Ozone National Ambient Air Quality Standard Health Exceedances on August 5, 2020

Exceedance Locations and Levels

On Wednesday, August 5, 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 8/5/2020

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	54
Bayonne	47
Brigantine	No Data
Camden Spruce St	49
Chester	48
Clarksboro	57
Colliers Mills	No Data
Columbia	40
Flemington	No Data
Leonia	No Data
Millville	47
Monmouth University	No Data
Newark Firehouse	53
Ramapo	No Data
Rider University	44
Rutgers University	No data
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).

Please note, the monitoring stations that were unable to report data due to power outages are noted in the Table 1 as “No Data”.

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 8/5/2020

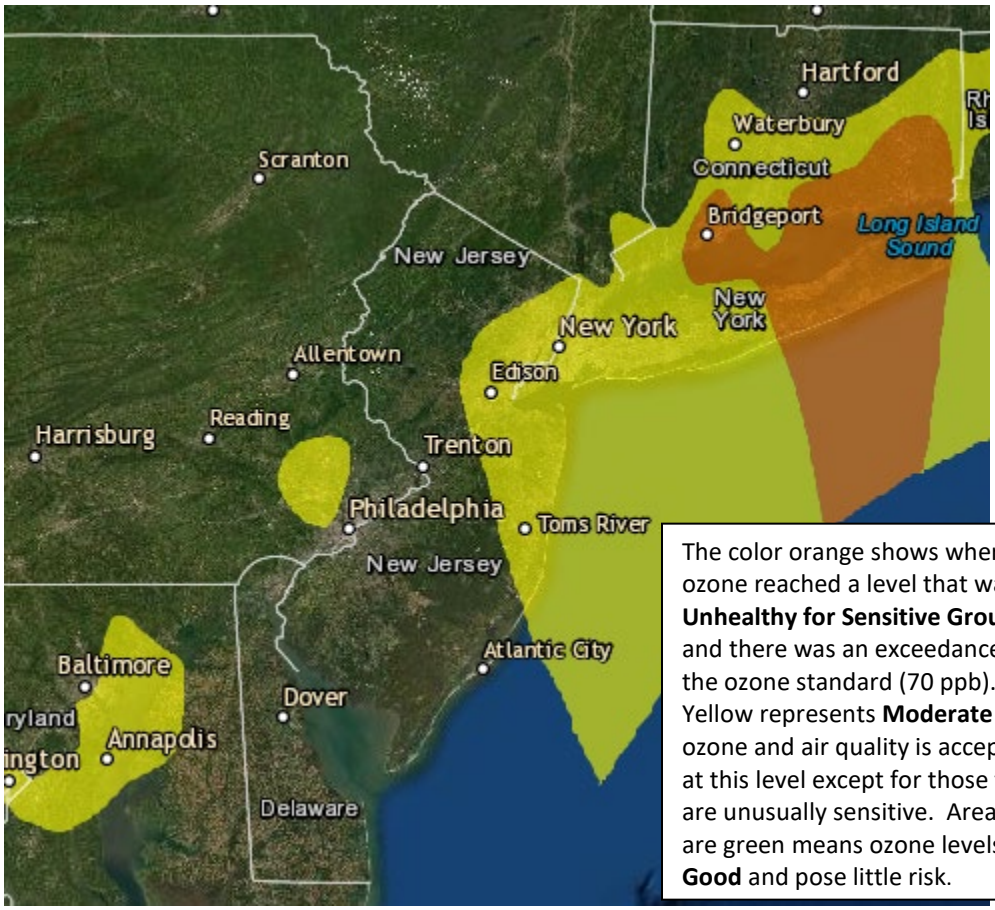
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	48
CT	Greenwich	67
CT	Madison-Beach Road	85
CT	Middletown-CVH-Shed	57
CT	New Haven	66
CT	Stratford	76
CT	Westport	No Data
DE	BCSP (New Castle Co.)	48
DE	BELLFNT2 (New Castle Co.)	51
DE	KILLENS (Kent Co.)	43
DE	LEWES (Sussex Co.)	54
DE	LUMS 2 (New Castle Co.)	50
DE	MLK (New Castle Co.)	50
DE	SEAFORD (Sussex Co.)	45
MD	Fair Hill	No Data
NY	Babylon	67
NY	Bronx - IS52	56
NY	CCNY	52
NY	Fresh Kills	No Data
NY	Holtsville	66
NY	Pfizer Lab	56
NY	Queens	65
NY	Riverhead	72
NY	Rockland Cty	44
NY	White Plains	53
PA	BRIS (Bucks Co.)	48
PA	CHES (Delaware Co.)	53
PA	NEWG (Chester Co.)	41
PA	NORR (Montgomery Co.)	57
PA	LAB (Philadelphia Co.)	51
PA	NEA (Philadelphia Co.)	53
PA	NEW (Philadelphia Co.)	53
	TOTAL EXCEEDANCES	3

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 – August 5, 2020 NAAQS = 70 ppb
Connecticut	13
Delaware	2
Maryland	0
New Jersey	4
New York	8
Pennsylvania	4

Figure 1. Ozone Air Quality Index for August 5, 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

In the wake of Post Tropical Storm Isaias, a frontal boundary was stalled over the non-attainment area on Wednesday, August 5th, 2020. This boundary helped to determine the wind direction and transport pattern throughout the region which relieved some locations of ozone production while enhancing it in others. These localized atmospheric conditions allowed ozone to rise along the Connecticut coastline and in Long Island leading to multiple exceedances.

A cold front approached the region from the west early in the day on August 5th, before stalling over the non-attainment area during the mid-day hours. This boundary, associated with Post Tropical Storm Isaias, which was located over southern Quebec, extended south through New England, central Connecticut, and into the Mid-Atlantic region. The placement of this front highly influenced the weather conditions across the non-attainment area on this day. Locations west of this front saw westerly winds with a mix of sun and clouds and temperatures reaching the upper 80s. Despite warm temperatures and mostly sunny skies, locations west of the front received a regionally clean air mass that greatly limited ozone formation. Meanwhile, locations east of the stalled front, saw mostly sunny skies, and southwesterly winds allowing for the transport of localized emissions from Long Island Sound into an environment of favorable ozone conditions. Additionally, the exceedance monitors were among the final locations for the front to pass through, allowing pollutants to mix down to the surface and accumulate in this area. August 5th was also the day after Tropical Storm Isaias crossed the region, leaving behind widespread power outages. As a result, many households and industries may have been running generators for extended periods, further contributing to ozone concentrations at the surface.

The observed exceedances along the Connecticut coastline and Long Island on August 5th can be attributed to the transport of localized emissions from Long Island Sound as well as the NYC metropolitan area into a favorable environment for ozone production.

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 August 3, 2020. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. Three monitoring stations were chosen to model 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	Stratford	76
CT	Madison-Beach Road	85
NY	Riverhead	72

Back trajectories from August 5th show that elevated ozone levels over portions of the northern non-attainment area were influenced by the localized transport of emissions from the NYC metropolitan area. Under favorable weather conditions, described above, unhealthy for sensitive groups (USG) levels of ozone were observed along the Connecticut coastline and over portions of eastern Long Island, NY.

Surface-level back trajectories (Figure 2) show air at the surface originated over eastern South Carolina, and off the coast of Virginia, before travelling in a north-northeast direction along the eastern seaboard. Under a tropical influence, air rotated in a counterclockwise direction over South Carolina, picking up localized emissions. One of the surface trajectories flowed in a counterclockwise direction, but over the Chesapeake Bay region, which allowed the air parcel to pick up emissions from the greater Washington D.C. area. Air parcels then traversed in a north-northeasterly direction, over the NYC metropolitan area and Long Island Sound vicinity before arriving its destination. It is worth note, air at this level traveled along the surface for the duration of its path, picking up emissions from cars, trucks, and industry along the way, enhancing ozone levels in a region recovering from the passage of Tropical Storm Isaias.

In Figure 3, air the mid-levels of the atmosphere (500 meters), originated in central Ohio and began traveling in a northeasterly direction before being influenced by Tropical Storm Isaias. As Tropical Storm Isaias surged northward early on the 4th, air at the mid-levels entered the southern region of the departing storm, where a westerly flow was observed following a counterclockwise circulation around the low-pressure center. As a result, the air parcels traversed in a slight counterclockwise motion through the majority of Pennsylvania. Overnight on the 5th, high pressure began to push in from the west, resulting in a southwesterly flow that transported the air parcels through northern New Jersey, the NYC metropolitan area, and eventually over the Long Island Sound onto the Connecticut Coastline and eastern Long Island, NY. In Figure 4, the upper level back trajectories (1500 meters) originated in portions of eastern Missouri and central Indiana. Like the mid-level air, the upper-level air parcels traveled in a primarily northeasterly direction through the heavily industrialized Ohio River Valley, southern Pennsylvania, and eventually through the NYC metropolitan area before arriving at its endpoints. Air at both the mid- and upper levels experienced a sinking motion towards the surface, which allowed for any pollutants aloft from upwind states and localized pollutants over the non-attainment zone to mix down to the surface.

Figure 5 shows the National Air Quality Index observed on August 4nd, the day prior to this high ozone event. Much of the region observed good air quality on this day due to the passage of Tropical Storm Isaias. Despite this, locally transported pollutants from the NYC metropolitan area and Long Island Sound may have contributed to the ozone concentrations in Connecticut and Long Island, NY on August 5th. The favorable meteorological conditions mentioned above along with this transport allowed ozone concentrations to rise to the unhealthy for sensitive groups category.

Figure 2. 48-hour Back Trajectories for August 5, 2020 at 10 meters

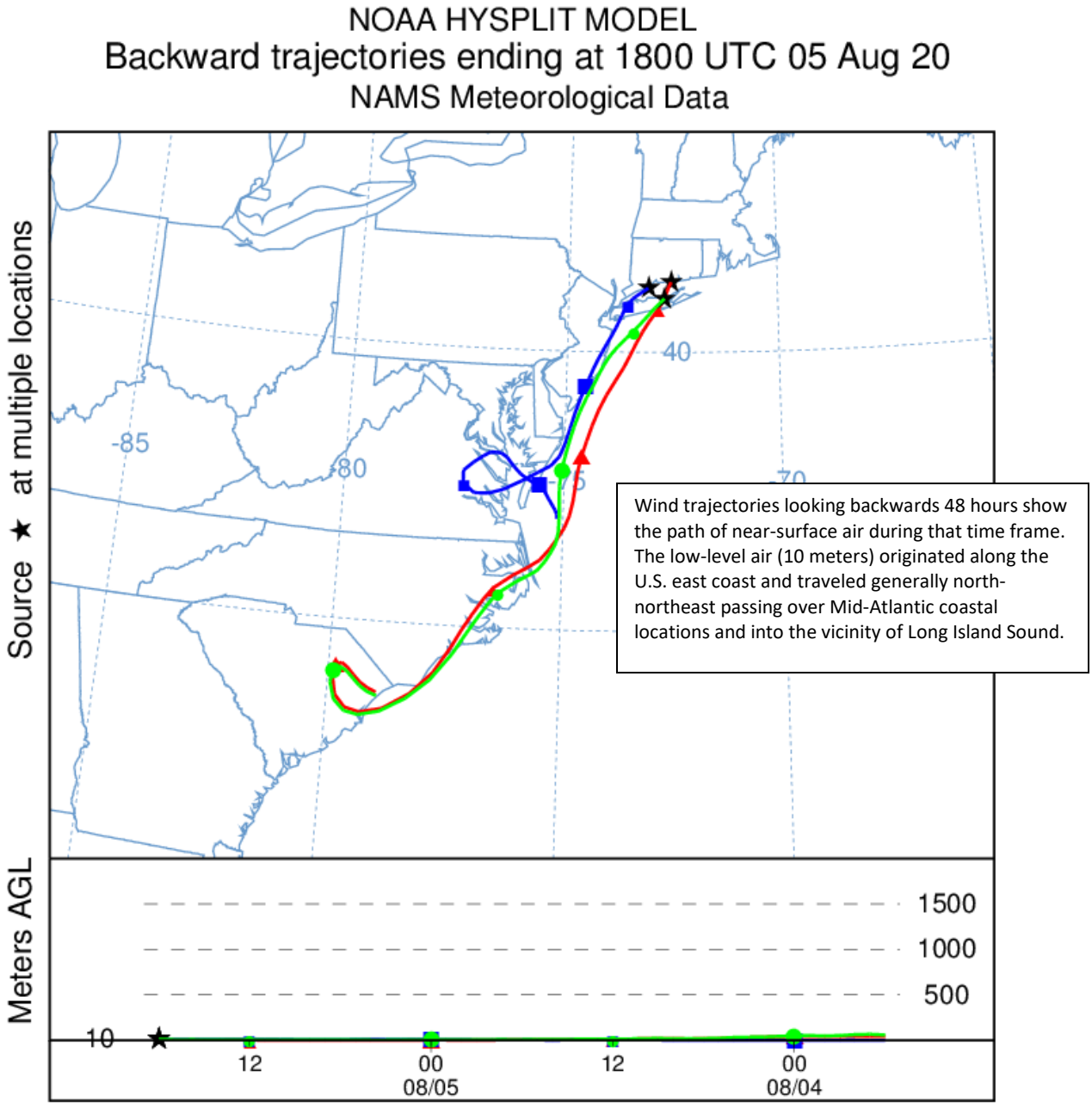


Figure 3. 48-hour Back Trajectories for August 5, 2020 at 500 meters

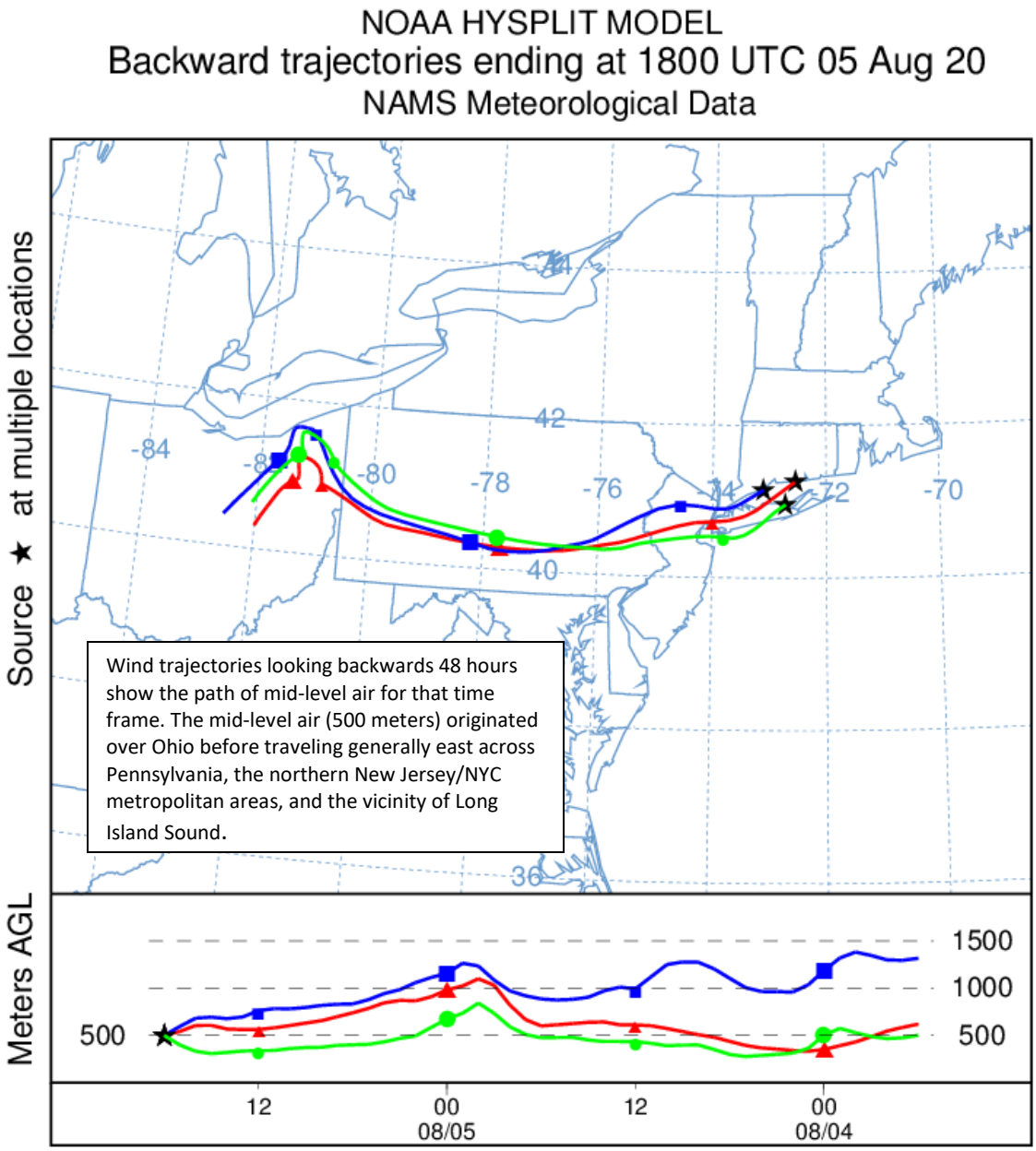


Figure 4. 48-hour Back Trajectories for August 5, 2020 at 1500 meters

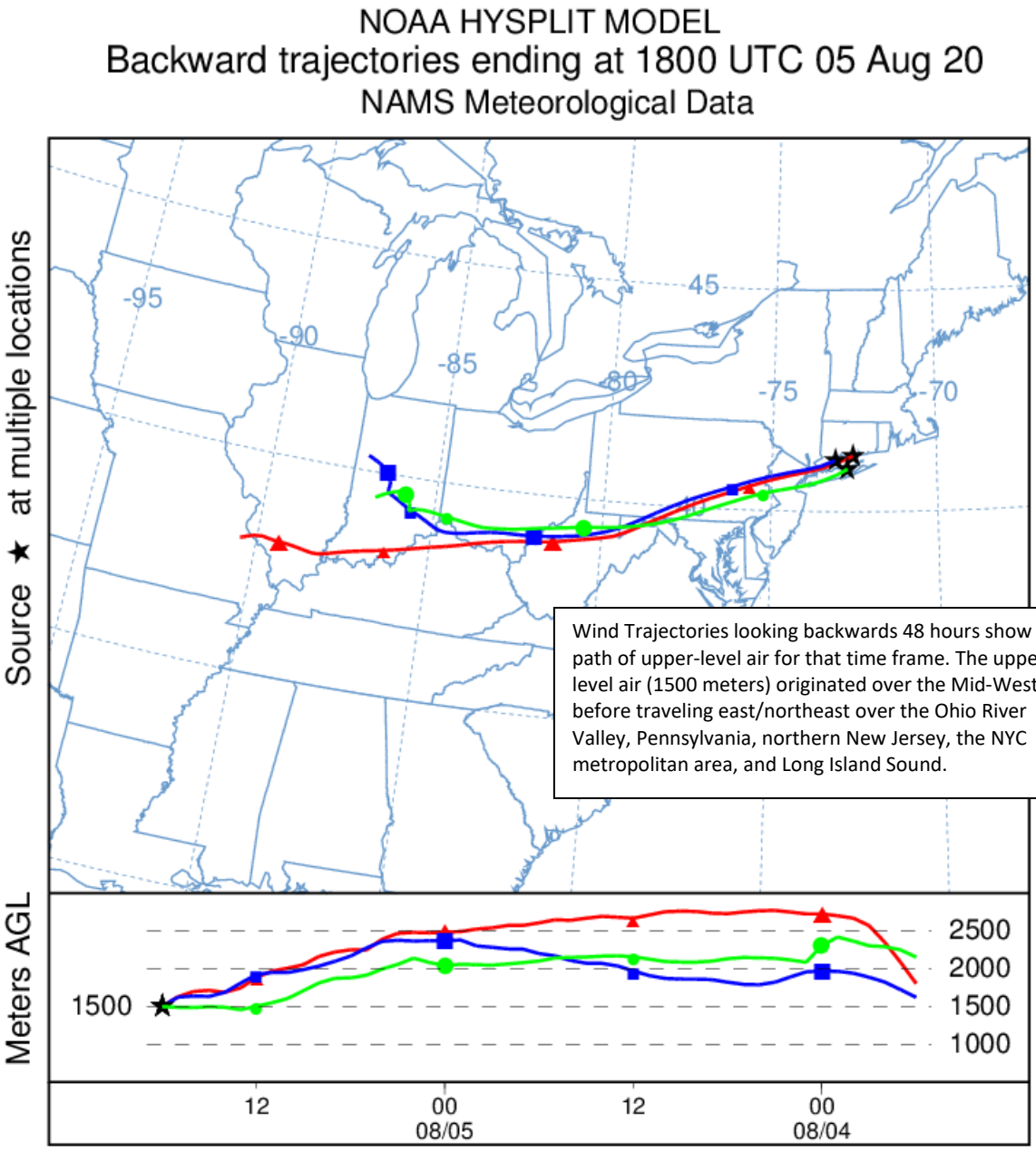
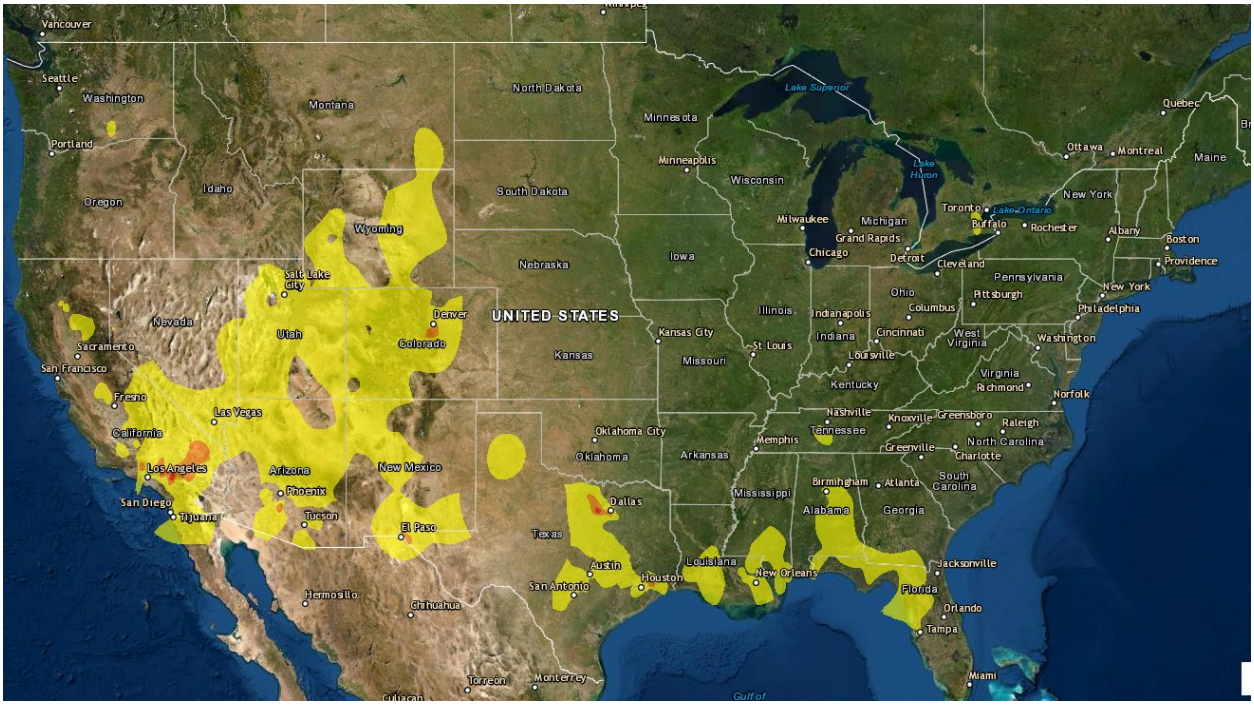


Figure 5. Combined Air Quality Index for the United States on August 4, 2020



Source: www.airnow.gov

How is Ozone Created?

Ground-level ozone is an air pollutant known to cause several 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/ .