## Ozone National Ambient Air Quality Standard Health Exceedances on July 28, 2020

### Exceedance Locations and Levels

On Tuesday, July 28, 2020, 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 7/28/2020**

| STATION | Daily Maximum 8-Hr Average (ppb) |
|---|---|
| Ancora State Hospital | 51 |
| Bayonne | 44 |
| Brigantine | No Data |
| Camden Spruce St | 46 |
| Chester | 44 |
| Clarksboro | 52 |
| Colliers Mills | 58 |
| Columbia | 38 |
| Flemington | 47 |
| Leonia | 47 |
| Millville | 49 |
| Monmouth University | 55 |
| Newark Firehouse | 50 |
| Ramapo | 39 |
| Rider University | 53 |
| Rutgers University | 50 |
| Washington Crossing* | 50 |
| TOTAL EXCEEDANCES | 0 |

*The Washington Crossing station is operated and maintained by EPA as part of the nationwide Clean Air Status and Trends Network (CASTNET).

From the out-of-state stations within New Jersey's ozone non-attainment areas, there were two (2) 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 7/28/2020**

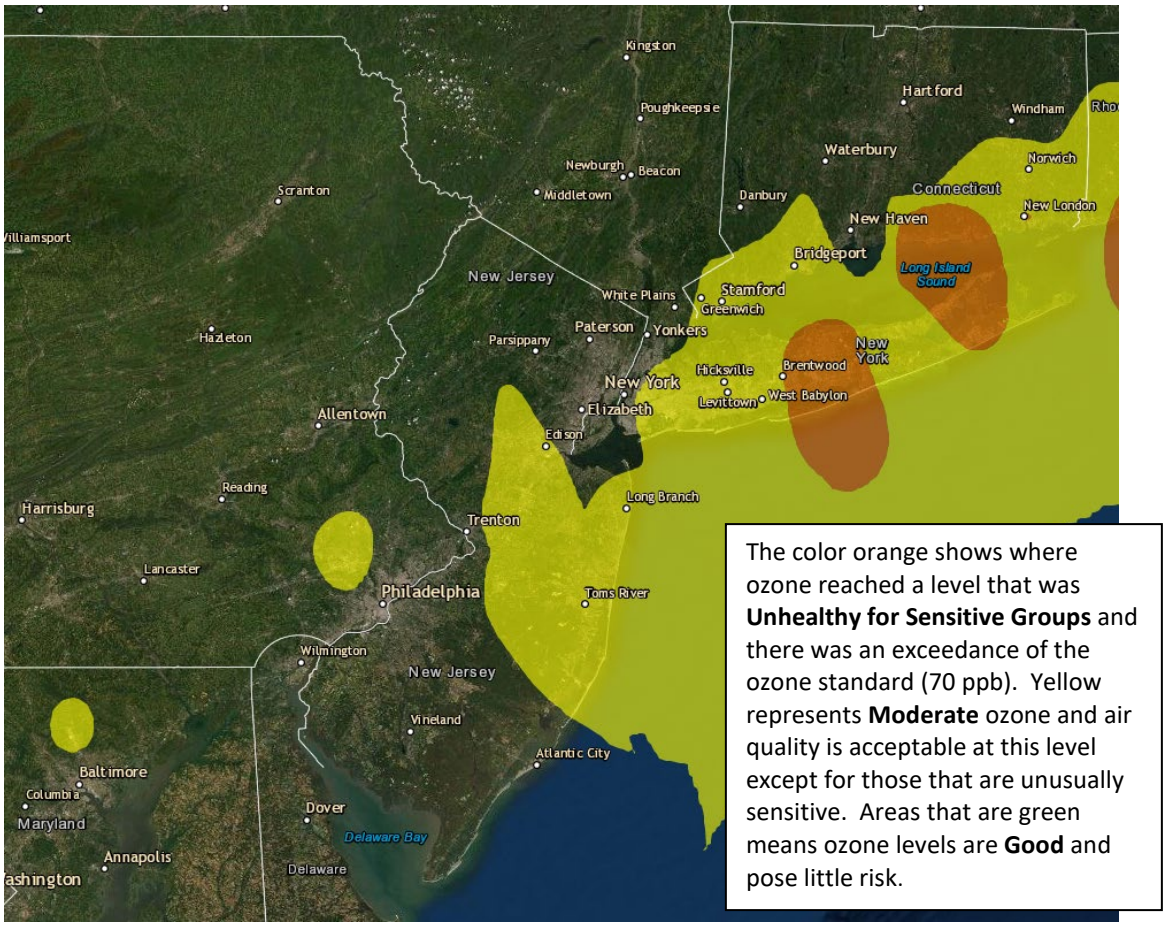
| STATE | STATION | Daily Maximum 8-Hr Average (ppb) |
|---|---|---|
| CT | Danbury | 47 |
| CT | Greenwich | 59 |
| CT | Madison-Beach Road | 86 |
| CT | Middletown-CVH-Shed | 52 |
| CT | New Haven | 48 |
| CT | Stratford | 66 |
| CT | Westport | 60 |
| DE | BCSP (New Castle Co.) | 48 |
| DE | BELLFNT2 (New Castle Co.) | 51 |
| DE | KILLENS (Kent Co.) | 52 |
| DE | LEWES (Sussex Co.) | 53 |
| DE | LUMS 2 (New Castle Co.) | 46 |
| DE | MLK (New Castle Co.) | 50 |
| DE | SEAFORD (Sussex Co.) | 53 |
| MD | Fair Hill | 49 |
| NY | Babylon | 69 |
| NY | Bronx - IS52 | 41 |
| NY | CCNY | 49 |
| NY | Fresh Kills | 51 |
| NY | Holtsville | 73 |
| NY | Pfizer Lab | 51 |
| NY | Queens | 64 |
| NY | Riverhead | 69 |
| NY | Rockland Cty | 41 |
| NY | White Plains | 48 |
| PA | BRIS (Bucks Co.) | 52 |
| PA | CHES (Delaware Co.) | 52 |
| PA | NEWG (Chester Co.) | 49 |
| PA | NORR (Montgomery Co.) | 55 |
| PA | LAB (Philadelphia Co.) | 49 |
| PA | NEA (Philadelphia Co.) | 53 |
| PA | NEW (Philadelphia Co.) | 53 |
| | TOTAL EXCEEDANCES | 2 |

The number of days in 2020 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 2020**

| STATE | # of Days NAAQS was Exceeded January 1 – July 28, 2020 NAAQS = 70 ppb |
|---|---|
| Connecticut | 10 |
| Delaware | 1 |
| Maryland | 0 |
| New Jersey | 4 |
| New York | 6 |
| Pennsylvania | 3 |

**Figure 1. Ozone Air Quality Index for July 28, 2020**




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 Tuesday July 28, 2020, a broad swath of high pressure was in place over the eastern United States, as well as a surface trough and weak frontal boundary over the non-attainment zone. This favorable meteorological setup allowed for mostly sunny skies, persistent hot temperatures, and southwesterly winds throughout the region, resulting in ozone concentrations reaching the Unhealthy for Sensitive Groups category (USG) in Long Island, NY and the Connecticut coastline.

On July 27th, the day prior to our exceedance event, a strong swath of high pressure was centered over the southeastern United States. This allowed for abundant sunshine, temperatures in the low-mid 90's, and light west-southwest winds throughout the region. As a result, widespread USG and even Unhealthy air quality was observed in the Long Island sound region, indicating that a heavily polluted air mass was already in place.

Early on the 28th, the southeastern U.S. high began to weaken as high pressure from the Midwest began to push into the Ohio River Valley, with a frontal boundary separating the two centers of high pressure. A surface trough was also in place over the non-attainment zone for the majority of the overnight hours into early morning on the 28th, stretching from Maine to the southeastern U.S. As the cold front approached, mostly sunny skies and southwesterly winds caused temperatures to rapidly spike into the low-mid 90's for most of the region, with temperatures in Long Island reaching 90 degrees even before 8 AM. By early afternoon, the cold front drastically slowed and stalled directly over central Long Island and the Connecticut coastline, allowing for additional pollutants aloft from days prior to mix down to an already heavily polluted surface. For locations west of the frontal boundary, winds shifted out of the northwest by mid-afternoon, likely inhibiting ozone production due to a cleaner air mass.

The location of the frontal boundary resulted in the mixing of localized pollutants aloft from days prior to the already heavily polluted surface at the two exceedance locations. This in combination with the favorable meteorological conditions mentioned above allowed for ozone concentrations to reach the USG category in Long Island, NY and the Connecticut coastline.

**Where Did the Air Pollution that Caused Ozone Come From?**

Please note, this exceedance is occurring while COVID-19 restrictions in New Jersey are in place, which have impacted transportation, business operations and energy use. As more data becomes available, the Department may have a better characterization of the conditions that influenced elevated ozone pollution levels in 2020.

Figures 2, 3, and 4 show the back trajectories starting at different wind heights for the monitored exceedances on July 28, 2020. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. Two monitoring stations were chosen to run back trajectories and are listed in Table 4 below.

**Table 4. Monitoring Stations with an 8-hr Ozone Exceedance that were Selected to Run 48-hr Back Trajectories**

| STATE | STATION | Daily Maximum 8-Hr Average (ppb) |
|---|---|---|
| CT | Madison-Beach Road | 86 |
| NY | Holtsville | 73 |

Back trajectories on July 28th show that air was influenced by a trough that was draped over the non-attainment area on this day. A broad frontal boundary was also present which allowed air to remain stagnant and recirculate already polluted air from the day before. This combination, along with favorable weather conditions, assisted ozone concentrations rising into the unhealthy for sensitive groups (USG) category on this day in Holtsville, NY and Madison-Beach Road, CT.

Surface level trajectories (Figure 2) show that air at the surface originated in eastern Ohio and northern Virginia before travelling in an easterly direction. During this time, one parcel travelled slowly over the Washington D.C. and Baltimore area, before both parcels meandered over the greater Philadelphia area, which allowed surface level air to pick up localized emissions from cars, trucks, and industry. Trajectories then traversed in a northeasterly direction over the I-95 corridor, following a surface trough, causing pollutants to mix down to surface level. The parcels then travelled over the NYC metropolitan area, where peaking units may have been operating on this day due to a prolonged period of heat and humidity, before arriving their destinations.

Mid-level and upper-level trajectories (Figures 3 & 4) both originated in the Mid-West and followed similar transport pathways initially following the periphery of high pressure before being propelled eastward by an approaching cold front. Beginning their expedition in Missouri, trajectories traveled in a general east-northeastward direction traversing multiple states along the way. Here, mid- and upper level trajectories passed through the heavily industrialized Ohio River Valley where they may have picked up emissions from local industry. Toward the end of their path, trajectories passed through the New York City area where they may have accumulated additional emissions from cars and trucks before reaching their endpoints in Connecticut and Long Island.

Figure 5 shows the National Air Quality Index observed on July 27$^{th}$, the day prior to this high ozone event. As shown in the figure, areas along the Connecticut coastline and Long Island reached the unhealthy for sensitive groups (USG) category with an isolated area of unhealthy located in Connecticut. The rest of the non-attainment area saw moderate levels of ozone on the 27$^{th}$. This previously polluted air was able to enhance ozone production over the region and, in combination with favorable weather conditions ahead of an approaching cold front, ozone levels were able to reach the USG category in isolated locations in Long Island and Connecticut.

**Figure 2. 48-hour Back Trajectories for July 28, 2020 at 10 meters**

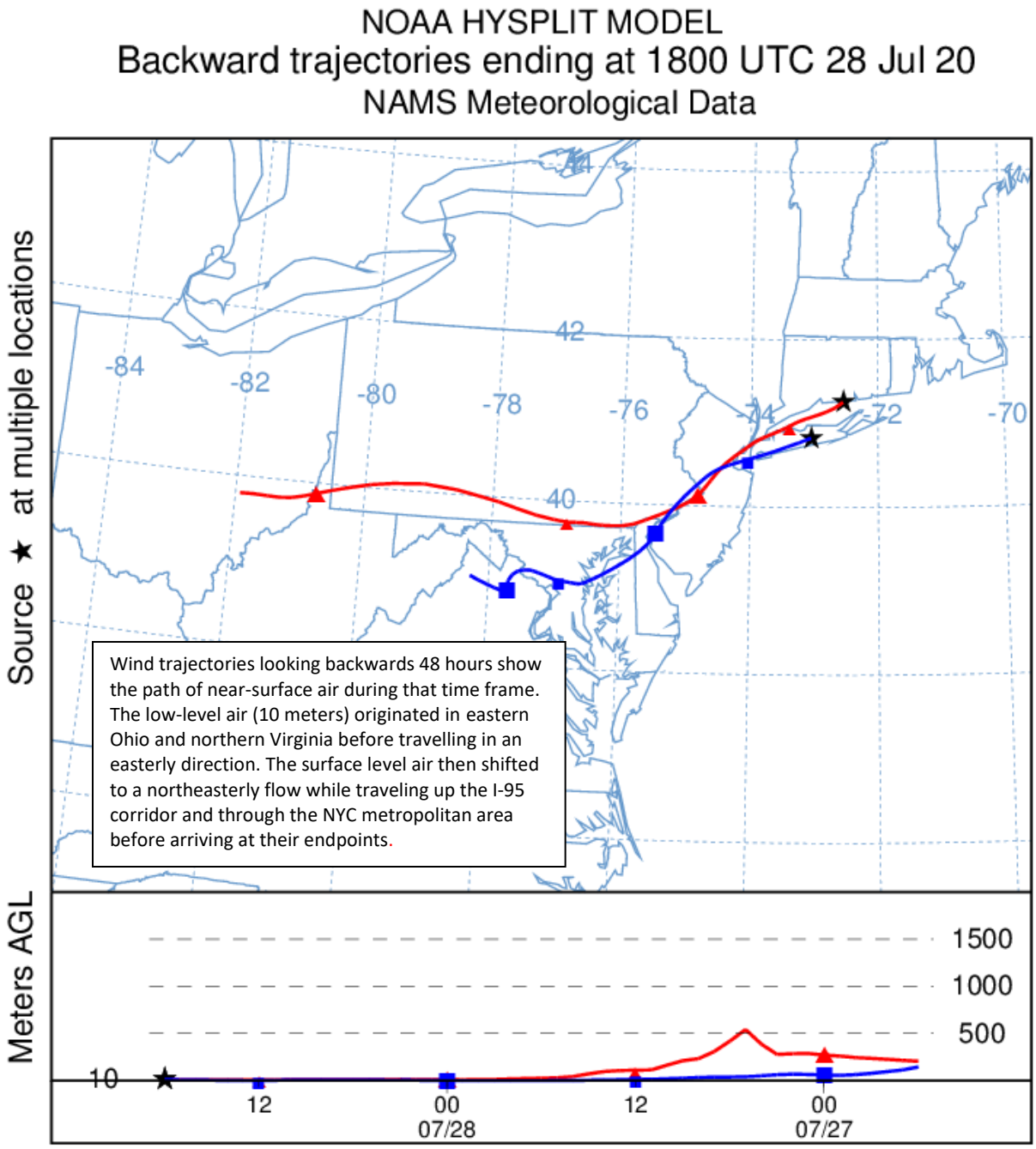


**Figure 3. 48-hour Back Trajectories for July 28, 2020 at 500 meters**

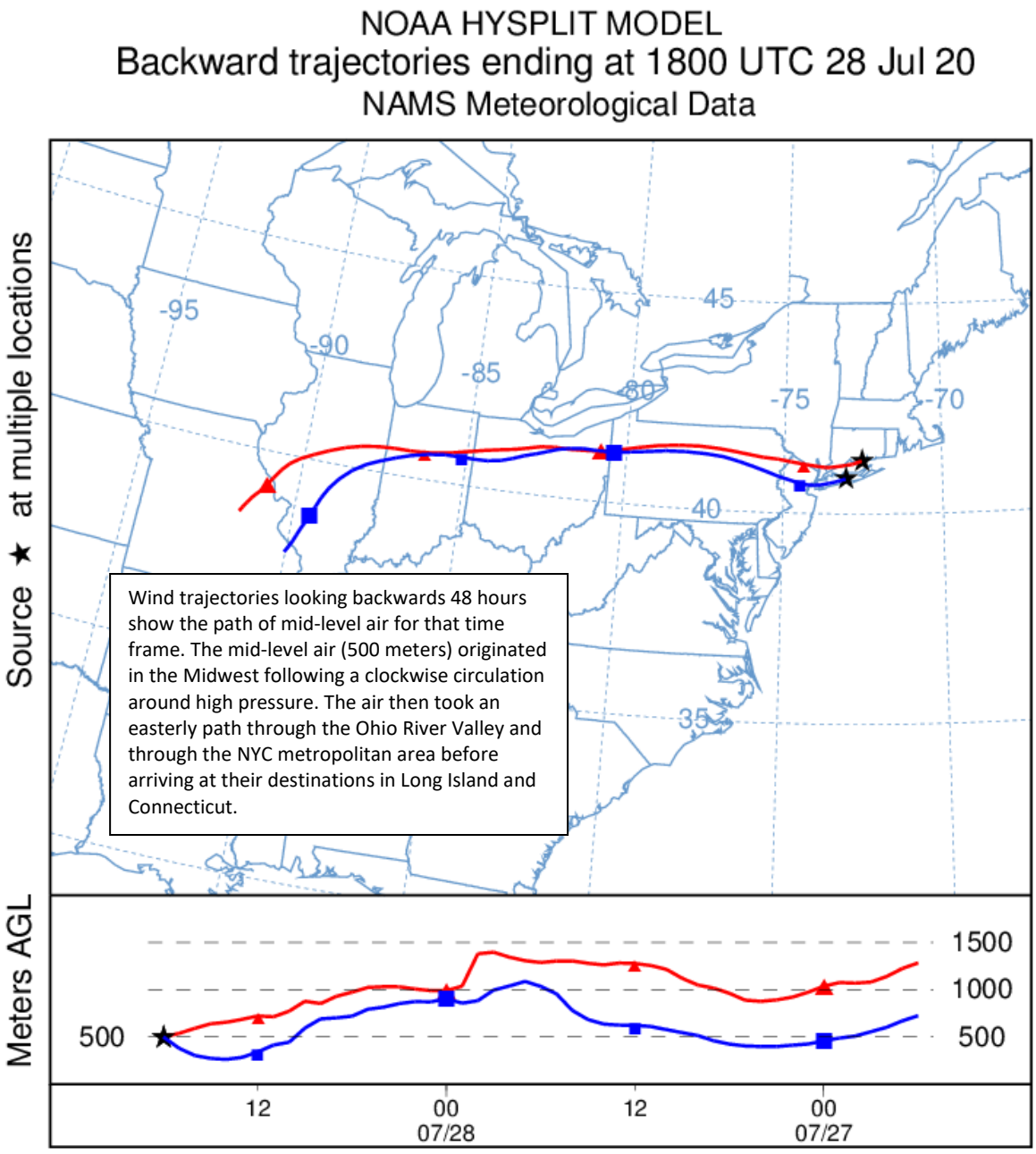


**Figure 4. 48-hour Back Trajectories for July 28, 2020 at 1500 meters**

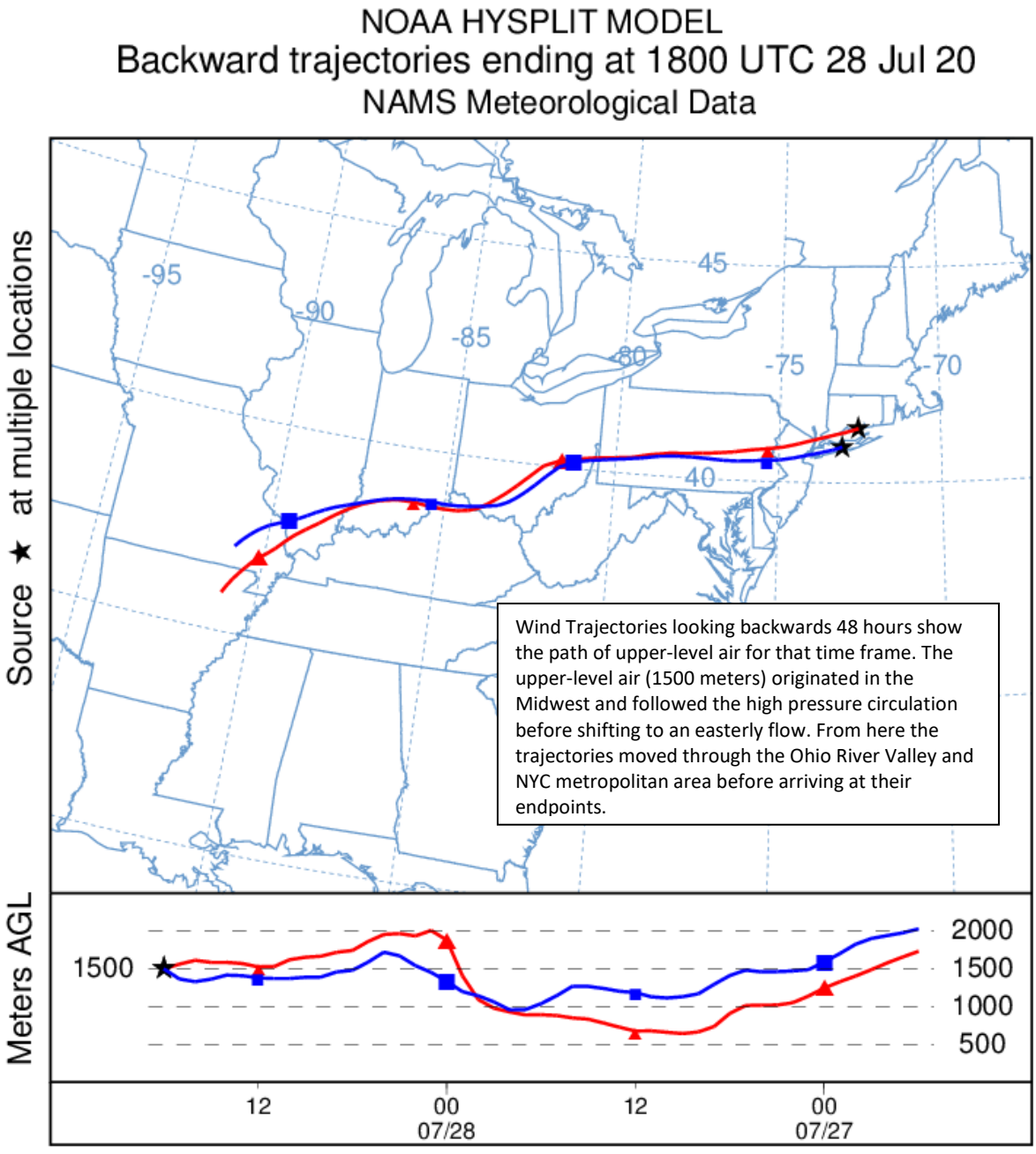
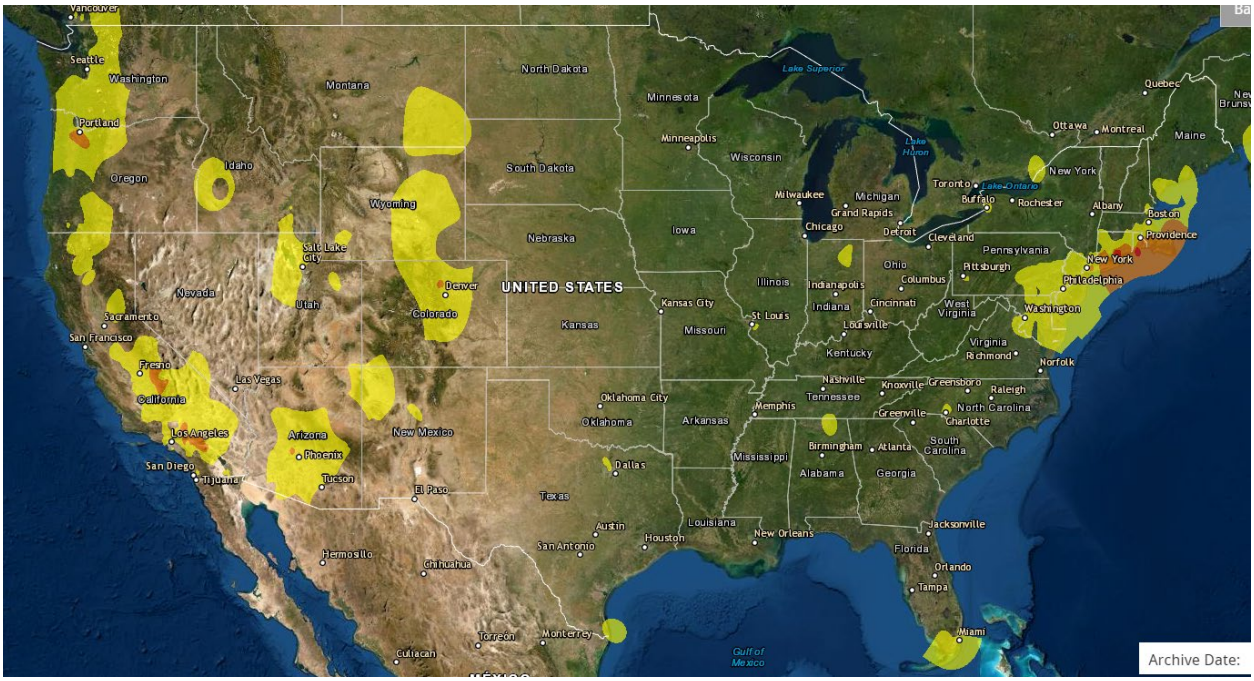


**Figure 5. Combined Air Quality Index for the United States on July 27, 2020**




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**

Learn more about your local ozone air quality forecast by visiting the "What's Your Air Quality Today?" page at http://www.nj.gov/dep/cleanairnj/ .