## Ozone National Ambient Air Quality Standard Health Exceedances on July 27, 2019

### Exceedance Locations and Levels

On Saturday, July 27, 2019, there was one (1) exceedance 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 7/27/2019**

| STATION | Daily Maximum 8-Hr Average (ppb) |
|---|---|
| Ancora State Hospital | 62 |
| Bayonne | 61 |
| Brigantine | 50 |
| Camden Spruce St | 77 |
| Chester | 56 |
| Clarksboro | 69 |
| Colliers Mills | 55 |
| Columbia | 56 |
| Flemington | 60 |
| Leonia | 68 |
| Millville | 62 |
| Monmouth University | 52 |
| Newark Firehouse | 62 |
| Ramapo | No Data |
| Rider University | 60 |
| Rutgers University | 60 |
| Washington Crossing* | No Data |
| TOTAL EXCEEDANCES | 1 |

*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 7/27/2019**

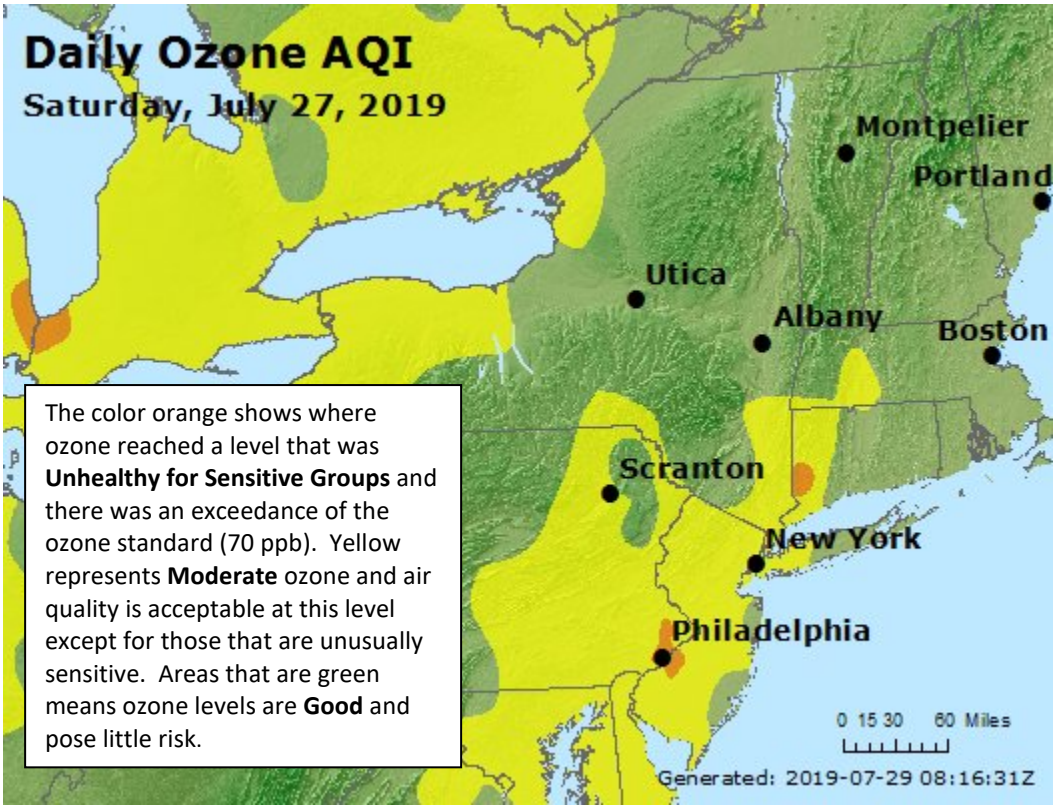
| STATE | STATION | Daily Maximum 8-Hr Average (ppb) |
|---|---|---|
| CT | Danbury | 72 |
| CT | Greenwich | 63 |
| CT | Madison-Beach Road | 40 |
| CT | Middletown-CVH-Shed | 48 |
| CT | New Haven | 50 |
| CT | Stratford | 53 |
| CT | Westport | 61 |
| DE | BCSP (New Castle Co.) | 57 |
| DE | BELLFNT2 (New Castle Co.) | 64 |
| DE | KILLENS (Kent Co.) | 61 |
| DE | LEWES (Sussex Co.) | 55 |
| DE | LUMS 2 (New Castle Co.) | 60 |
| DE | MLK (New Castle Co.) | 66 |
| DE | SEAFORD (Sussex Co.) | 63 |
| MD | Fair Hill | No Data |
| NY | Babylon | 54 |
| NY | Bronx - IS52 | 56 |
| NY | CCNY | 60 |
| NY | Fresh Kills | 61 |
| NY | Holtsville | 40 |
| NY | Pfizer Lab | 59 |
| NY | Queens | 57 |
| NY | Riverhead | 38 |
| NY | Rockland Cty | No Data |
| NY | White Plains | 65 |
| PA | BRIS (Bucks Co.) | 63 |
| PA | CHES (Delaware Co.) | 69 |
| PA | NEWG (Chester Co.) | 62 |
| PA | NORR (Montgomery Co.) | 61 |
| PA | LAB (Philadelphia Co.) | 73 |
| PA | NEA (Philadelphia Co.) | 69 |
| PA | NEW (Philadelphia Co.) | 78 |
| | 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 27, 2019 NAAQS = 70 ppb |
|---|---|
| Connecticut | 12 |
| Delaware | 3 |
| Maryland | 2 |
| New Jersey | 10 |
| New York | 8 |
| Pennsylvania | 6 |

**Figure 1. Ozone Air Quality Index for July 27, 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 in place over the Eastern United States brought mostly sunny skies, light winds, and warm temperatures to the region on July 27th. These favorable meteorological conditions, along with localized transport, led to multiple exceedances in Philadelphia, Pennsylvania, Camden, New Jersey and Danbury, Connecticut.

High pressure continued to strengthen over the region and remained anchored over the Mid-Atlantic, supplying the area with hot temperatures, mostly sunny skies, and light/variable winds. Temperatures were able to reach the upper 80's across Philadelphia and southern New Jersey, and the low 80's in Connecticut and Long Island, New York. As the day progressed, a strong sea breeze developed along the New Jersey, Long Island, and Connecticut coasts. This sea breeze shifted the winds to a more southerly direction, provided cleaner air at these locations, and increased cloud cover, - all of which limited ozone production along the coasts and some areas inland. In southern New Jersey, the sea breeze front pushed far inland, converging with southwesterly flow at the surface. The frontal boundary combined with the southwest winds, brought previously polluted air to the region, and allowed for pollutants to build up along the I-95 corridor, causing exceedances in Philadelphia, Pennsylvania and Camden, New Jersey.

Recirculation of air at the surface along with the transport of local emissions and favorable meteorological conditions led to ozone concentrations reaching the unhealthy for sensitive groups category in our non-attainment area.

**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 27, 2019. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. Four (4) monitoring stations with an 8-hour average ozone exceedance 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 | Danbury | 72 |
| NJ | Camden Spruce St | 77 |
| PA | LABP | 73 |
| PA | NEW | 78 |

Back trajectories from July 27th show that air was largely influenced by persistent high pressure over the region and resulted in light, recirculating winds. Light winds at the surface and aloft resulted in very short trajectories at all three levels observed. This allowed pollutants to accumulate at various locations in the tri-state area and increased local transport from Pennsylvania.

Surface level trajectories (Figure 2) originated over the Atlantic Ocean before recirculating over the water. Surface air impacting the Philadelphia area traveled northwestward very slowly in the 48 hours preceding this high ozone event. Meanwhile, air impacting Danbury, Connecticut traveled across Long Island where peaking units may have been operating on this day. Air at the surface then crossed through the Long Island Sound and coastal Connecticut before reaching its destination. Air at the surface experienced very short trajectories, allowing air to linger during transit and pick up emissions from cars, trucks, and industry along the way.

Mid-level trajectories (Figure 3) followed different transport pathways. Air traveling to Philadelphia and Camden originated in north-central Pennsylvania and traveled southeastward in direction. Air at the mid-levels recirculated several times during transit through industrialized portions of Pennsylvania. Mid-level trajectories passed through Philadelphia picking up emissions from cars, trucks, local industry, and power plants, including peak demand electric generating units (EGUs). Meanwhile, air at this level traveling toward Danbury, Connecticut followed a similar path as it did at the surface.

Upper level back trajectories (Figure 4) originated over Lake Ontario and portions of northeast Pennsylvania. Air impacting the Philadelphia area traveled southeastward through Pennsylvania and recirculated around the Philadelphia suburbs before reaching its destination. Air traveling to Danbury, Connecticut traveled through Rochester and portions of southern New York before crossing through the lower Hudson Valley. It is important to note that upper level trajectories for this day did not travel far in the 48-hours preceding the high ozone event. This allowed air at all levels to increase in pollution during the days leading up to the monitored exceedances.

Figure 5 shows the national Air Quality Index observed on July 26th, the day prior to this exceedance episode. As shown in the figure, widespread moderate air quality was observed over the Great Lakes and Ontario the day before this high ozone event. Finally, vertical smoke was noted over our region in the days leading up to and including July 27th which appears to have been transported from wildfires in Canada. As smoke is known to contain pollutant precursors for ozone formation, it is possible that, in addition to the above, this smoke enhanced ozone levels across our non-attainment area. Influence from industrial locations in Pennsylvania and Long Island, including peak demand EGUs, combined with favorable meteorological conditions in the presence of wildfire smoke resulted in multiple exceedances on this day.

**Figure 2. 48-hour Back Trajectories for July 27, 2019 at 10 meters**

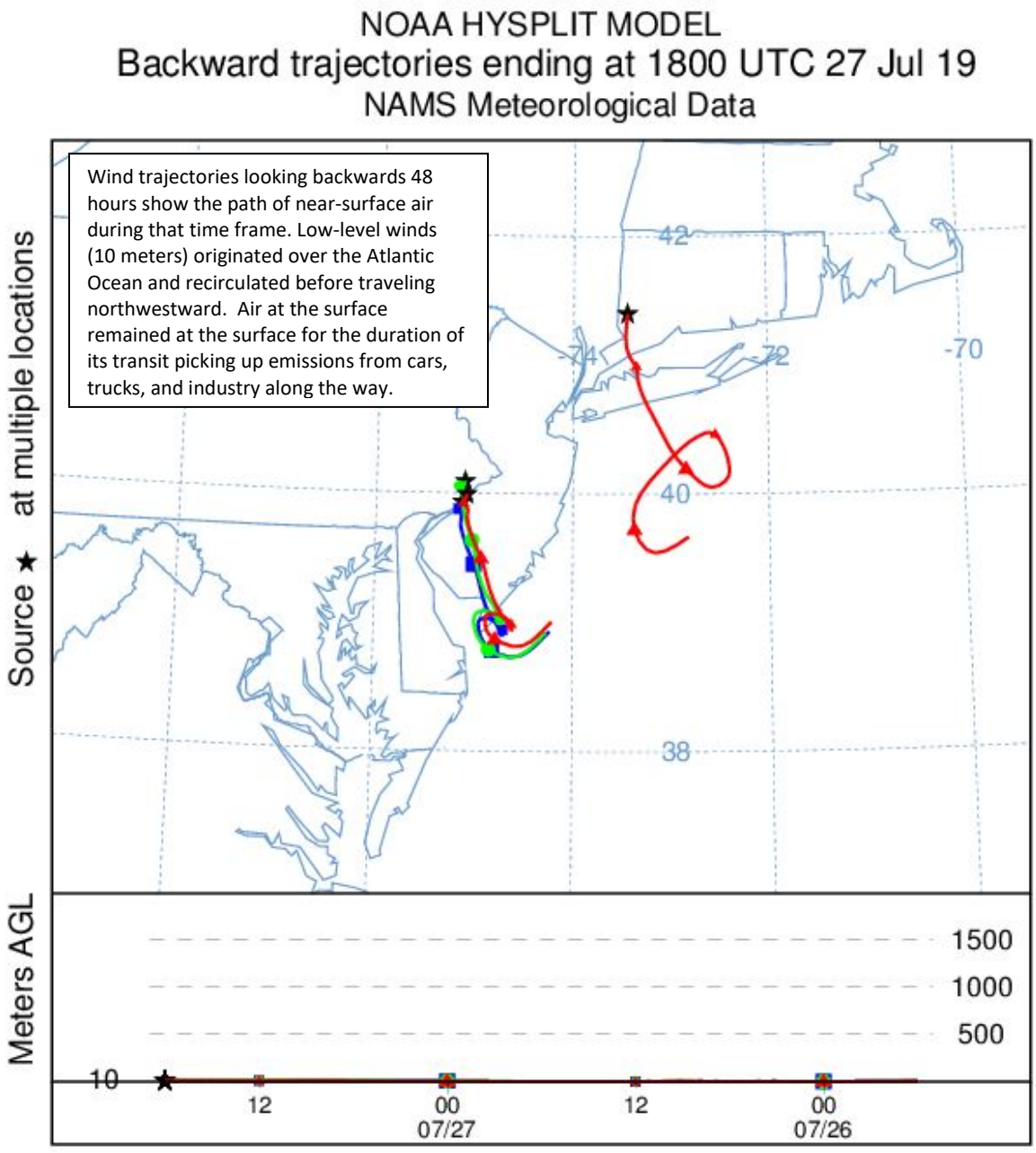


**Figure 3. 48-hour Back Trajectories for July 27, 2019 at 500 meters**

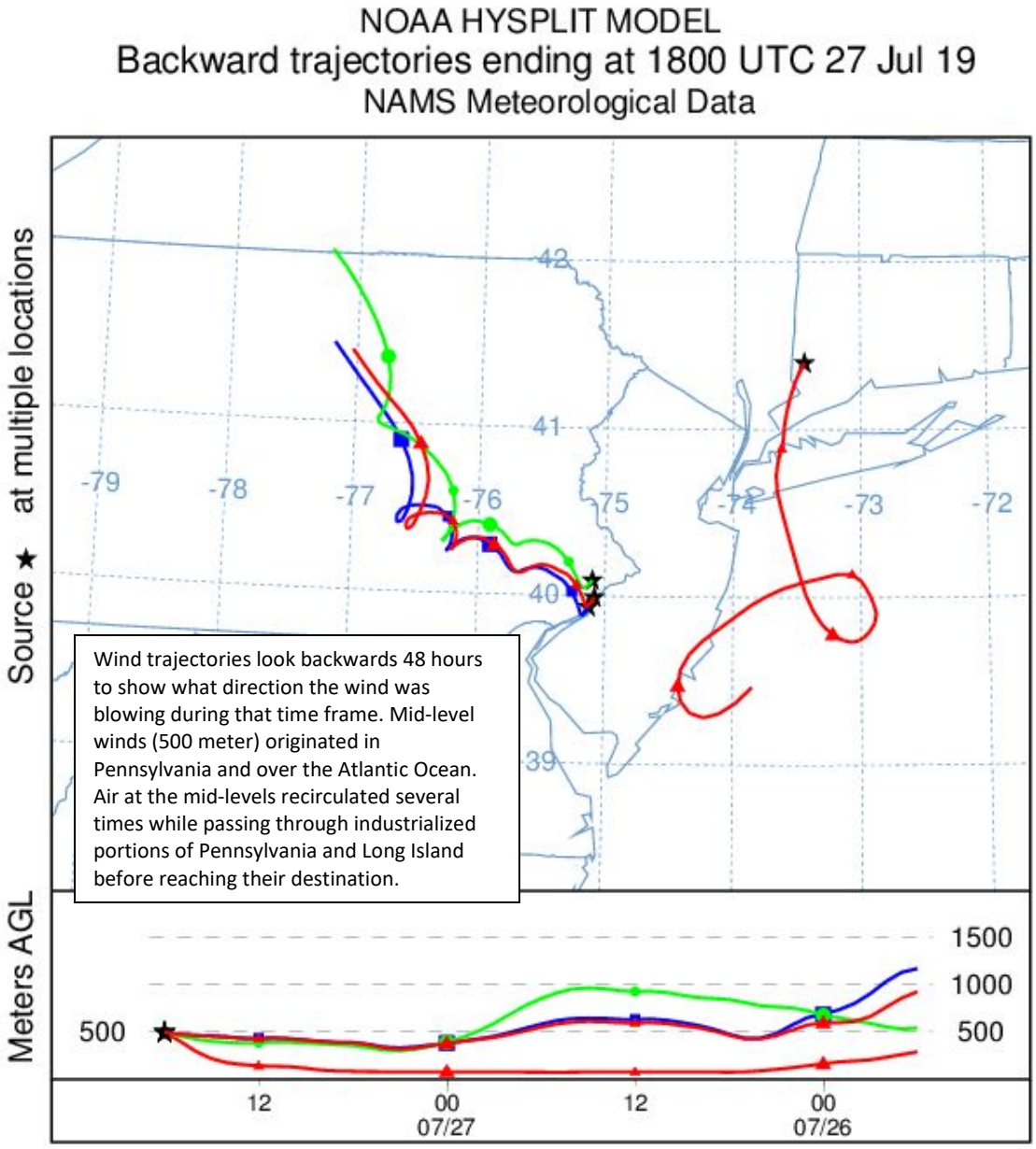


**Figure 4. 48-hour Back Trajectories for July 27, 2019 at 1500 meters**

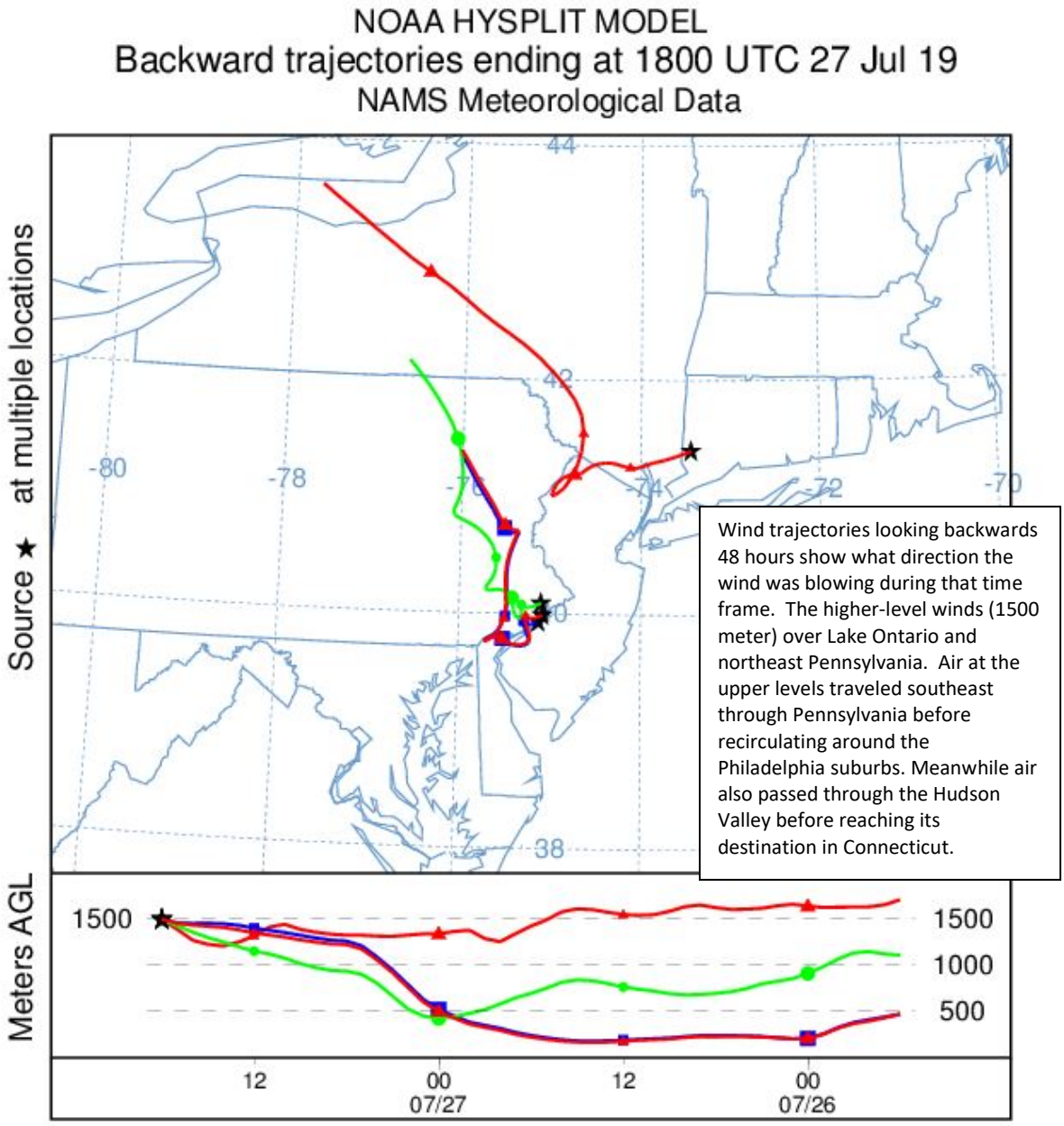
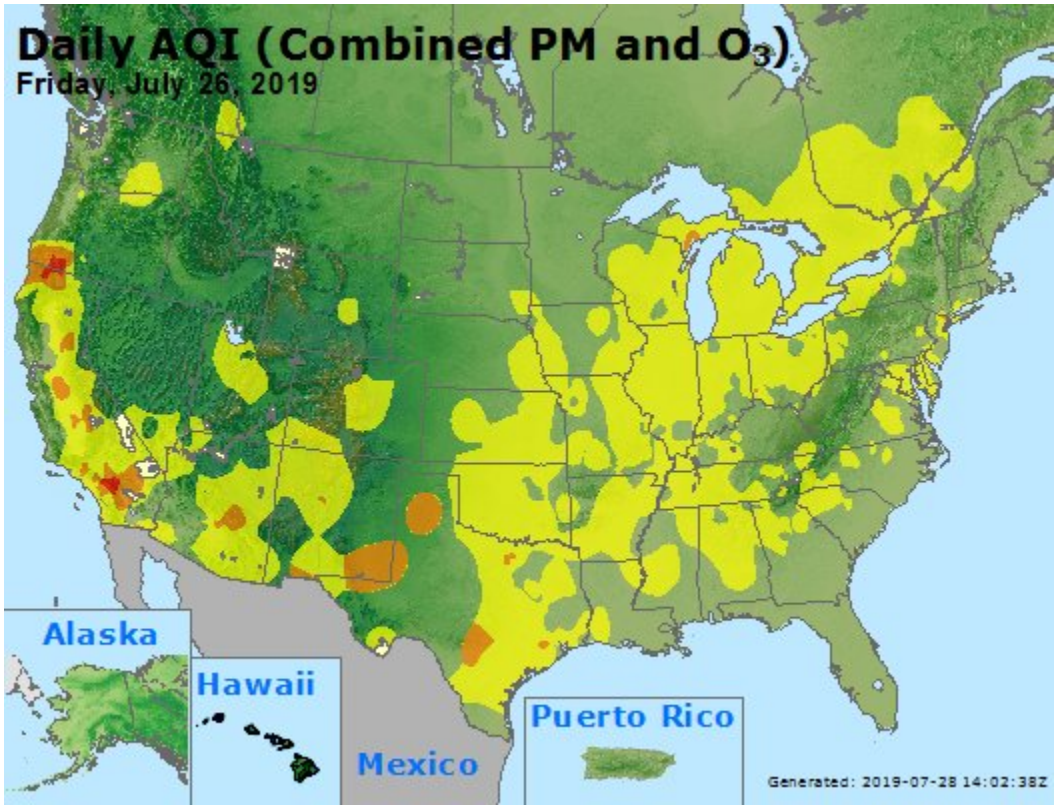


**Figure 5. Combined Air Quality Index for the United States on July 26, 2019**




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.