Ozone National Ambient Air Quality Standard Health Exceedances on July 26, 2021

On Monday, July 26, 2021, 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). Since this exceedance, 87 ppb at Monmouth University, was unusually high, the same-day calibration data was reviewed, and the site operator was dispatched to inspect the sampling train. The calibration results met applicable criteria, and the inspection of the sampling train did not reveal any improper operation, hence the data is valid. See Table 1.

Table 1. New Jersey Ozone Concentrations on 7/26/2021

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	61
Bayonne	58
Brigantine	47
Camden Spruce St	67
Chester	48
Clarksboro	62
Colliers Mills	61
Columbia	46
Flemington	56
Leonia	37
Millville	58
Monmouth University	87
Newark Firehouse	56
Ramapo	41
Rider University	57
Rutgers University	61
Washington Crossing*	No Data
TOTAL EXCEEDANCES	1

*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 nonattainment areas, there was one (1) exceedance of the ozone NAAQS. See Table 2.

Table 2. Ozone Concentrations at Out-of-State Monitoring Stations in New Jersey's Ozone Nonattainment Areas on 7/26/2021

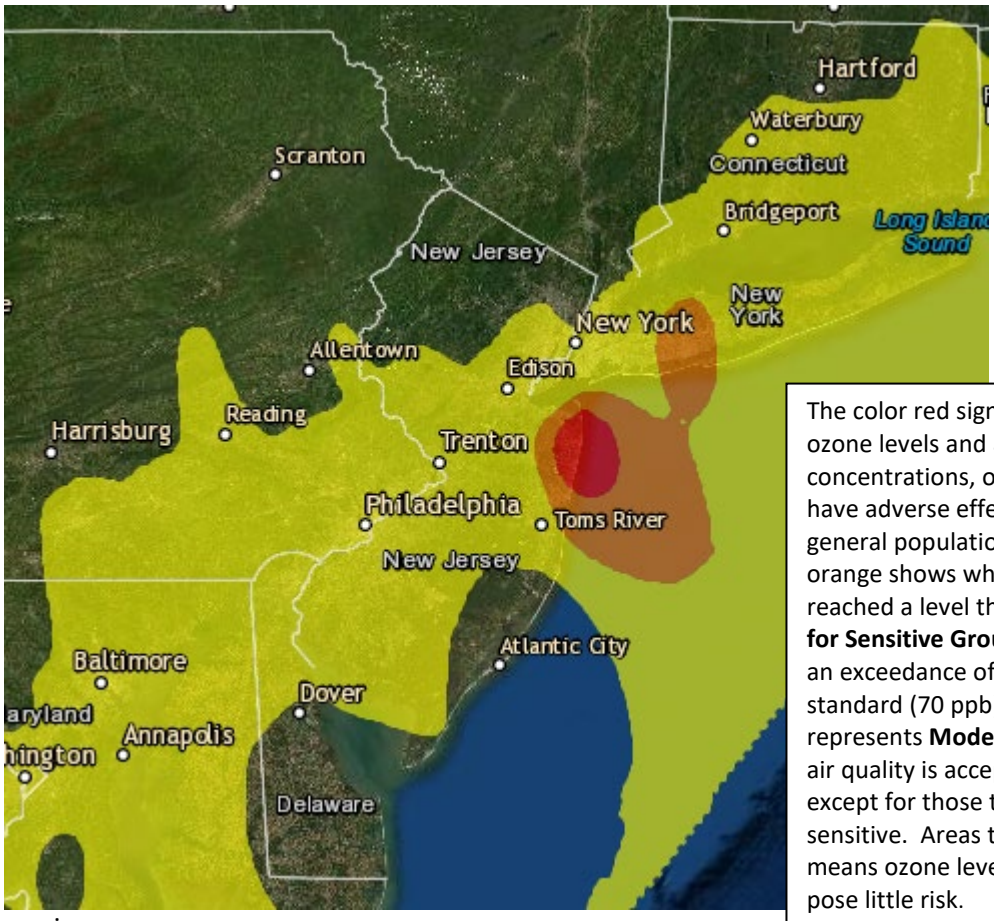
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	53
CT	Greenwich	61
CT	Madison-Beach Road	69
CT	Middletown-CVH-Shed	60
CT	New Haven	59
CT	Stratford	62
CT	Westport	60
DE	BCSP (New Castle Co.)	55
DE	BELLFNT2 (New Castle Co.)	61
DE	KILLENS (Kent Co.)	53
DE	LEWES (Sussex Co.)	51
DE	LUMS 2 (New Castle Co.)	57
DE	MLK (New Castle Co.)	59
DE	SEAFORD (Sussex Co.)	53
MD	Fair Hill	61
NY	Babylon	73
NY	Bronx - IS52	58
NY	CCNY	56
NY	Flax Pond	60
NY	Fresh Kills	55
NY	Holtsville	61
NY	Pfizer Lab	54
NY	Queens	70
NY	Riverhead	62
NY	Rockland Cty	45
NY	White Plains	53
PA	BRIS (Bucks Co.)	60
PA	CHES (Delaware Co.)	60
PA	NEWG (Chester Co.)	59
PA	NORR (Montgomery Co.)	61
PA	LAB (Philadelphia Co.)	62
PA	NEA (Philadelphia Co.)	63
PA	NEW (Philadelphia Co.)	61
	TOTAL EXCEEDANCES	1

The number of days in 2021 on which exceedances of the ozone NAAQS were recorded for all the states within New Jersey's ozone nonattainment areas is summarized in Table 3.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Nonattainment Areas in 2021

STATE	# of Days NAAQS was Exceeded January 1 – July 26, 2021 NAAQS = 70 ppb
Connecticut	12
Delaware	2
Maryland	3
New Jersey	6
New York	10
Pennsylvania	7

Figure 1. Ozone Air Quality Index for July 26, 2021



The color red signifies **Unhealthy** ozone levels and at these concentrations, ozone can begin to have adverse effects on the general population. The color orange shows where ozone reached a level that was **Unhealthy for Sensitive Groups** and there was an exceedance of the ozone standard (70 ppb). Yellow represents **Moderate** ozone and air quality is acceptable at this level except for those that are unusually sensitive. Areas that are green means ozone levels are **Good** and pose little risk.

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 cold front slowly made its way through the region, where it eventually stalled along the New Jersey coast and over New York City and Long Island Sound. This front produced very little rain, with mostly sunny skies and hot temperatures observed across the nonattainment area. The boundary was also able to push pollutants to locations ahead of it and recirculate the air. Favorable meteorological conditions, along with the position of the front led to the two exceedances at the Jersey Shore and Long Island.

Early Monday morning, a weak cold front, draped over Connecticut, New York City, and northern New Jersey, began to move southeastward. As the day progressed, this front slowed and eventually stalled along the coast of New Jersey, and over New York City and the Long Island Sound. Throughout much of the day, cirrus clouds covered the area. By early afternoon, the cirrus pushed offshore, providing mostly sunny skies for much of the nonattainment area. Temperatures soared into the upper 80s and low 90s, providing a hot day to the region. Since favorable meteorological conditions were present, ozone production began to ramp up. The stalled frontal boundary allowed for polluted air aloft to mix down to the surface, as well as recirculate any polluted air that may have been pushed offshore by the front. Ozone levels were, therefore, able to reach the unhealthy for sensitive groups category in Monmouth, New Jersey and Babylon, New York, locations just ahead of the front where pollutants were able to both build and recirculate.

Favorable weather conditions, along with the position of a stationary front and localized and regional transport of pollutants all contributed to the exceedances observed in Monmouth, New Jersey and Babylon, New York.

Where Did the Air Pollution that Caused Ozone Come From?

Air pollution from human activities including cars, trucks, factories, and power plants is blown by the prevailing winds and reacts with sunlight and other ozone precursors to create poor air quality. An analysis of the meteorology and back trajectories from July 26th shows that the exceedances observed over portions of coastal New Jersey and Long Island were influenced by high pressure placement and an approaching frontal boundary. This atmospheric set up allowed for rapidly rising ozone concentrations due to the collection of localized emissions, which led to two exceedances of the ozone NAAQS in northern coastal New Jersey and Long Island, NY.

Figures 2, 3, and 4 show the back trajectories starting at different wind heights for the monitored exceedances on July 26, 2021. 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 model back trajectories and are listed in Table 4.

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)
NY	Babylon	73
NJ	Monmouth University	87

The surface-level back trajectories (Figure 2) show that air originated off the coast of North Carolina and traveled briefly inland before turning northeastward under the influence of high pressure. The trajectory ending at the Monmouth University monitor traveled further inland, traversing over the Chesapeake Bay region, Delaware, and along the I-95 corridor prior to arrival. The trajectory ending at the Babylon monitor remained along the mid-Atlantic coastline through transit, and eventually traveled over the NYC metropolitan area before making a sharp southeastward turn over Long Island and eventually to Babylon. Both air masses remained at the surface through transit and stalled drastically upon arrival, picking up emissions from cars, trucks, and local industry along the way. Canadian wildfire smoke was also present at the surface as detected from satellite imagery, which potentially enhanced the rapidly rising ozone concentrations in coastal New Jersey and Long Island, NY.

Mid and upper-level surface trajectories (Figures 3 & 4) followed similar transport pathways during their transit. Originating in southern Ontario, the trajectory traveling to New York took a general southeasterly route while traversing many states across the Great Lakes region before entering upstate New York. Air at the mid and upper levels traveled over the New York City area picking up emissions from cars and trucks before arriving at its destination just downwind of the city in Babylon. Meanwhile, the trajectory traveling to New Jersey originated in Ohio and passed over Pennsylvania (and some portions of New York at the upper level) before entering the Garden State and arriving at its destination.

Figure 5 shows the National Air Quality Index observed on July 25th, the day prior to this exceedance event. As the figure shows, the area saw widespread good air quality, except for patches of moderate in New York and Pennsylvania, which suggests there was little build-up of previously polluted air to increase ozone concentrations. This relatively clean airmass over the region helped to keep ozone concentrations below the unhealthy for sensitive groups category in much of the nonattainment area except for Babylon, New York, and at the Monmouth University monitor in New Jersey, where unhealthy levels were recorded. Favorable meteorological conditions and local and regional emissions led to an exceedance of the 8-hour ozone standard.

Figure 2. 48-hour Back Trajectories for July 26, 2021 at 10 meters

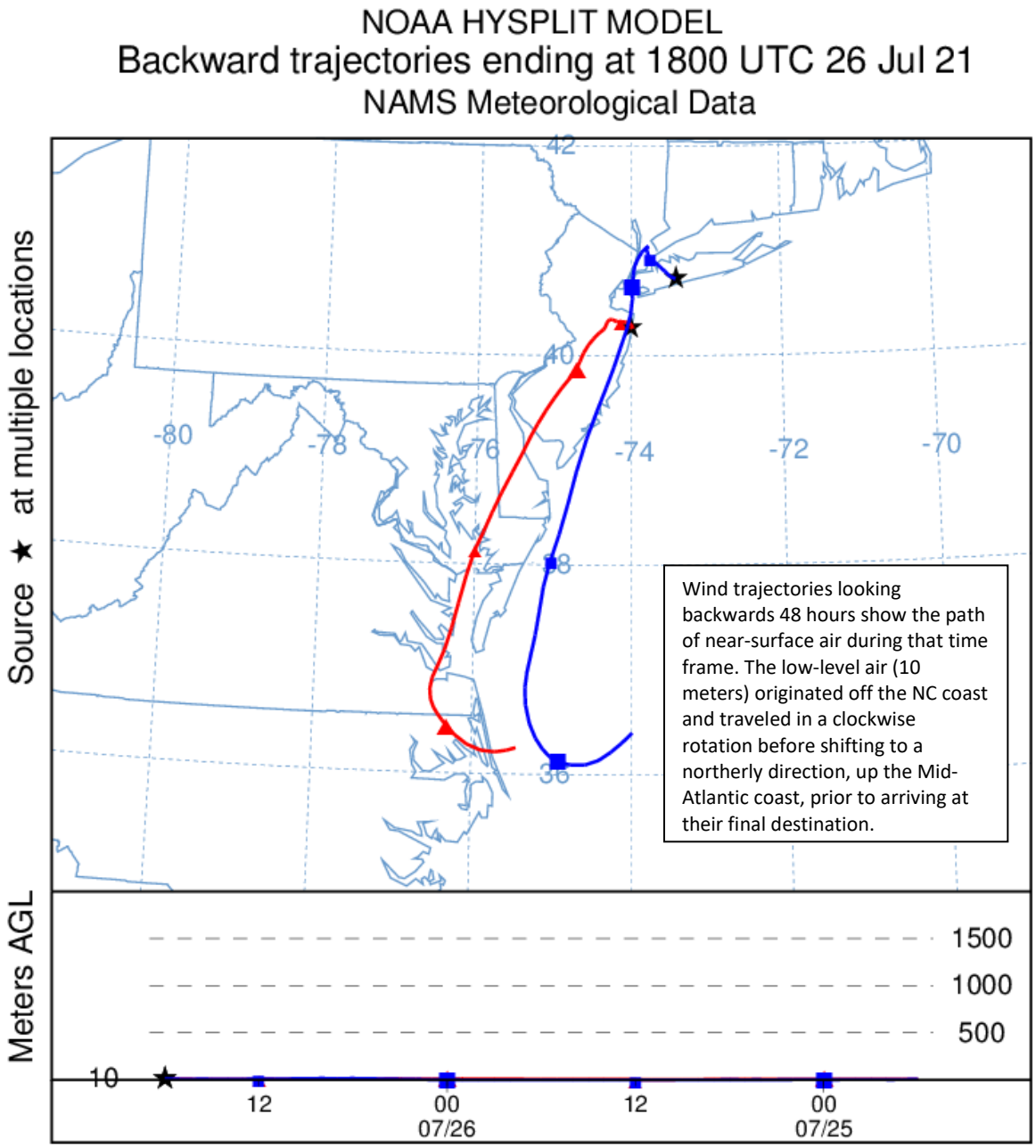


Figure 3. 48-hour Back Trajectories for July 26, 2021 at 500 meters

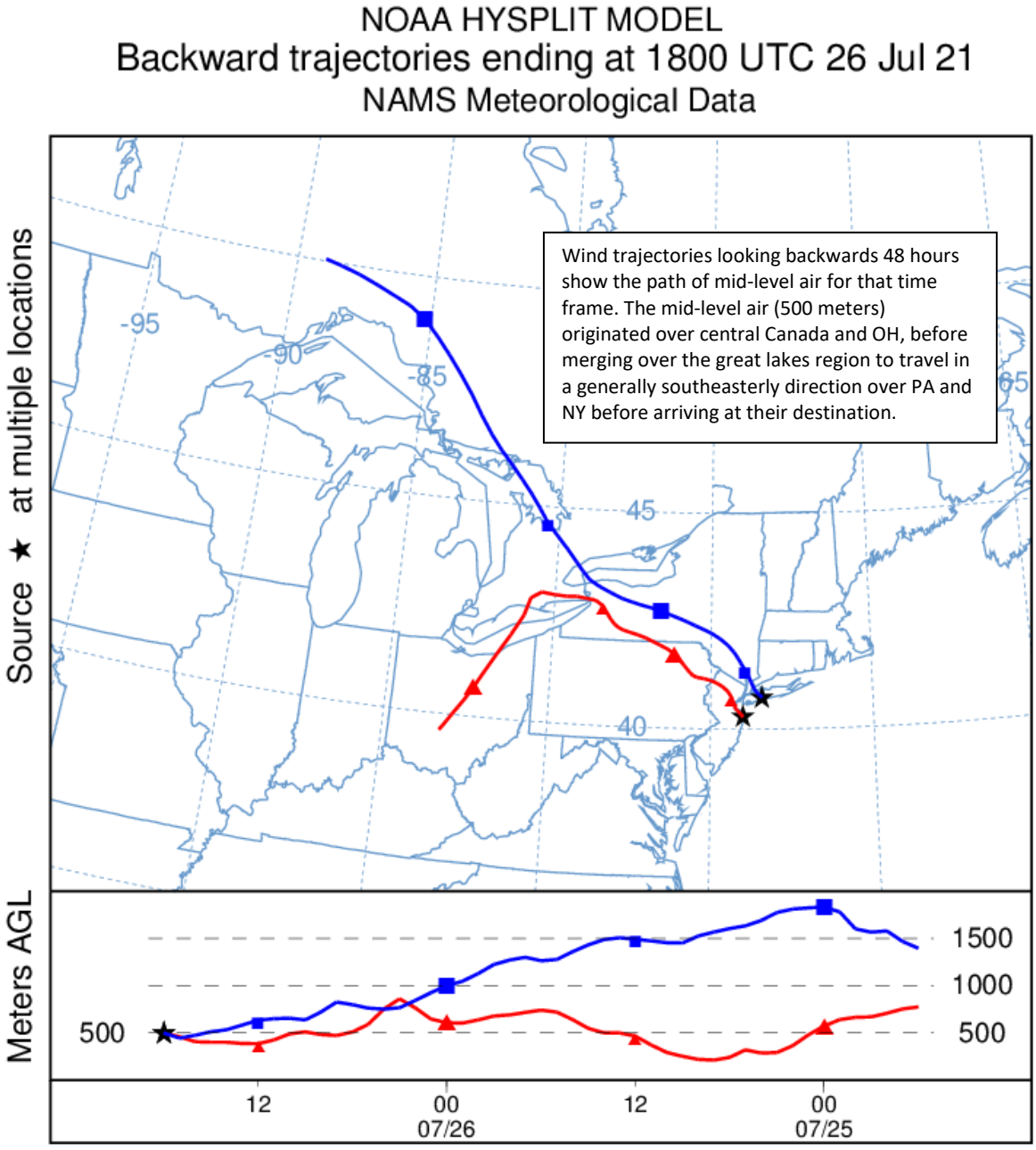


Figure 4. 48-hour Back Trajectories for July 26, 2021 at 1500 meters

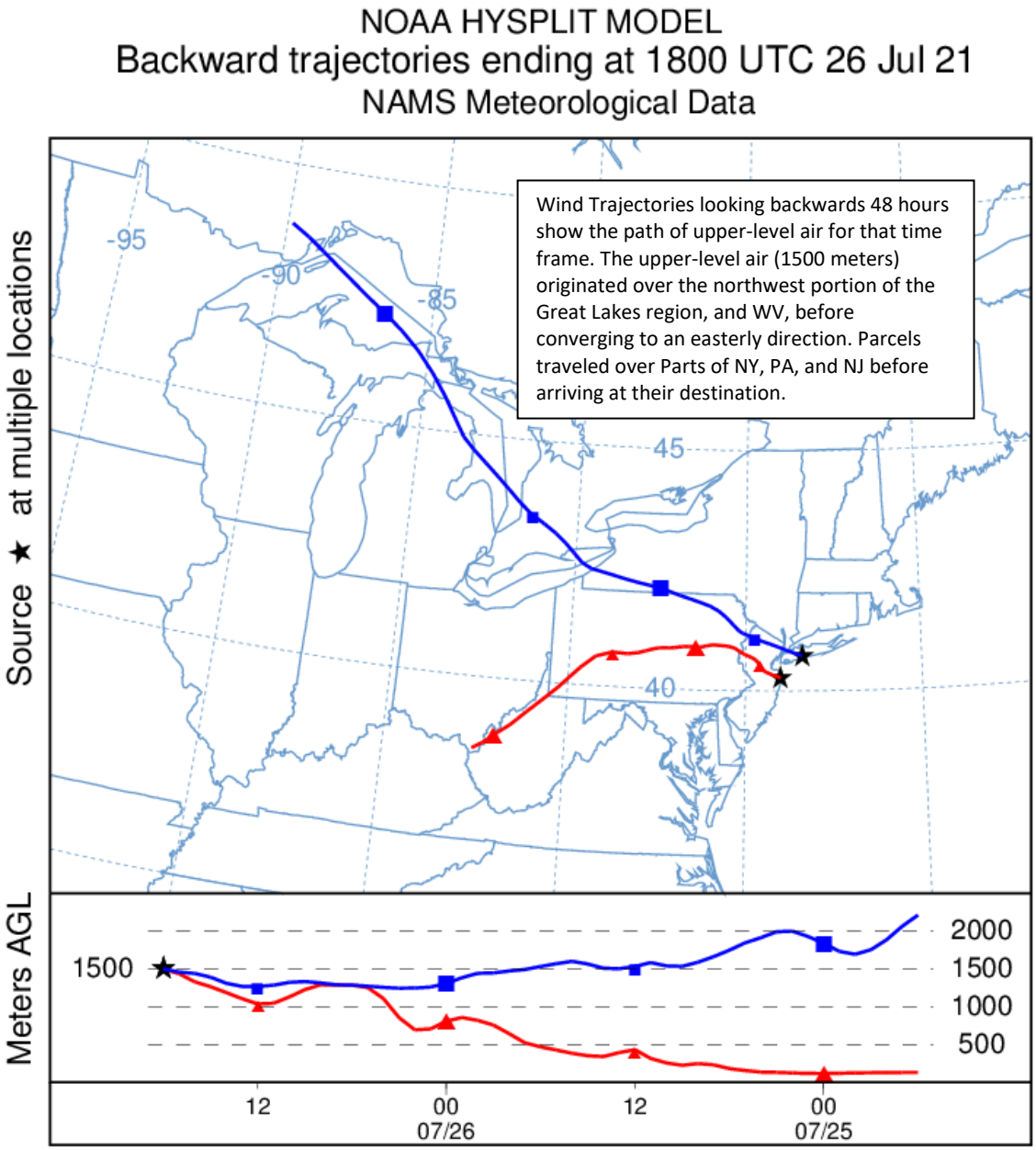
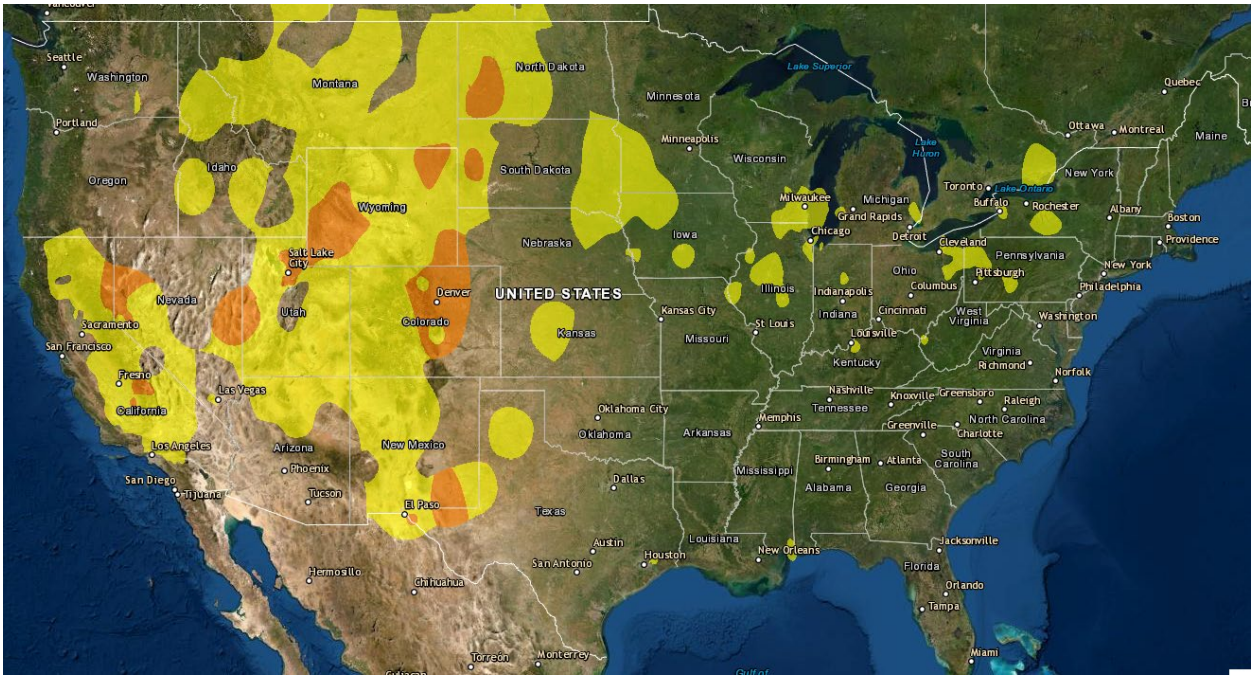


Figure 5. Combined Air Quality Index for the United States on July 25, 2021



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/ .