

Ozone National Ambient Air Quality Standard Health Exceedances on August 10, 2020

Exceedance Locations and Levels

On Monday, August 10, 2020, there were two (2) 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 8/10/2020

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	46
Bayonne	65
Brigantine	34
Camden Spruce St	64
Chester	57
Clarksboro	56
Colliers Mills	59
Columbia	50
Flemington	55
Leonida	76
Millville	39
Monmouth University	44
Newark Firehouse	65
Ramapo	62
Rider University	71
Rutgers University	66
Washington Crossing*	64
TOTAL EXCEEDANCES	2

*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 four (4) 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 8/10/2020

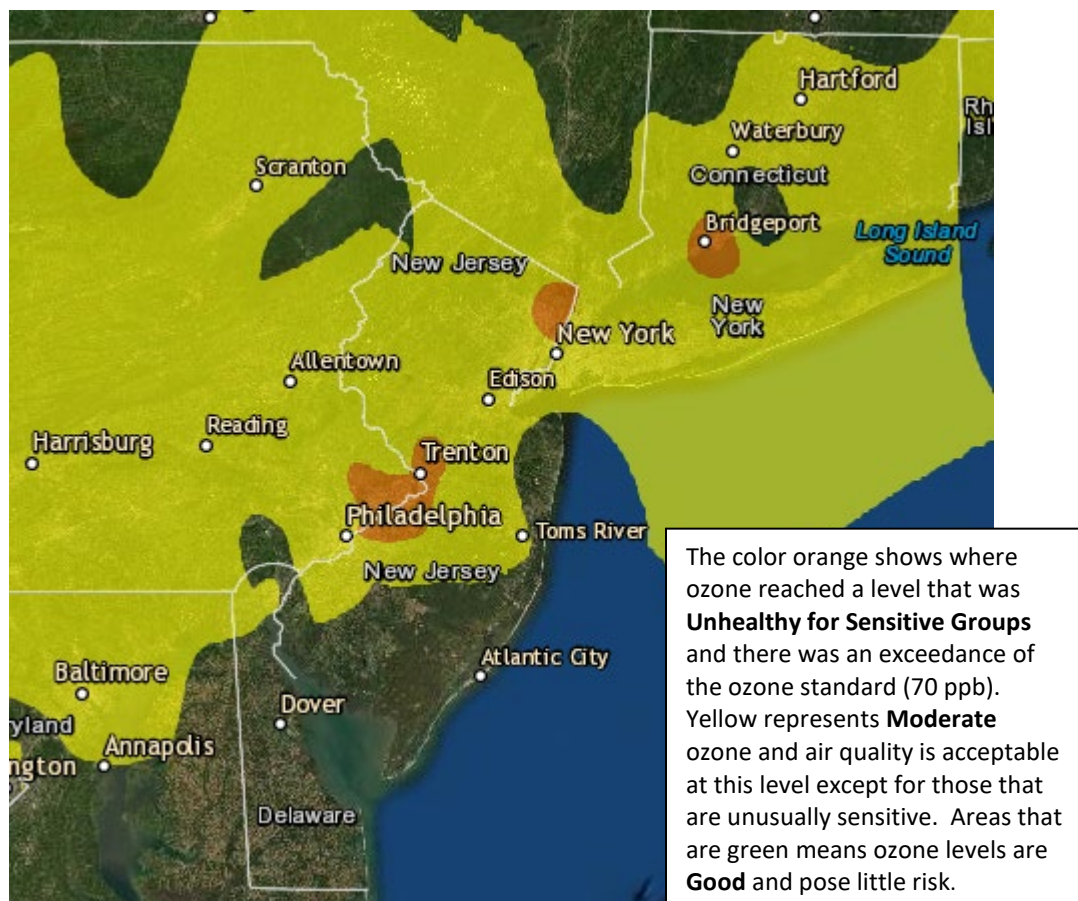
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	68
CT	Greenwich	No Data
CT	Madison-Beach Road	54
CT	Middletown-CVH-Shed	69
CT	New Haven	52
CT	Stratford	71
CT	Westport	No Data
DE	BCSP (New Castle Co.)	51
DE	BELLFNT2 (New Castle Co.)	49
DE	KILLENS (Kent Co.)	38
DE	LEWES (Sussex Co.)	37
DE	LUMS 2 (New Castle Co.)	50
DE	MLK (New Castle Co.)	55
DE	SEAFORD (Sussex Co.)	37
MD	Fair Hill	61
NY	Babylon	62
NY	Bronx - IS52	65
NY	CCNY	70
NY	Fresh Kills	57
NY	Holtsville	60
NY	Pfizer Lab	70
NY	Queens	64
NY	Riverhead	60
NY	Rockland Cty	56
NY	White Plains	70
PA	BRIS (Bucks Co.)	75
PA	CHES (Delaware Co.)	58
PA	NEWG (Chester Co.)	23
PA	NORR (Montgomery Co.)	69
PA	LAB (Philadelphia Co.)	66
PA	NEA (Philadelphia Co.)	74
PA	NEW (Philadelphia Co.)	73
	TOTAL EXCEEDANCES	4

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 10, 2020 NAAQS = 70 ppb
Connecticut	14
Delaware	2
Maryland	0
New Jersey	5
New York	8
Pennsylvania	5

Figure 1. Ozone Air Quality Index for August 10, 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 Monday, August 10th, a stationary front was located over the nonattainment area. In addition, a sea breeze developed over the coastal areas. As a result, pollutants were able to build up in between these boundaries along the I-95 corridor and into parts of western Connecticut. Ozone formation was enhanced in these areas and isolated locations saw ozone levels reach the unhealthy for sensitive groups (USG) category.

A stalled frontal boundary along the western periphery of weak high pressure was located over the region early Monday morning. The front stretched from eastern Pennsylvania through northern New Jersey, New York City, Connecticut, and up the New England coastline. As the day progressed, the front slowly made its way south before weakening and dissipating over the area. Temperatures reached the low 90s across the region with a light southwest wind across most of the area, except for the Jersey Shore, Long Island, and the Connecticut coast, which all had a sea breeze develop throughout the day. Skies were mostly sunny in the morning and early afternoon. By late afternoon, the stationary front, as well as the sea breeze, allowed for some scattered cumulus to develop across the area along with scattered showers. The combination of the sea breeze and stationary front allowed pollutants to build along the I-95 corridor and into the western portion of the Connecticut coast. The stationary front also allowed for additional mixing over these areas and, as a result of this mixing and other favorable weather conditions, isolated areas of USG were observed.

The observed exceedances can be attributed to the position of the stationary front in combination with the sea breeze front along coastal areas. This allowed for an increase in pollutants and ozone production in the area between the fronts. These favorable meteorological conditions allowed for multiple isolated exceedances to occur throughout the nonattainment area.

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. Six 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	71
NJ	Leonida	76
NJ	Rider University	71

PA	Bristol (Bucks Co.)	75
PA	NEA	74
PA	NEW	73

Back trajectories from August 10th show that isolated exceedances in the northern non-attainment area as well as in the Philadelphia metropolitan area and portions of central New Jersey were influenced by both the localized transport of emissions along the I-95 corridor as well as the long-range transport of previously polluted air from the Great Lakes/Ohio River Valley regions.

The surface level back trajectory (Figure 2) shows that air originated over Mid-Atlantic coastal locations. Air influencing the Philadelphia metropolitan area as well as the New Jersey monitors, traveled north-northeast through the Chesapeake Bay region and then northeast along the I-95 corridor to its destination. Air impacting the Connecticut coastline traveled further east, over coastal New Jersey, the NYC metropolitan area, and the Long Island South region into arrival. All trajectories traveled along the surface during their duration, picking up localized emission from cars, trucks, and industry along the way. Additionally, moderate levels of ozone were noted over portions of the non-attainment area, specifically along the I-95 corridor and the NYC metropolitan area, in the day leading up to this exceedance event. As such, it is likely that this air at the surface, under favorable weather conditions, became increasingly polluted throughout the day.

Figure 3 shows mid-level back trajectories at 500 meters. Trajectories travelling into northern New Jersey and Connecticut originated in Ohio, and traversed in an easterly direction over Pennsylvania, picking up previously polluted air from the day prior. Before reaching their endpoints, air parcels travelled over the New York City metropolitan area, picking up emissions aloft from vehicles and local industry. A second set of trajectories originated in Virginia and West Virginia. Under the influence of high pressure, the air parcels rotated in a clockwise direction, while slowly meandering northward. Mid-level air traversed over the Washington metropolitan area, picking up ozone precursors along the path, before reaching their endpoints in the greater Philadelphia area.

In Figure 4, air at upper levels (1500 meters) originated in the southern Great Lakes region. With high pressure setup over the mid-Atlantic and northeast, a primarily westerly upper level flow dominated the region, causing the air parcels to track in an east-southeasterly direction throughout the entirety of their trajectories. The air parcels traversed over southern Michigan, Ohio, and Pennsylvania along its path, all regions that observed widespread moderate and isolated USG the day prior, as seen in Figure 5 below. For the exceedances in central New Jersey and southeastern PA, upper level air traversed over the Philadelphia metropolitan area, gathering additional pollutants aloft and transporting them towards the surface. Meanwhile, the exceedances in northern New Jersey and the CT coastline saw upper level air that traversed over northern Pennsylvania, northern New Jersey, and southern New York state before arriving at their endpoints.

Figure 5 shows the National Air Quality Index observed on August 9th, the day prior to this high ozone event. As shown in the figure, widespread moderate air quality was observed in the Ohio River Valley on this day, which is consistent with where the air came from in the mid and upper levels. Both the localized transport of emissions up the I-95 corridor, residual ozone within the non-attainment area, as well as, long range transport from the Ohio River Valley created a favorable environment for ozone

formation. As a result, multiple exceedances were observed throughout the non-attainment area on August 10th.

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

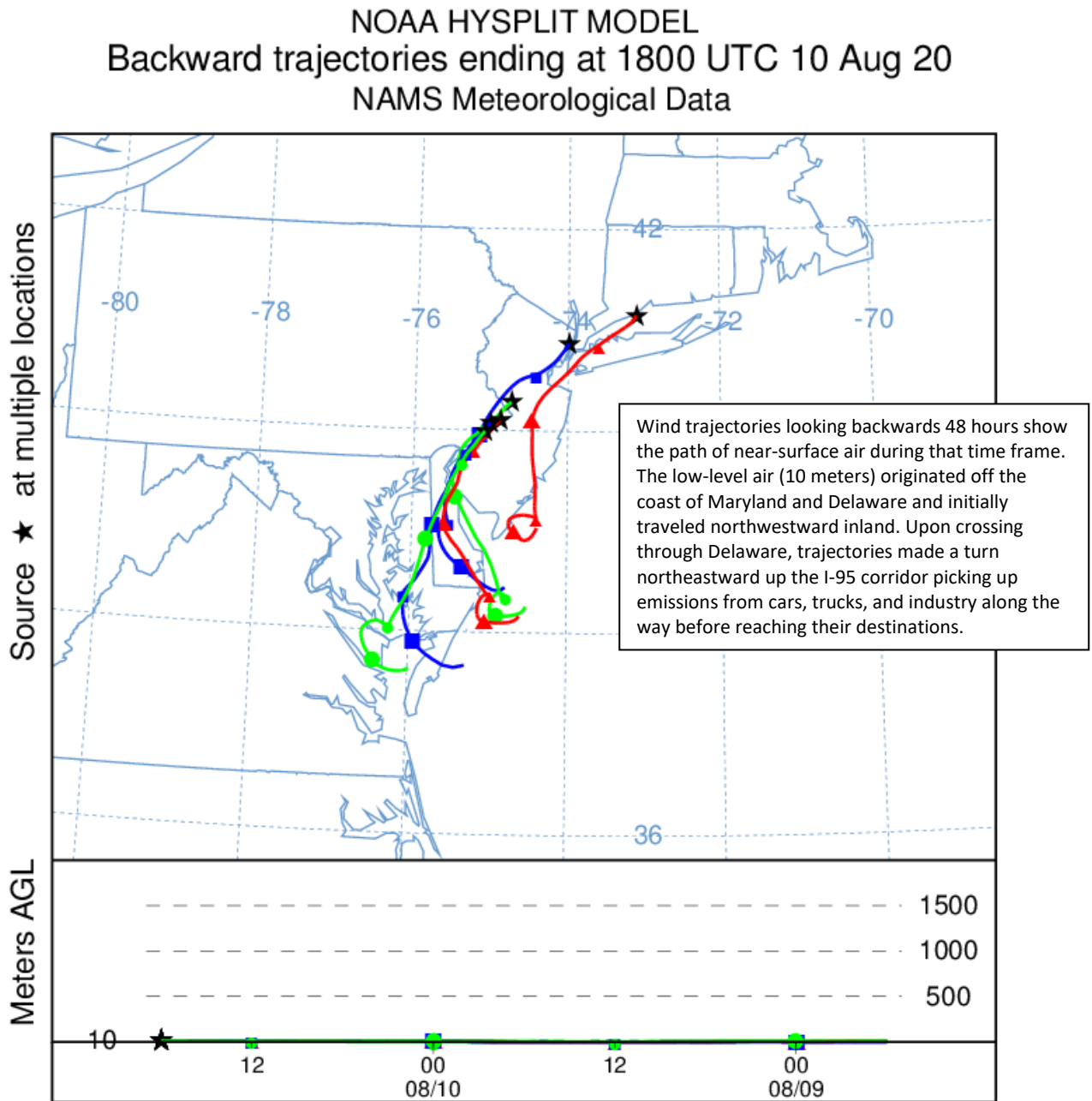


Figure 3. 48-hour Back Trajectories for August 10, 2020 at 500 meters

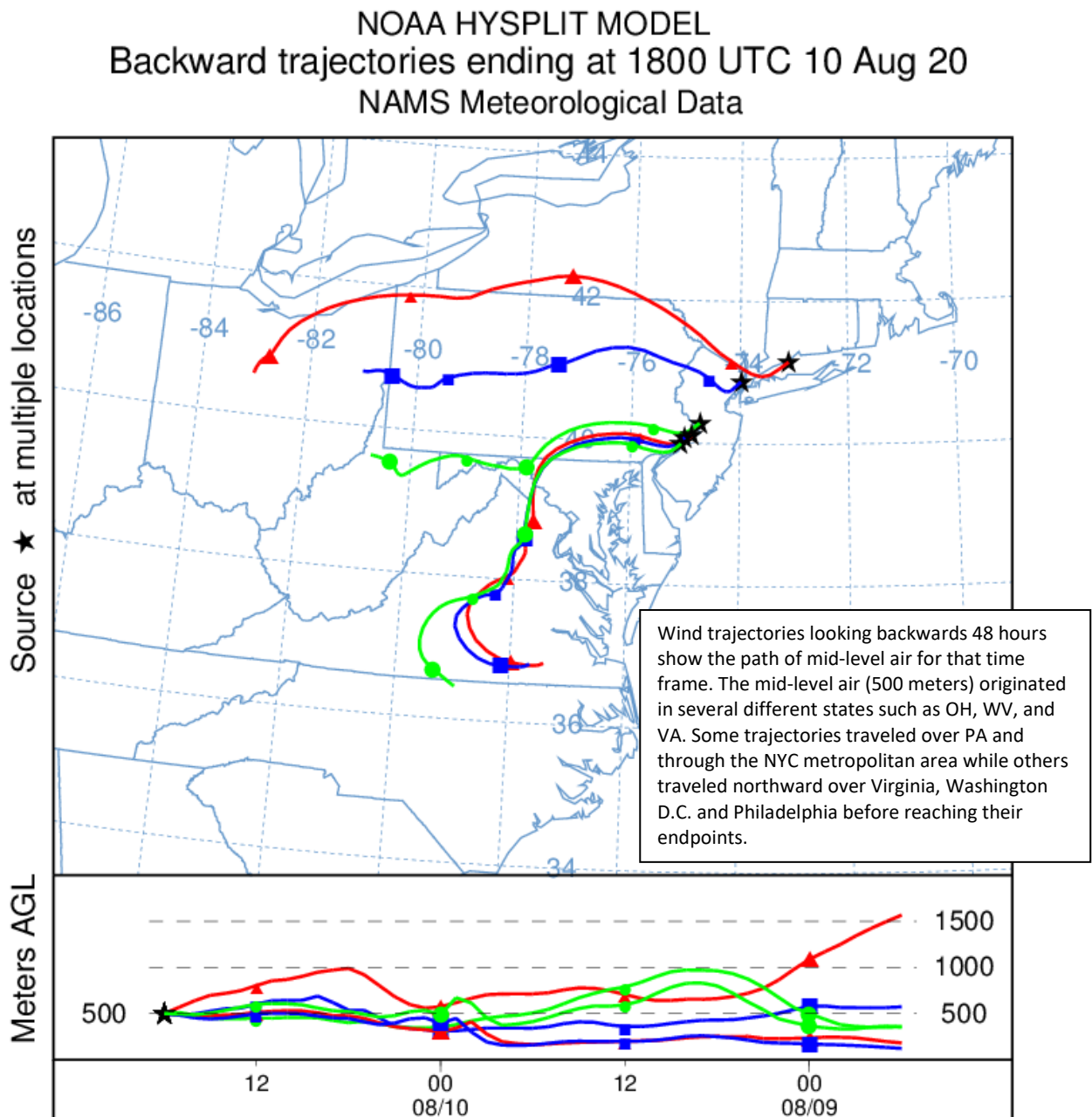


Figure 4. 48-hour Back Trajectories for August 10, 2020 at 1500 meters

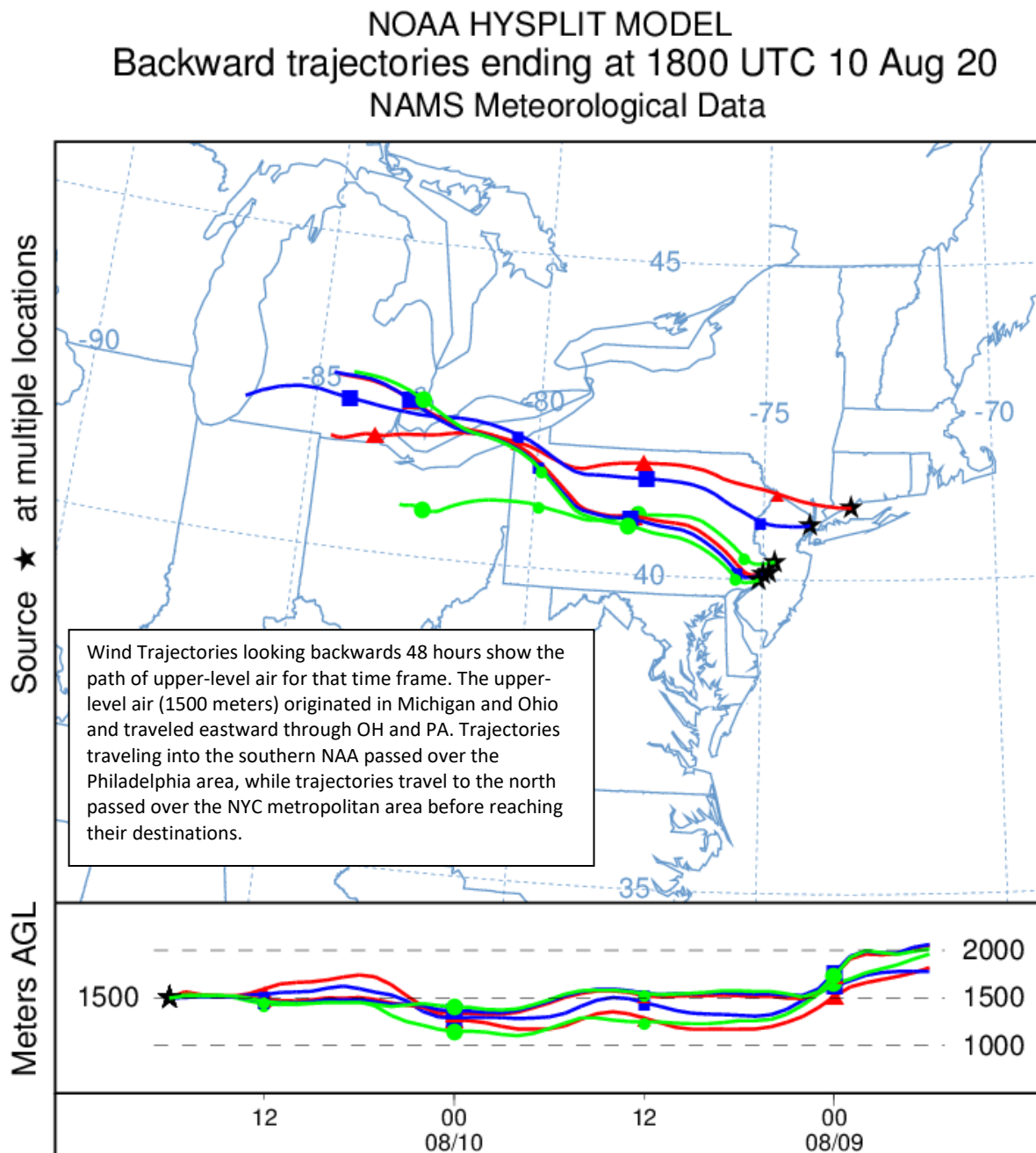
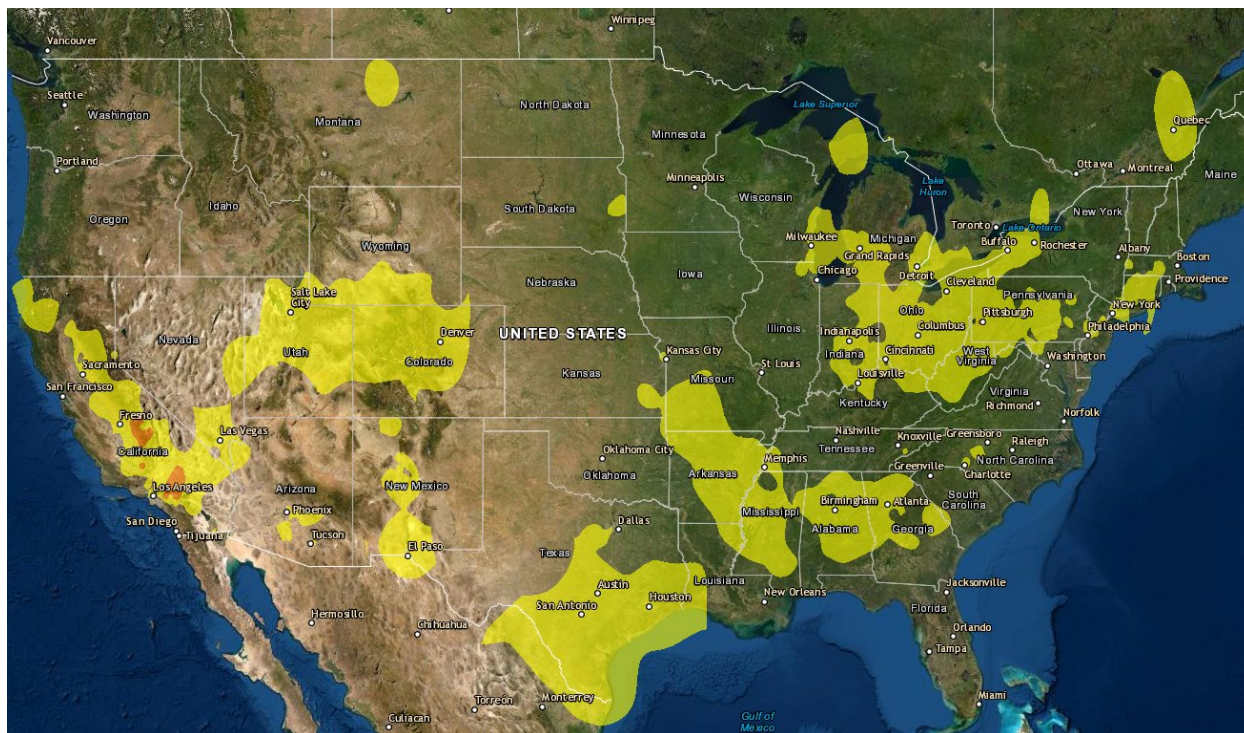


Figure 5. Combined Air Quality Index for the United States on August 9, 2020



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 (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

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/>.