## Ozone National Ambient Air Quality Standard Health Exceedances on July 17, 2019

### Exceedance Locations and Levels

On Wednesday, July 17, 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 7/17/2019**

| STATION | Daily Maximum 8-Hr Average (ppb) |
|---|---|
| Ancora State Hospital | 45 |
| Bayonne | 65 |
| Brigantine | 48 |
| Camden Spruce St | 57 |
| Chester | 44 |
| Clarksboro | 43 |
| Colliers Mills | 43 |
| Columbia | 38 |
| Flemington | 50 |
| Leonia | 68 |
| Millville | 49 |
| Monmouth University | 48 |
| Newark Firehouse | 54 |
| Ramapo | 38 |
| Rider University | 57 |
| Rutgers University | 70 |
| Washington Crossing* | 56 |
| 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 were three (3) exceedances 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 7/17/2019**

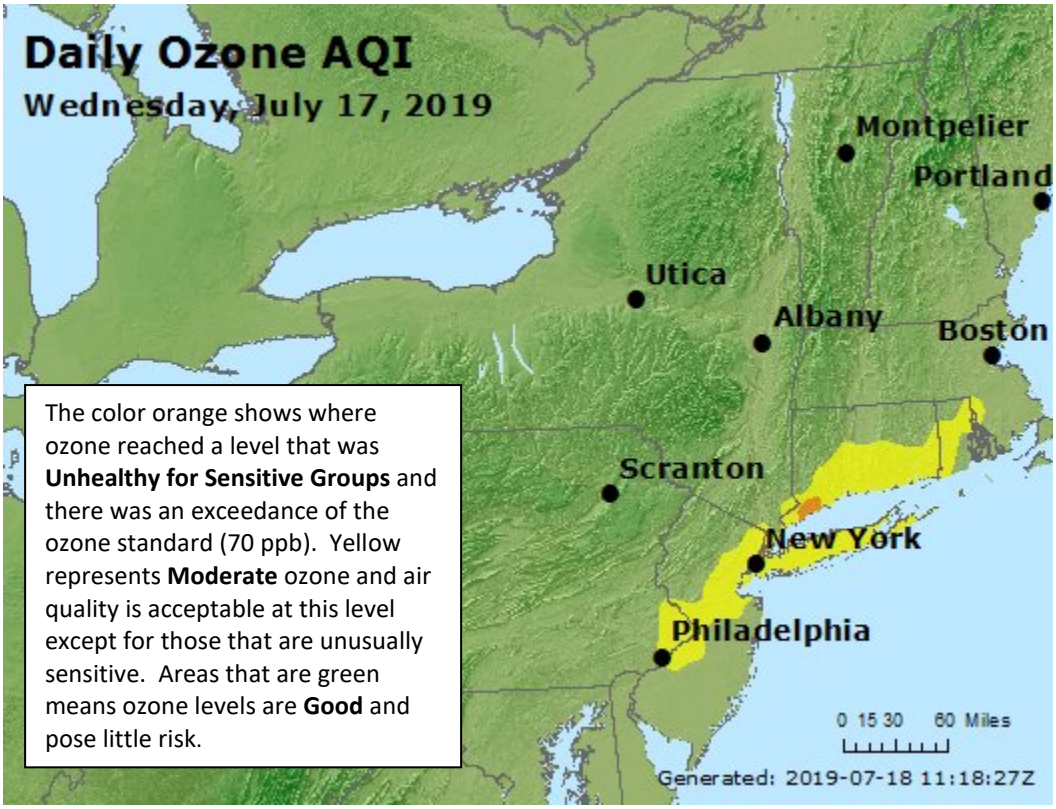
| STATE | STATION | Daily Maximum 8-Hr Average (ppb) |
|---|---|---|
| CT | Danbury | 53 |
| CT | Greenwich | 69 |
| CT | Madison-Beach Road | 60 |
| CT | Middletown-CVH-Shed | 60 |
| CT | New Haven | 57 |
| CT | Stratford | 69 |
| CT | Westport | 74 |
| DE | BCSP (New Castle Co.) | 48 |
| DE | BELLFNT2 (New Castle Co.) | 52 |
| DE | KILLENS (Kent Co.) | 50 |
| DE | LEWES (Sussex Co.) | 47 |
| DE | LUMS 2 (New Castle Co.) | 50 |
| DE | MLK (New Castle Co.) | 54 |
| DE | SEAFORD (Sussex Co.) | 52 |
| MD | Fair Hill | 54 |
| NY | Babylon | 57 |
| NY | Bronx - IS52 | 71 |
| NY | CCNY | 71 |
| NY | Fresh Kills | 67 |
| NY | Holtsville | 54 |
| NY | Pfizer Lab | 68 |
| NY | Queens | 63 |
| NY | Riverhead | 55 |
| NY | Rockland Cty | 41 |
| NY | White Plains | 52 |
| PA | BRIS (Bucks Co.) | 62 |
| PA | CHES (Delaware Co.) | 52 |
| PA | NEWG (Chester Co.) | 47 |
| PA | NORR (Montgomery Co.) | 46 |
| PA | LAB (Philadelphia Co.) | 56 |
| PA | NEA (Philadelphia Co.) | 60 |
| PA | NEW (Philadelphia Co.) | 65 |
| | TOTAL EXCEEDANCES | 3 |

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 – July 17, 2019 NAAQS = 70 ppb |
|---|---|
| Connecticut | 9 |
| Delaware | 3 |
| Maryland | 2 |
| New Jersey | 8 |
| New York | 8 |
| Pennsylvania | 4 |

**Figure 1. Ozone Air Quality Index for July 17, 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**

A large swath of high pressure was in place over the Eastern United States on Wednesday, July 17th, providing hot temperatures, southwesterly winds, and sunny skies to the Northeast. In addition, a surface trough created a mechanism for polluted air aloft to mix down to the surface and combine with local emissions generated during the day. Favorable weather conditions in combination with localized transport up the I-95 corridor led to exceedances in New York and Connecticut.

On Wednesday, July 17th, a Bermuda High was in place over the Atlantic Ocean. The position of this high-pressure center off the coast allowed for southwesterly winds to transport polluted air into our region from the Southeast U.S., where moderate ozone was observed the previous day. Meteorological data from across the region shows temperatures reached the low 90s with southwesterly winds and clear skies for much of the day. In addition, a surface trough developed across the region extending from North Carolina to southern New England. This trough crossed through central New Jersey, New York, and Connecticut. A surface trough offers the potential for any polluted air aloft to mix down to the surface and enhance ozone concentrations at ground level. This pattern continued to deliver warm, unsettled, and increasingly moist air to the Northeast. As a result, scattered clouds developed in the early afternoon, along with light rain before thunderstorms arrived in the evening. This may be the reason why exceedances occurred exclusively in the northern nonattainment area; Clouds forming earlier in the day across New Jersey provided some relief from ground-level ozone formation.

Based on this weather analysis, the observed exceedances on July 17th can be attributed to favorable weather conditions, localized transport, and locally generated emissions being transported into/throughout the nonattainment area and added to a previously-polluted air mass.

**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 July 17, 2019. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. Three (3) monitoring stations with 8-hour average ozone exceedances were used to run back trajectories. The selected sites 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-hr Back Trajectories**

| STATE | STATION | Daily Maximum 8-Hr Average (ppb) |
|---|---|---|
| CT | Westport | 74 |
| NY | Bronx – IS52 | 71 |
| NY | CCNY | 71 |

The back trajectories from July 17th show the transport of air at the surface and at upper levels was heavily influenced by high pressure circulation, resulting in a southwesterly flow. This southwesterly flow allowed polluted air to travel along the I-95 corridor and resulted in a few ozone exceedances in the region.

Surface trajectories (Figure 2) show that air was transported onshore from off the coast of the Mid-Atlantic, before turning sharply towards the northeast under the influence of high pressure. These surface trajectories show that air off of the Mid-Atlantic coast was subject to more of a south-southwesterly flow, allowing the air mass to travel over the New York City metropolitan area and portions of Long Island before arriving at their exceedance locations. Along its path, air near the surface picked up emissions from cars, trucks, industry and power plants, including peak demand electric generating units, which exacerbated already poor air quality.

Back trajectories at upper levels (Figures 3 and 4) show that the air was highly influenced by a predominantly southwesterly flow, and originated in West Virginia, Virginia, and as far south as Alabama. Air at these levels showed a general sinking motion as a result of the high pressure, causing possibly polluted air to sink to the surface. Air at 500 meters (Figure 3) originated primarily in southern Virginia before traveling northeastward along the I-95 corridor over urban areas such as Richmond, Washington D.C., Baltimore, and the Philadelphia region before entering the NYC metropolitan area. The air mass at 1500 meters (Figure 4) originated over Alabama before traveling northeastward over northwestern Georgia, eastern Tennessee, West Virginia, western Maryland, and southeastern Pennsylvania before entering our non-attainment area. These upper level air masses were previously polluted from July 15th and 16th, and picked up additional emissions from cars, trucks, industry, and power plants near the Ohio River Valley along the way.

Figure 5 shows the national ozone concentrations observed on July 16th, the day prior to this exceedance episode. As shown in the figure, levels of moderate ozone were observed over the Mid-Atlantic region along with isolated areas reaching the unhealthy for sensitive groups category. This previously polluted air mass was transported into the New York City metropolitan area, which had reached the unhealthy for sensitive groups category on the previous day, along with parts of Connecticut reaching the unhealthy category. Back trajectories for July 17th suggest that localized transport and air pollution emissions to the southwest and along the I-95 corridor, combined with favorable weather conditions, led to the exceedances in the nonattainment area.

**Figure 2. 48-hour Back Trajectories for July 17, 2019 at 10 meters**

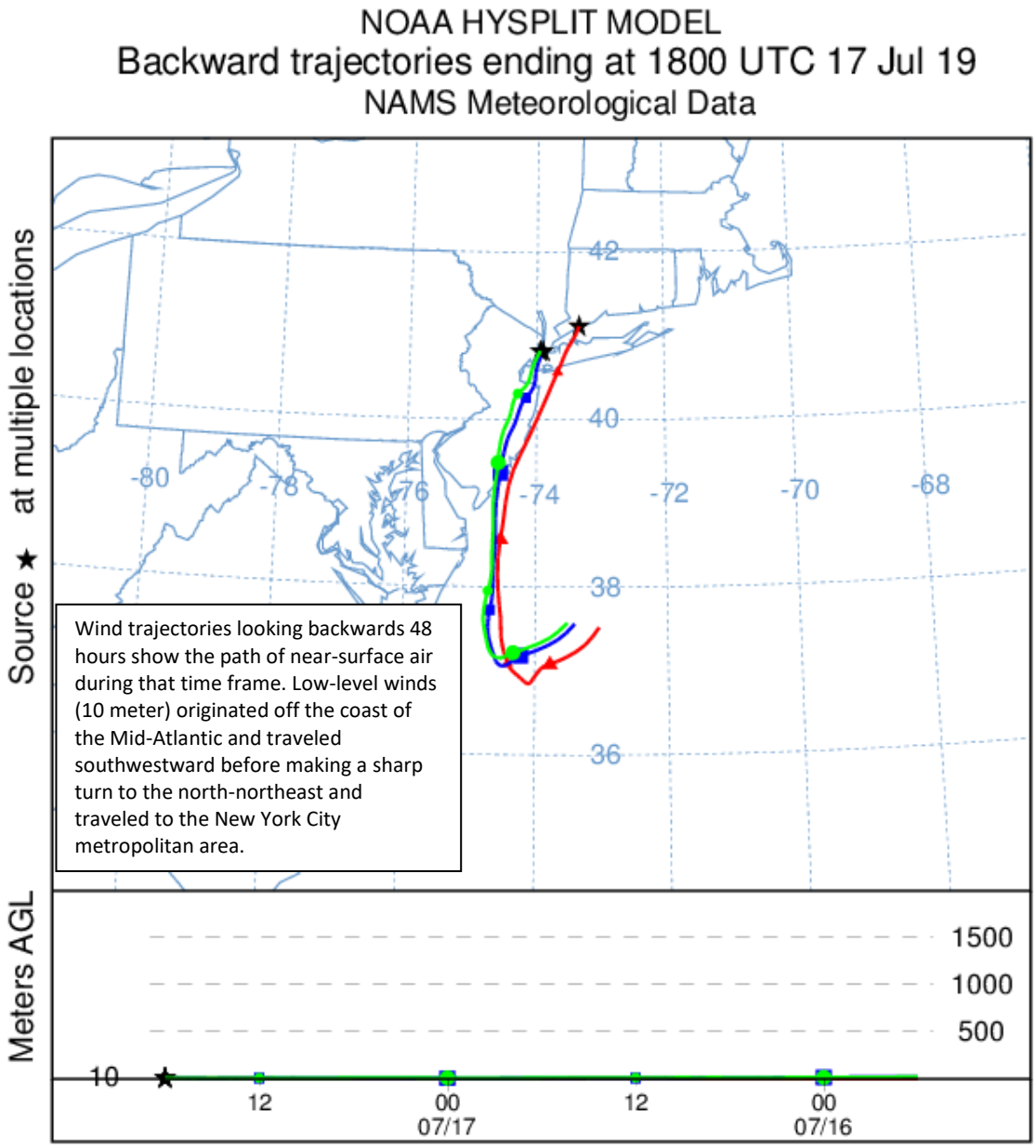


**Figure 3. 48-hour Back Trajectories for July 17, 2019 at 500 meters**

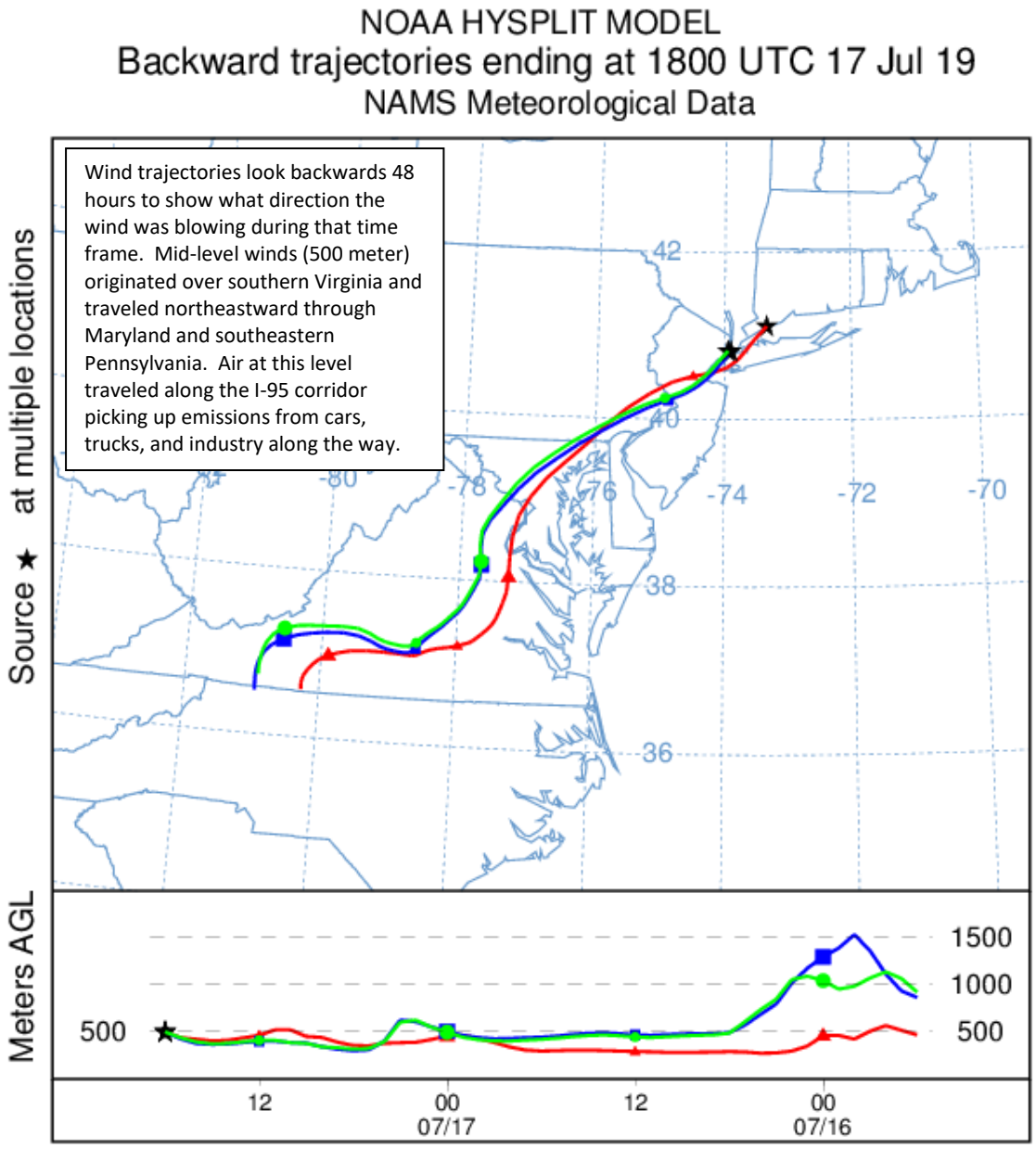


**Figure 4. 48-hour Back Trajectories for July 17, 2019 at 1500 meters**

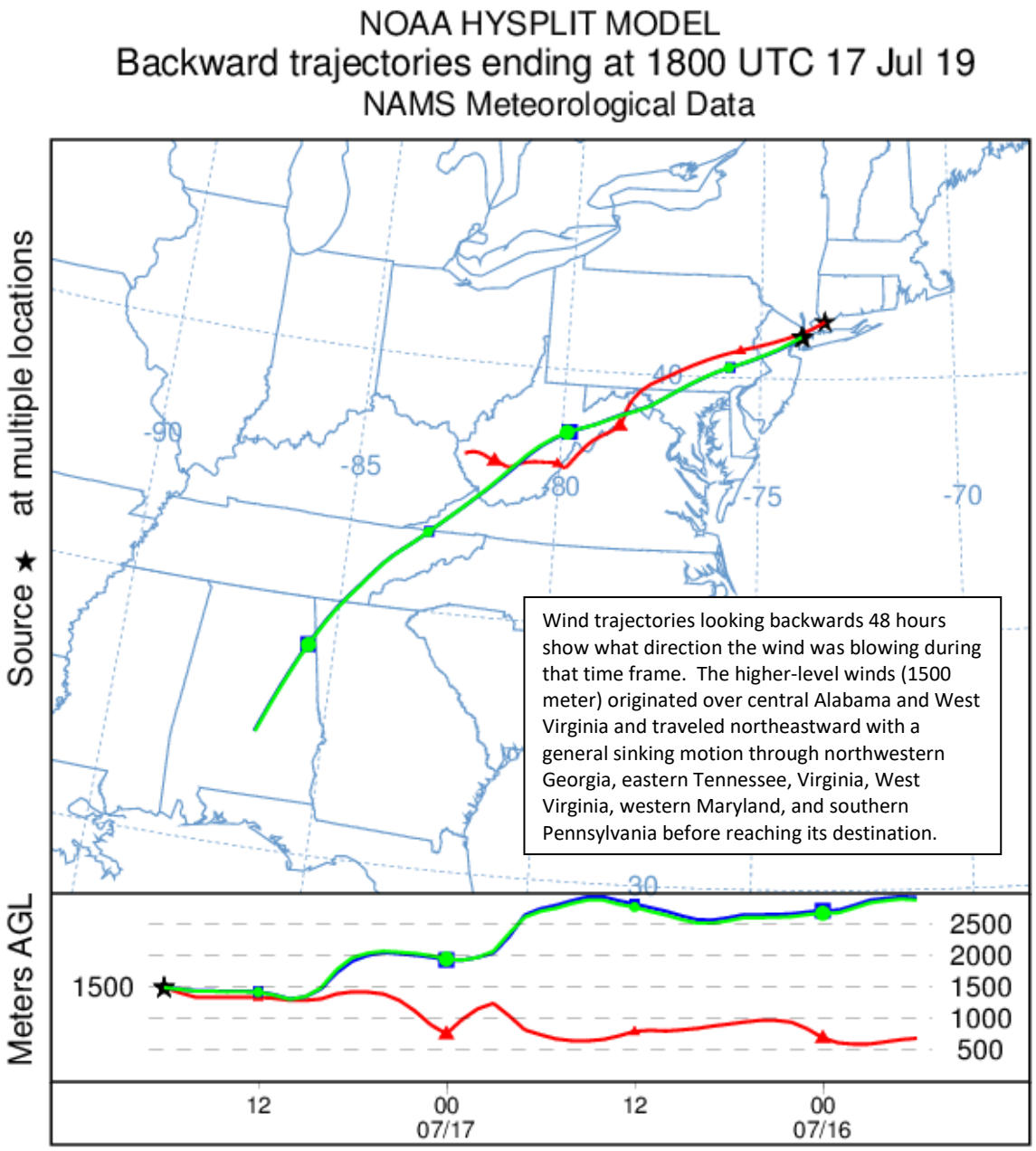
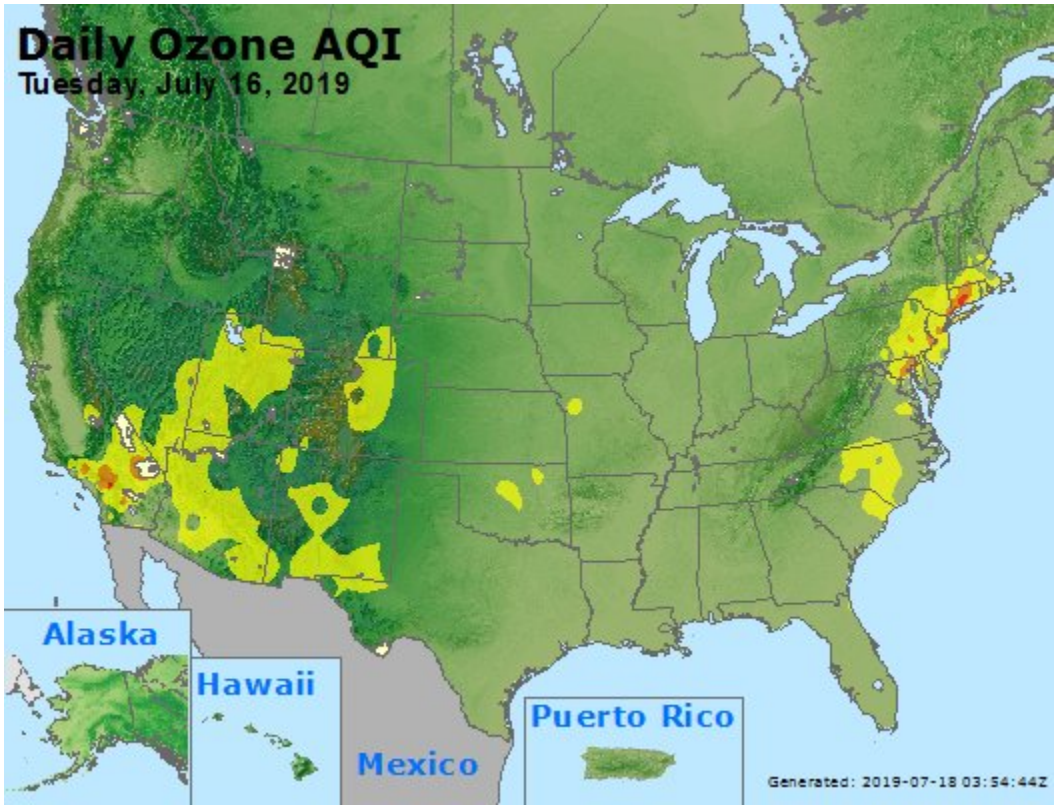


**Figure 5. Ozone Air Quality Index for the United States on July 16, 2019**




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.