

Ozone National Ambient Air Quality Standard Health Exceedances on August 5, 2019

Exceedance Locations and Levels

On Monday, August 5, 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 8/5/2019

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	51
Bayonne	41
Brigantine	42
Camden Spruce St	68
Chester	54
Clarksboro	60
Colliers Mills	48
Columbia	40
Flemington	51
Leonia	54
Millville	52
Monmouth University	37
Newark Firehouse	38
Ramapo	64
Rider University	59
Rutgers University	50
Washington Crossing*	No Data
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 8/5/2019

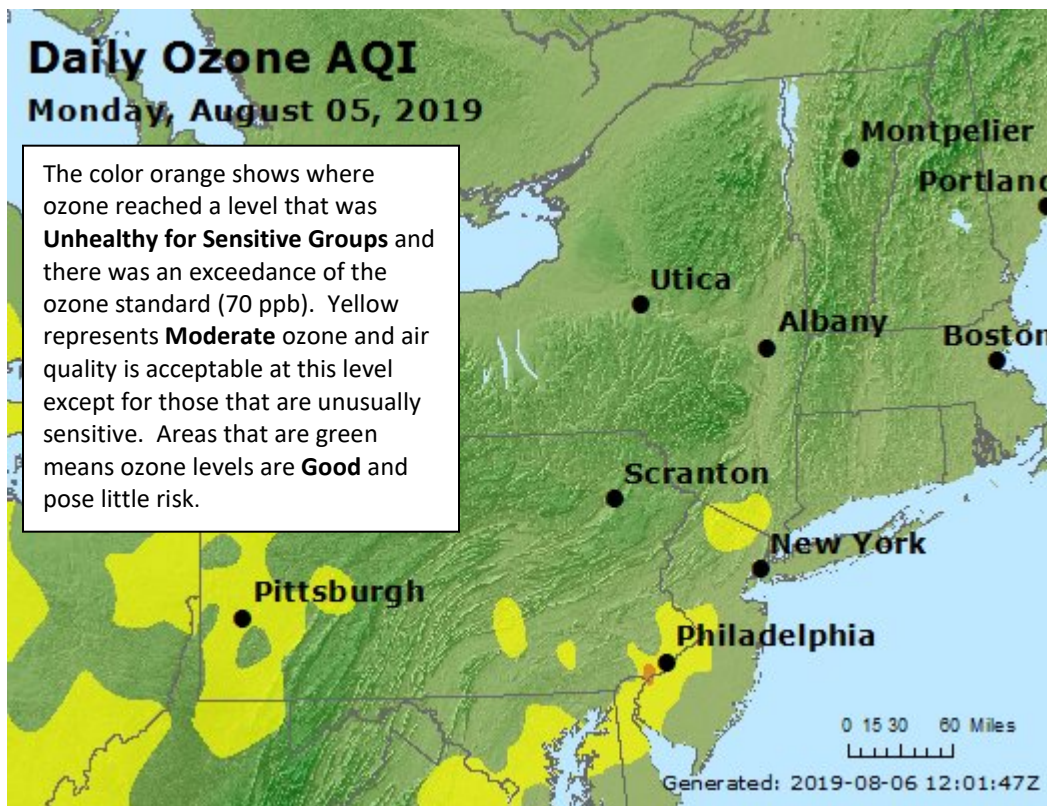
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	53
CT	Greenwich	47
CT	Madison-Beach Road	47
CT	Middletown-CVH-Shed	51
CT	New Haven	44
CT	Stratford	46
CT	Westport	45
DE	BCSP (New Castle Co.)	46
DE	BELLFNT2 (New Castle Co.)	68
DE	KILLENS (Kent Co.)	54
DE	LEWES (Sussex Co.)	44
DE	LUMS 2 (New Castle Co.)	60
DE	MLK (New Castle Co.)	70
DE	SEAFORD (Sussex Co.)	52
MD	Fair Hill	48
NY	Babylon	44
NY	Bronx - IS52	51
NY	CCNY	48
NY	Fresh Kills	39
NY	Holtsville	42
NY	Pfizer Lab	51
NY	Queens	48
NY	Riverhead	40
NY	Rockland Cty	57
NY	White Plains	53
PA	BRIS (Bucks Co.)	65
PA	CHES (Delaware Co.)	72
PA	NEWG (Chester Co.)	49
PA	NORR (Montgomery Co.)	50
PA	LAB (Philadelphia Co.)	62
PA	NEA (Philadelphia Co.)	65
PA	NEW (Philadelphia Co.)	66
	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 – August 5, 2019 NAAQS = 70 ppb
Connecticut	16
Delaware	3
Maryland	2
New Jersey	12
New York	10
Pennsylvania	8

Figure 1. Ozone Air Quality Index for August 5, 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 Monday August 5th, a stationary front developed across the region providing light and variable winds to the region. While many locations to the north of this boundary received a relatively clean air mass, the Chester, Pennsylvania monitor was able to reach the unhealthy for sensitive groups (USG) category due to localized transport and the mixing of air at higher altitudes.

Beginning on August 4th, the central portion of the non-attainment area was located between two frontal boundaries impacting our region. This unsettled pattern resulted in very light and variable winds at the surface with scattered cloud cover along the front. In the morning hours on August 5th, the main front stalled across southern New Jersey and the Delmarva. Throughout the day this front retreated and remained stalled across Philadelphia and the suburbs where the Chester County monitor is located. At this time, the stationary front crossed over the Chester monitor in Pennsylvania allowing the winds to make periodic switchbacks throughout the daytime hours. Meanwhile, an area of weak low pressure began to migrate along this front and resulted in an isolated thunderstorm cell in the Philadelphia area. This exceedance occurring exclusively in Chester, Pennsylvania is likely due to a number of factors including the transport of elevated ozone down to the surface through the downdraft of a localized thunderstorm.

Despite a relatively clean air mass that hindered ozone production throughout the region, ozone concentrations were able to climb into the unhealthy for sensitive groups (USG) category in one location on August 5th. Based on this meteorological analysis the recorded exceedance on August 5th can be attributed to localized transport, moderate air quality the previous day, and the transport of air down to the surface from aloft.

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 August 5, 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 level recorded is 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)
PA	CHES (Delaware Co.)	72

Backward trajectories from August 5th show that air was influenced by a cold front extending south from Canada and was followed by high pressure building over the Northeast. This resulted in a northerly wind shift that allowed for transport of polluted air into our non-attainment area. The favorable meteorological conditions mentioned above, along with the transport of common ozone precursors from local industry resulted in one exceedance of the 8-hour average NAAQS in Chester, Pennsylvania.

Looking at Figure 2, we can see that air at the surface originated over Lake Ontario before turning sharply south and rising slightly as the cold front pushed through. This air mass then traveled through central New York State before entering northeastern Pennsylvania and traveling south towards the greater Philadelphia area. This air mass sank towards the surface under the influence of high pressure and traveled over cities such as Scranton and Philadelphia, PA, picking up emissions from cars, trucks, local industry, and power plants before arriving in Chester.

Air at mid-levels (Figure 3) originated over Lake Ontario and traveled east before gradually turning towards the southeast under the influence of the cold front. This air mass traveled through much of New York State before entering the Lower Hudson Valley and New York City metropolitan area. The air mass then made a sharp turn towards the southwest as a result of a stalled front over the I-95 corridor, which allowed for additional mixing of polluted air towards the surface. This air moved southwestward along the I-95 corridor and over the greater Philadelphia region, picking up additional emissions from power plants and local industry before arriving in Chester. Looking at Figure 4, we can see that upper level air originated over the previously polluted Great Lakes region and traveled in a predominantly southeasterly direction throughout the entirety of its path. This air mass traveled through the Great Lakes region, southwestern New York State, and central Pennsylvania before arriving in Chester.

Figure 5 shows the national Air Quality Index observed on August 4th, the day prior to this exceedance. As shown in the figure, moderate air quality was observed in the Great Lakes region and Pennsylvania the day before. Backward trajectories from August 4th suggest that previously polluted air at upper levels was transported into the non-attainment area. Despite the lack of widespread moderate and unhealthy for sensitive groups categories in the region, the location of the fronts along with localized transport of ozone precursors allowed for the convergence of polluted air over Chester, PA.

Figure 2. 48-hour Back Trajectory for August 5, 2019 at 10 meters

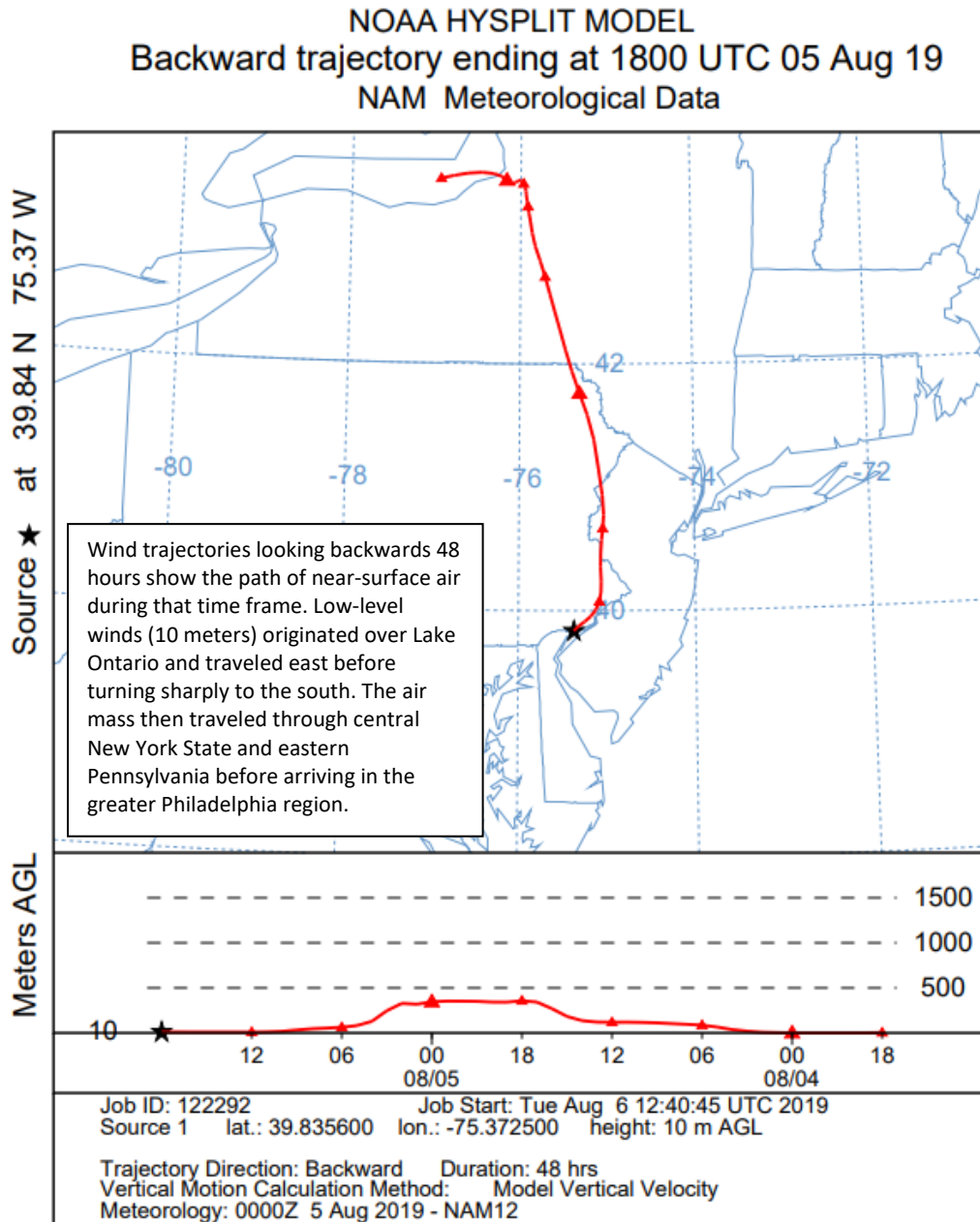


Figure 3. 48-hour Back Trajectory for August 5, 2019 at 500 meters

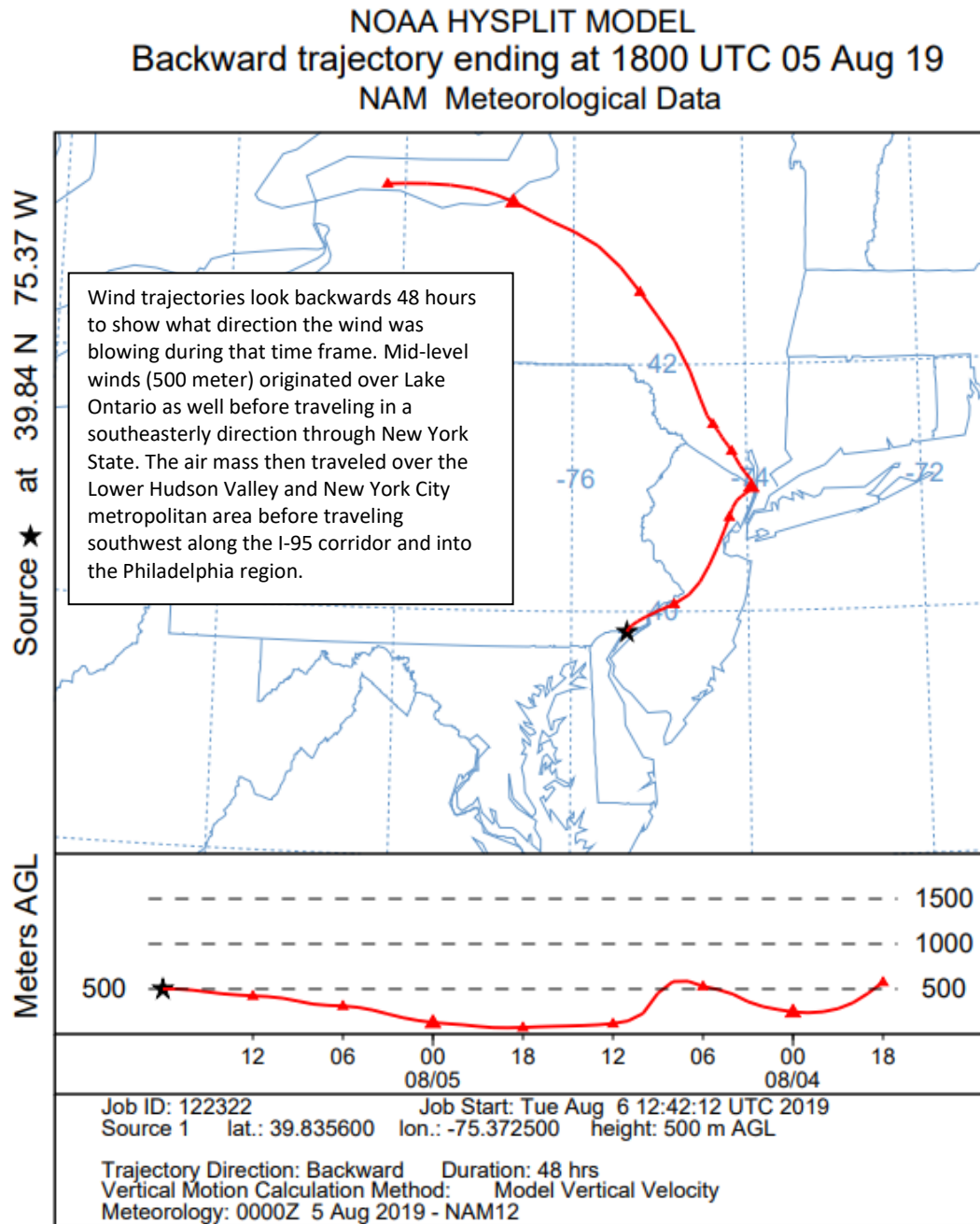


Figure 4. 48-hour Back Trajectory for August 5, 2019 at 1500 meters

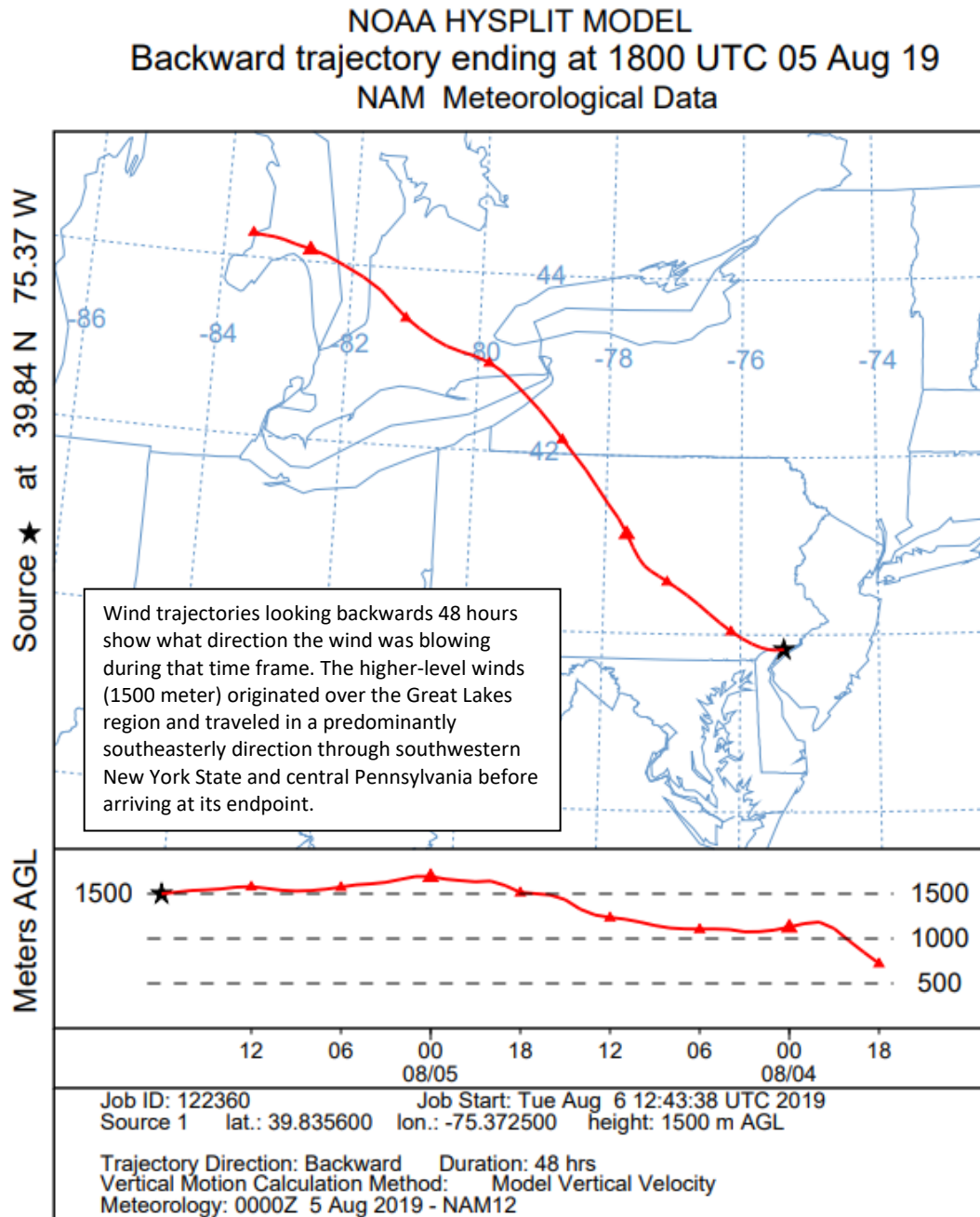
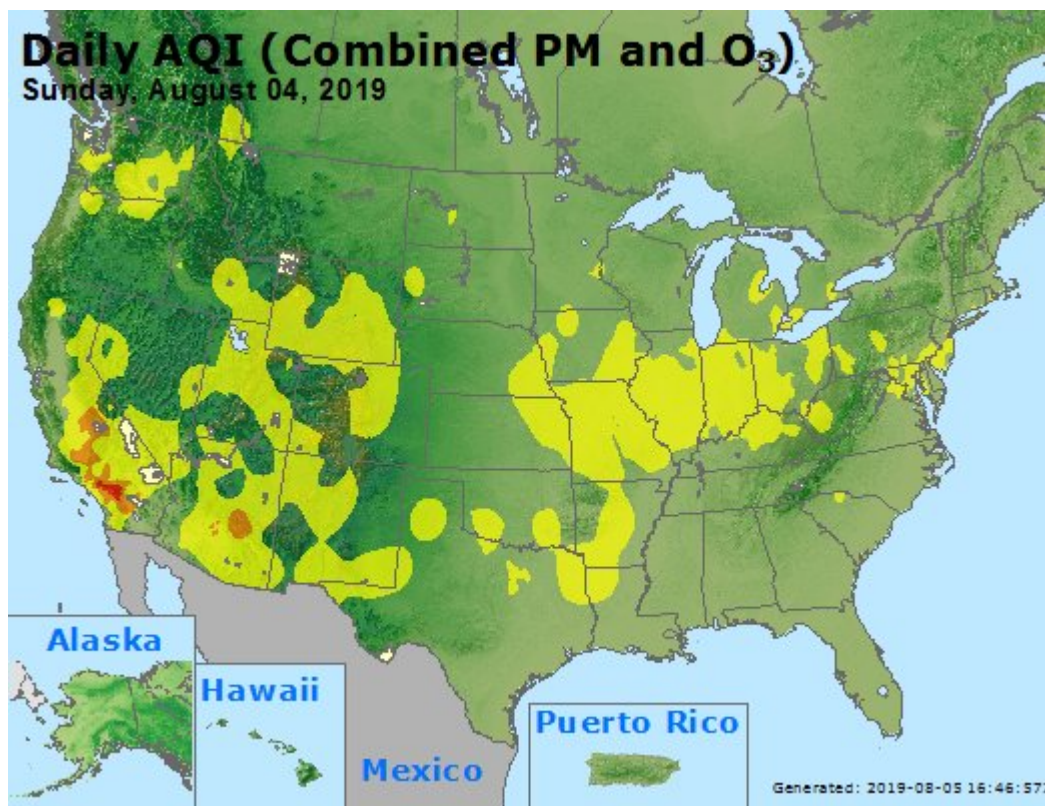


Figure 5. Combined Air Quality Index for the United States on August 4, 2019



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 (NO_x) 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.