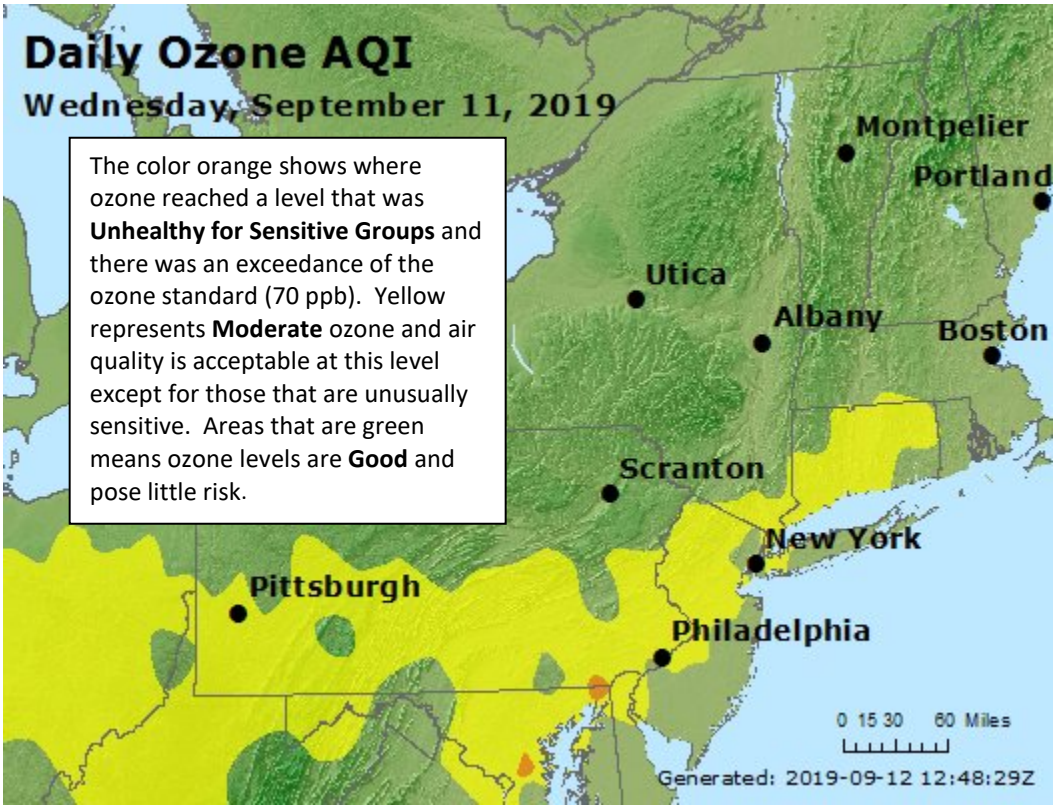
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	66
CT	Greenwich	64
CT	Madison-Beach Road	54
CT	Middletown-CVH-Shed	67
CT	New Haven	56
CT	Stratford	60
CT	Westport	68
DE	BCSP (New Castle Co.)	57
DE	BELLFNT2 (New Castle Co.)	61
DE	KILLENS (Kent Co.)	47
DE	LEWES (Sussex Co.)	41
DE	LUMS 2 (New Castle Co.)	57
DE	MLK (New Castle Co.)	60
DE	SEAFORD (Sussex Co.)	27
MD	Fair Hill	72
NY	Babylon	42
NY	Bronx - IS52	56
NY	CCNY	52
NY	Fresh Kills	60
NY	Holtsville	38
NY	Pfizer Lab	57
NY	Queens	55
NY	Riverhead	43
NY	Rockland Cty	55
NY	White Plains	58
PA	BRIS (Bucks Co.)	63
PA	CHES (Delaware Co.)	63
PA	NEWG (Chester Co.)	67
PA	NORR (Montgomery Co.)	61
PA	LAB (Philadelphia Co.)	59
PA	NEA (Philadelphia Co.)	67
PA	NEW (Philadelphia Co.)	62
	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 11, 2019 NAAQS = 70 ppb
Connecticut	19
Delaware	3
Maryland	3
New Jersey	12
New York	10
Pennsylvania	8

Figure 1. Ozone Air Quality Index for September 11, 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

On Wednesday, September 11th, a large area of high pressure was centered over the southeastern United States and Mid-Atlantic region. This weather system brought southwest winds, warm temperatures and sunny skies to the non-attainment area. These favorable meteorological conditions caused ground level ozone concentrations to reach the unhealthy for sensitive groups (USG) category in Fair Hill, Maryland.

Early on Wednesday, high pressure was centered over the Mid-Atlantic and southeastern United States, causing winds to shift out of the southwest. This resulted in clear skies and surface temperatures reaching the upper 80's to low 90's throughout the region. As the morning progressed, high pressure over the Mid-Atlantic began to push offshore, allowing a surface trough to develop that draped down from the northeast southward into North Carolina. As the surface trough developed, it settled over the I-95 corridor and allowed pollutants aloft to mix down to the surface, causing ozone concentrations throughout Maryland to rapidly spike into the USG category. The surface trough along with increased humidity fueled clouds and thunderstorms to the west in Pennsylvania and western Maryland. However, the storms did not reach eastern Maryland until early evening, allowing ozone concentrations to remain elevated for a longer time period. Ozone levels reached only the moderate category for the remainder of the region because much of the non-attainment area experienced an onshore flow of clean air during the two previous days. Transport of previously polluted air from the Ohio River Valley and Mid-Atlantic region, along with mixing from the surface trough, caused ozone to spike in isolated areas of Maryland.

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 on September 11, 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 recorded 8-hour average ozone level 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)
MD	Fair Hill	72

Backward trajectories from September 11th show that air was highly influenced at all levels of the atmosphere by a large high-pressure system located over the Mid-Atlantic. Southwesterly winds allowed for the transport of polluted air from the Ohio River Valley and Mid-Atlantic states into the region. This pattern, in combination with favorable weather conditions mentioned above led to the non-attainment area exceedance of the 8-hour average ozone standard in Maryland.

The surface level backward trajectory (Figure 2) originated off the Mid-Atlantic coast. The trajectory was highly influenced by a departing low-pressure system and shows onshore flow for the two days prior to the exceedance. High pressure then began to move in from the west and dominated the weather pattern early on September 11th, allowing winds to shift out of the southwest. Air at the surface

experienced no rising or sinking motion and traveled over the Baltimore metropolitan area before arriving at Fair Hill, picking up emissions from cars, trucks, power plants and local industry along the way.

The mid-level trajectory (Figure 3) originated over western North Carolina and moved in a clockwise direction, passing over West Virginia, southern Pennsylvania, and eventually moving into Maryland. The upper-level trajectory (Figure 4) originated over northern Alabama and follows the high-pressure circulation. The trajectory is shown traveling over the heavily industrialized Ohio River Valley and transporting additional industry and power plant emissions from this region toward Maryland.

Figure 5 shows the national Air Quality Index observed on September 10th, the day prior to the exceedance event. As shown in the figure, areas in the Ohio river valley and parts of the southeastern United States reached the moderate category the day before with isolated areas of USG. Despite relatively good air quality the previous day, southwesterly winds transported a plume of ozone precursors from this region into Maryland. Along with favorable weather conditions mentioned above, ozone levels reached the USG category in Fair Hill, Maryland on September 11th.

Figure 2. 48-hour Back Trajectories for September 11, 2019 at 10 meters

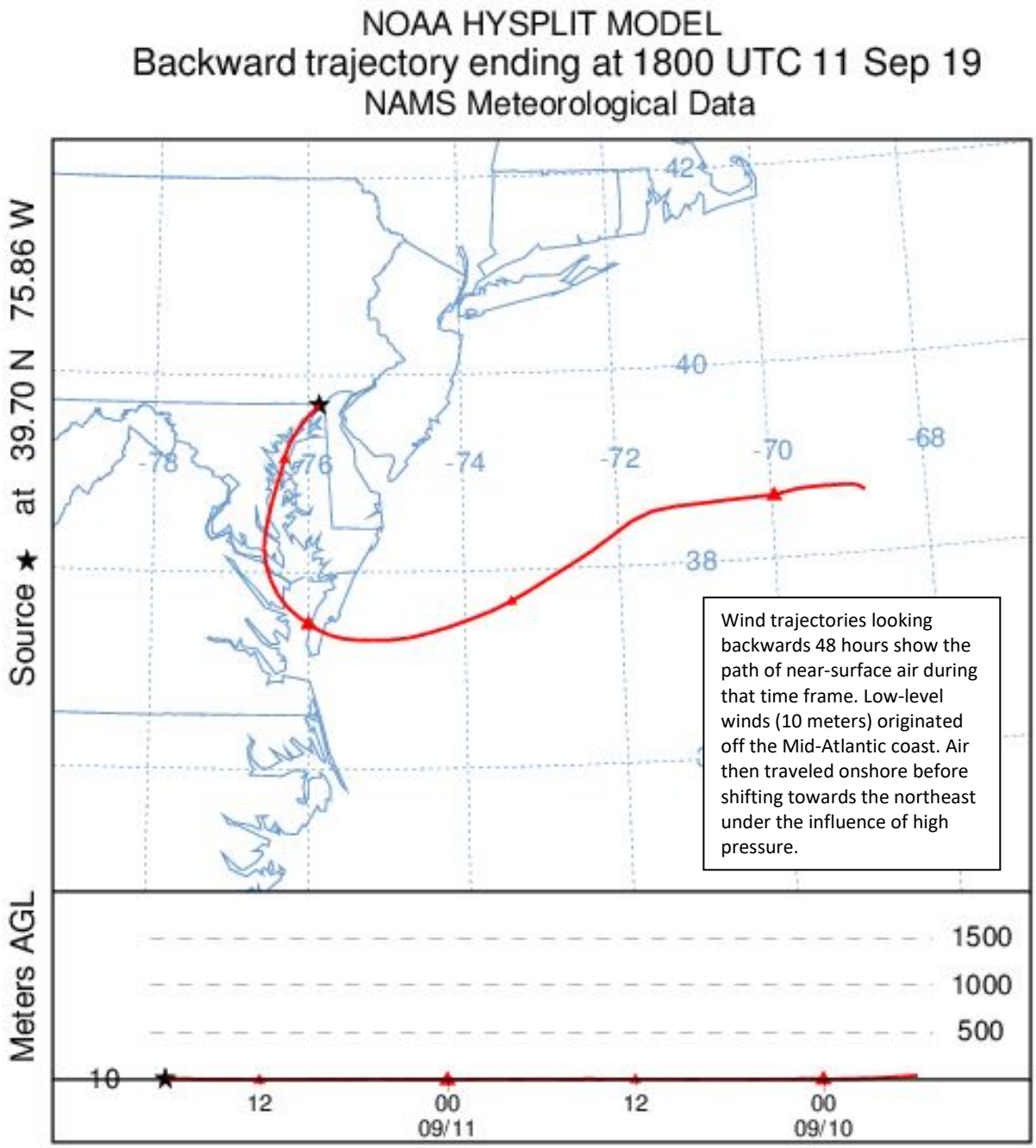


Figure 3. 48-hour Back Trajectories for September 11, 2019 at 500 meters

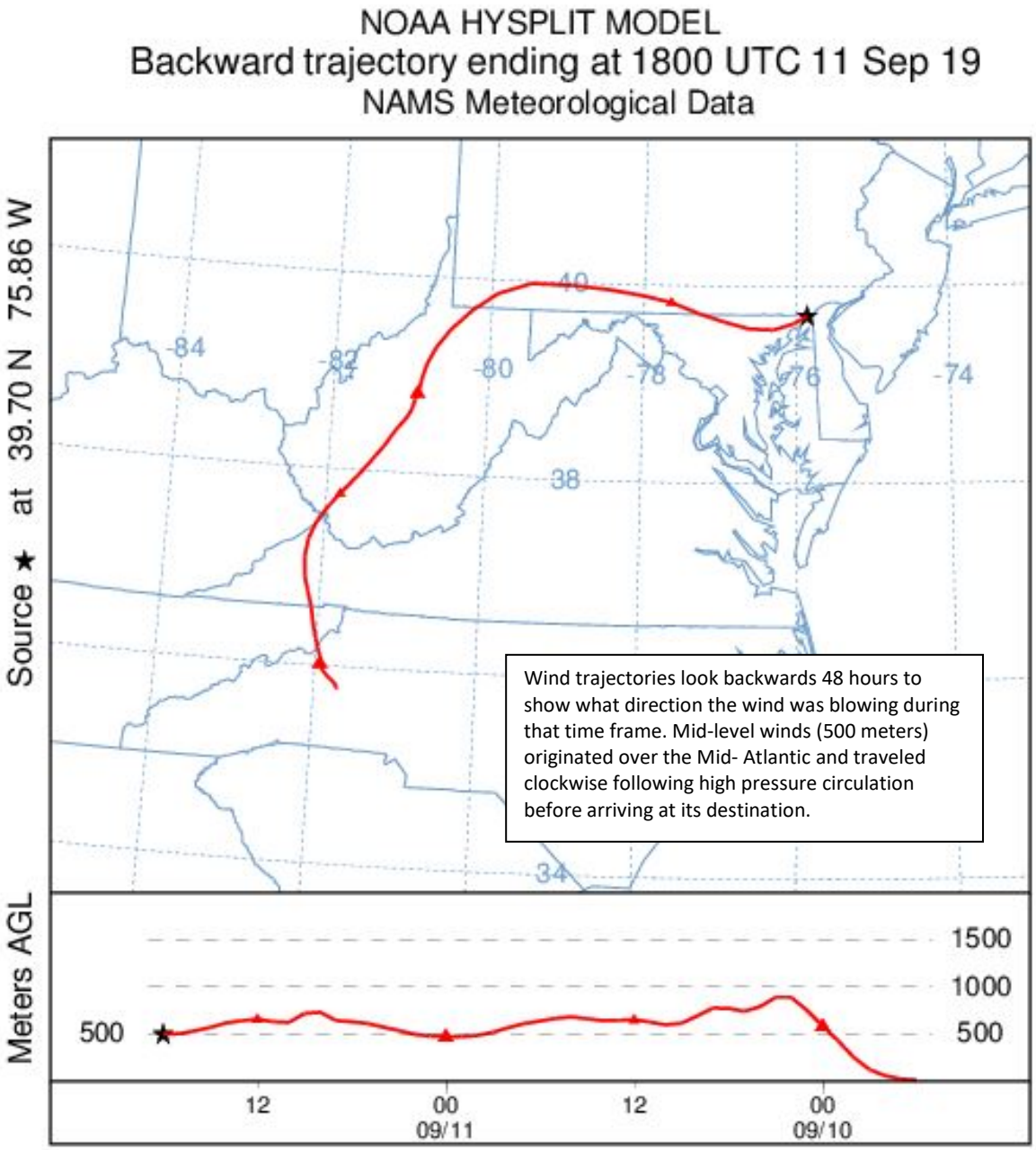


Figure 4. 48-hour Back Trajectories for September 11, 2019 at 1500 meters

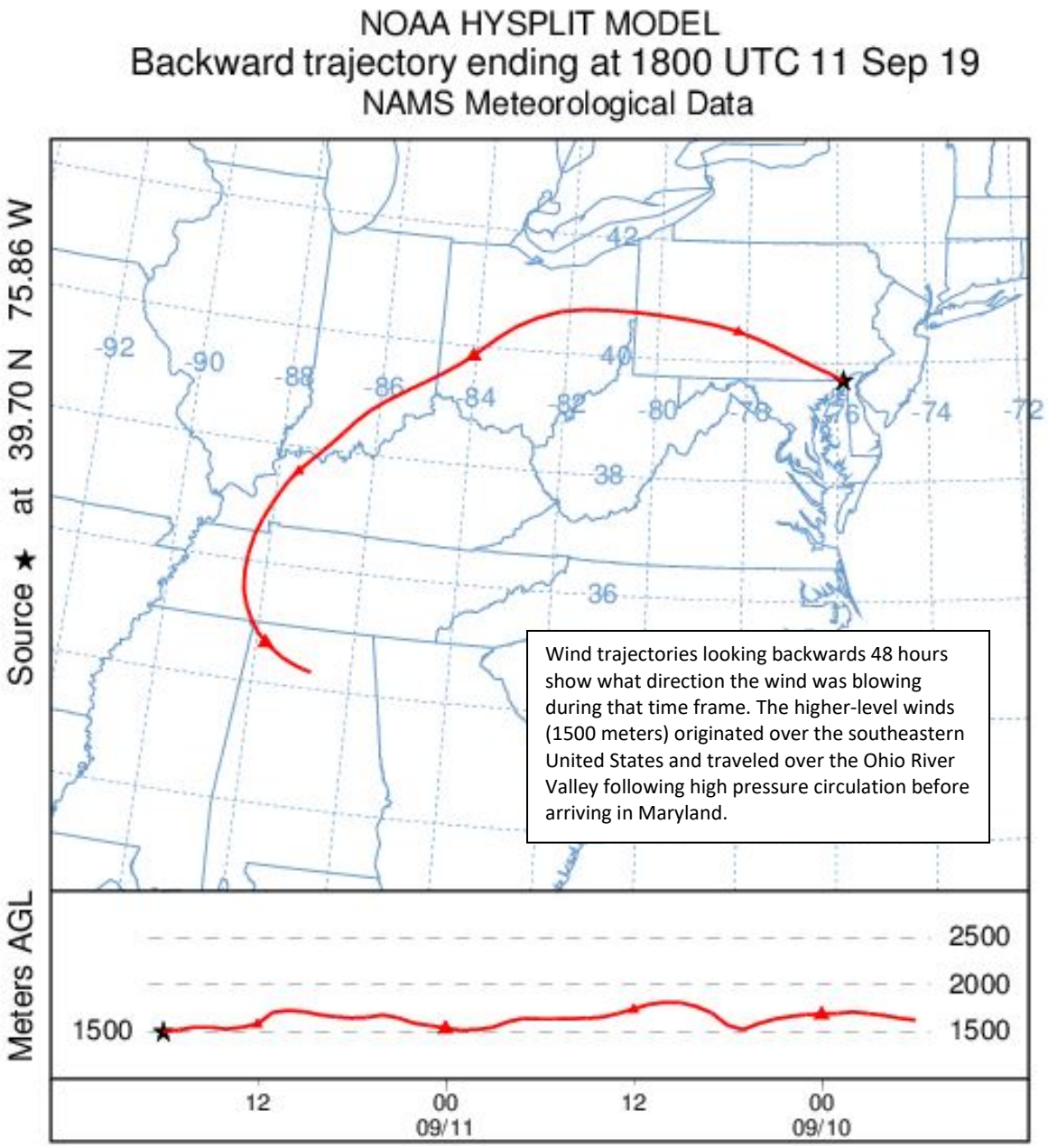
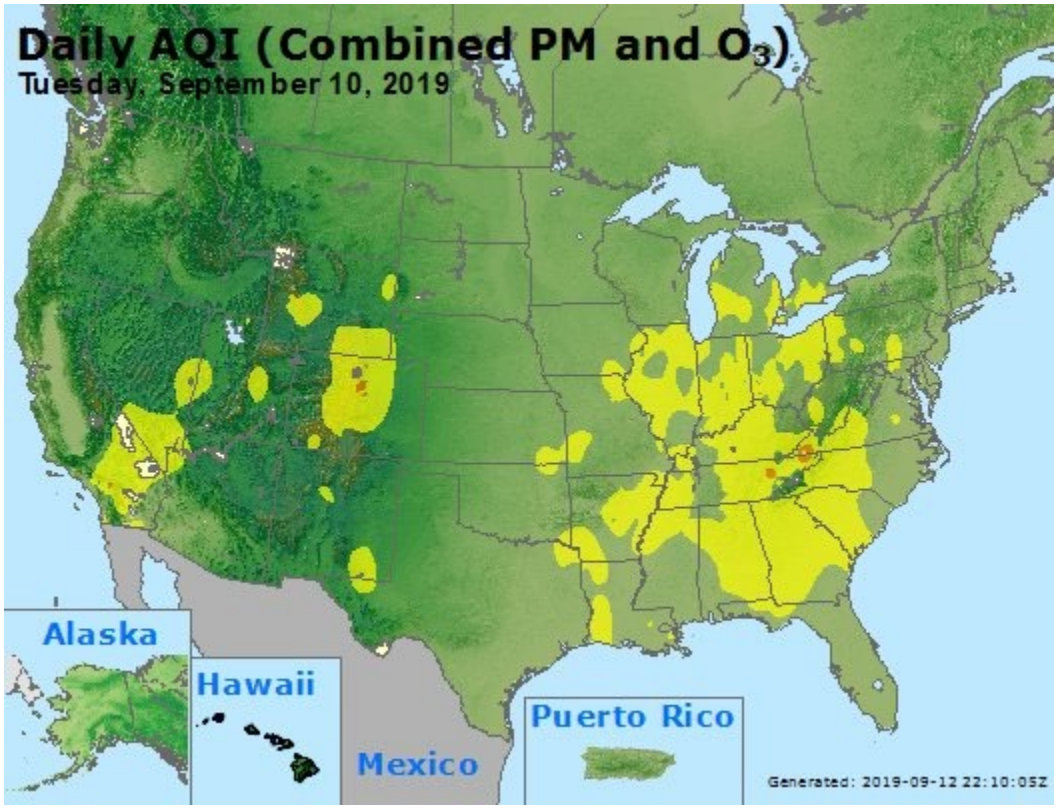


Figure 5. Combined Air Quality Index for the United States on September 10, 2019



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.