Ozone National Ambient Air Quality Standard Health Exceedances on August 21, 2020

Exceedance Locations and Levels

On Friday, August 21, 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 8/21/2020

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	44
Bayonne	49
Brigantine	40
Camden Spruce St	47
Chester	45
Clarksboro	44
Colliers Mills	45
Columbia	48
Flemington	47
Leonia	50
Millville	41
Monmouth University	44
Newark Firehouse	51
Ramapo	48
Rider University	58
Rutgers University	55
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 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 Non-Attainment Areas on 8/21/2020

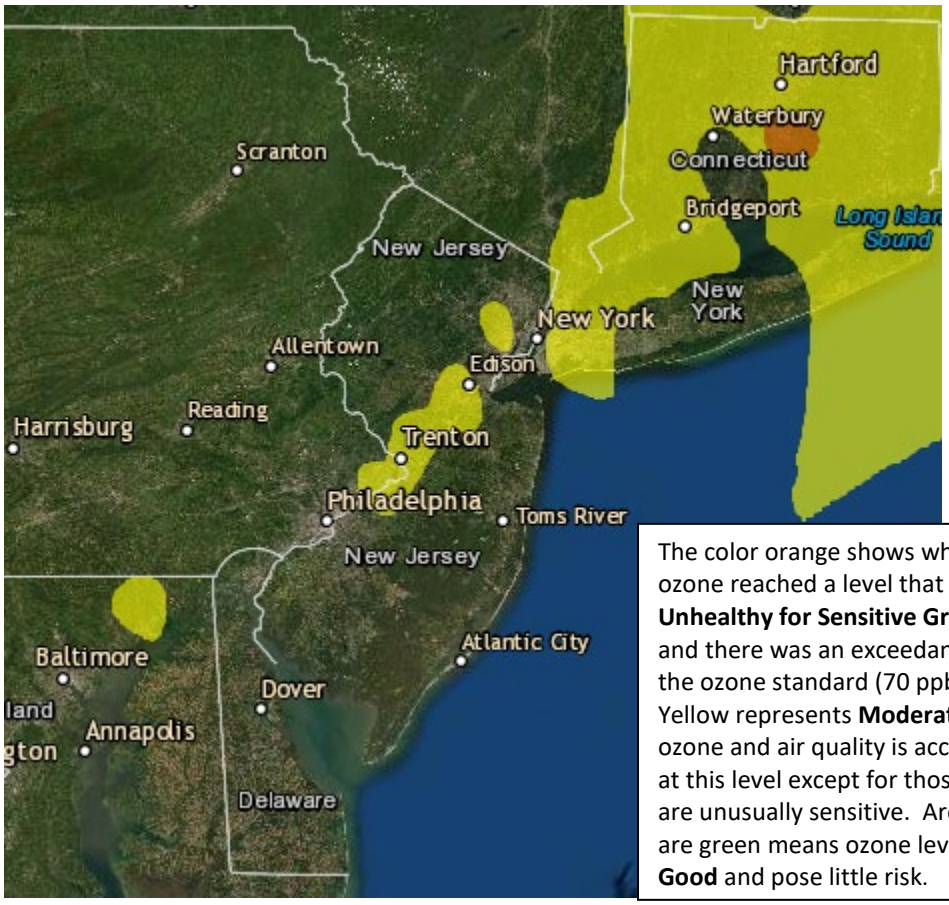
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	57
CT	Greenwich	63
CT	Madison-Beach Road	68
CT	Middletown-CVH-Shed	71
CT	New Haven	42
CT	Stratford	68
CT	Westport	61
DE	BCSP (New Castle Co.)	No Data
DE	BELLFNT2 (New Castle Co.)	40
DE	KILLENS (Kent Co.)	41
DE	LEWES (Sussex Co.)	44
DE	LUMS 2 (New Castle Co.)	44
DE	MLK (New Castle Co.)	47
DE	SEAFORD (Sussex Co.)	43
MD	Fair Hill	54
NY	Babylon	52
NY	Bronx - IS52	55
NY	CCNY	52
NY	Fresh Kills	50
NY	Holtsville	48
NY	Pfizer Lab	57
NY	Queens	59
NY	Riverhead	53
NY	Rockland Cty	52
NY	White Plains	58
PA	BRIS (Bucks Co.)	55
PA	CHES (Delaware Co.)	49
PA	NEWG (Chester Co.)	54
PA	NORR (Montgomery Co.)	52
PA	LAB (Philadelphia Co.)	49
PA	NEA (Philadelphia Co.)	54
PA	NEW (Philadelphia Co.)	52
	TOTAL EXCEEDANCES	1

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 21, 2020 NAAQS = 70 ppb
Connecticut	15
Delaware	2
Maryland	0
New Jersey	5
New York	8
Pennsylvania	5

Figure 1. Ozone Air Quality Index for August 21, 2020



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

High pressure dominated the non-attainment area on Friday, August 21st while a surface trough extended from New England southward into portions of the southeastern United States. Variation in cloud cover and winds, along with warm temperatures, allowed for isolated regions of elevated ozone, with levels reaching the unhealthy for sensitive groups category (USG) at the Middleton, CT monitor.

Meteorological data depicts the non-attainment area was dominated by high pressure, with an occluded front to the north and south of the northeastern United States, allowing for favorable conditions for ozone formation. This meteorological set up allowed Connecticut to see abundant sunshine and temperatures in the mid to upper 80s, while surrounding areas saw cooler temperatures, and mostly cloudy conditions. The variation in cloud cover across the region likely helped to limit ozone formation in some locations while enhancing ozone levels in others. Winds became breezy in the afternoon on Long Island, having more of a southwesterly component, while the Connecticut coastline had a lighter southerly wind. This likely helped to influence the localized transport of emissions from the New York City metropolitan area and Long Island sound area into Connecticut. As air traveled, a broad sinking motion associated with the high pressure allowed the polluted air aloft to mix toward the surface. Finally, a surface trough, extending from New England southward through the non-attainment area was observed throughout the day. This trough provided an additional opportunity for any ozone aloft to mix toward the surface and increase already rising levels of ozone.

This exceedance, occurring exclusively in Middleton, CT, can be attributed to favorable localized meteorology, the transport of ozone precursors from the New York City area, and with a broad sinking motion associated with high pressure.

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 21, 2020. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. One monitoring station was chosen to model back trajectories and is 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	Middletown	71

Back trajectories from August 21st show that the isolated exceedance in Connecticut was heavily influenced by localized transport of ozone precursors from New York City and Long Island Sound area.

This localized transport was enhanced by the presence of a stagnant air mass and the recirculation of emissions under favorable weather conditions at the exceedance location. The combination of these factors allowed ozone concentrations to reach the unhealthy for sensitive groups (USG) category in Middletown, CT on this day.

Surface level back trajectories (Figure 2) show that surface level air originated in lower New York State and traveled generally in a southerly direction through the Hudson Valley, New York City, and Long Island. Under the presence of high-pressure and light southwesterly winds, the air mass made a turn northward and recirculated over Long Island and New York City. Air at the surface traveled very slowly, allowing the accumulation of emissions from cars, trucks, industry and power plants along the way. At the surface, air then traveled over the Long Island Sound and southwestern Connecticut before reaching its destination.

Figure 3 shows the mid-level back trajectory at 500 meters. The trajectory originated off the New Jersey coast and followed a clockwise circulation around high pressure over the area. After moving in a southeasterly direction along the coast, the air traveled over the Washington-Baltimore metropolitan areas, picking up emissions aloft. It then traveled over eastern Pennsylvania, northern New Jersey and the NYC metropolitan area before arriving in Connecticut

In Figure 4, air at upper levels (1500 meters) originated over the Great Lakes Region. Due to high-pressure over the region, air moved in a southeasterly direction before reaching Pennsylvania where the trajectory started to take an easterly path along the New York and Pennsylvania border and eventually arrived at its destination.

Figure 5 shows the National Air Quality Index observed on August 20th, the day prior to this exceedance event. As shown in the figure, air quality conditions were generally clean over the eastern half of the United States on this day. This information indicates that it was likely localized emissions from the NYC metropolitan area/Long Island Sound region, under the influence of favorable weather conditions for ozone formation, led to the isolated exceedance at the Middletown, CT monitor on August 21st.

Figure 2. 48-hour Back Trajectories for August 21, 2020 at 10 meters

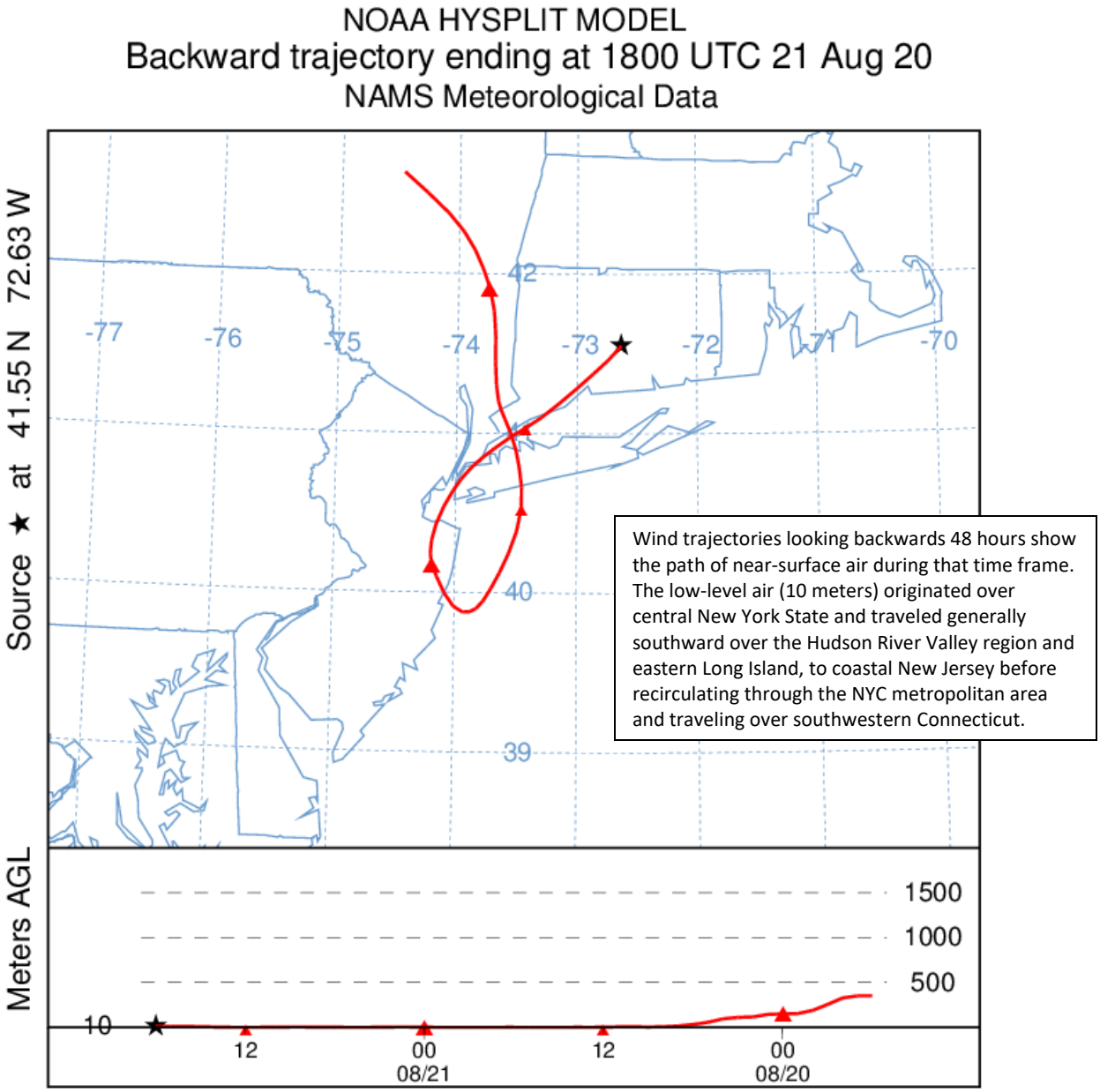


Figure 3. 48-hour Back Trajectories for August 21, 2020 at 500 meters

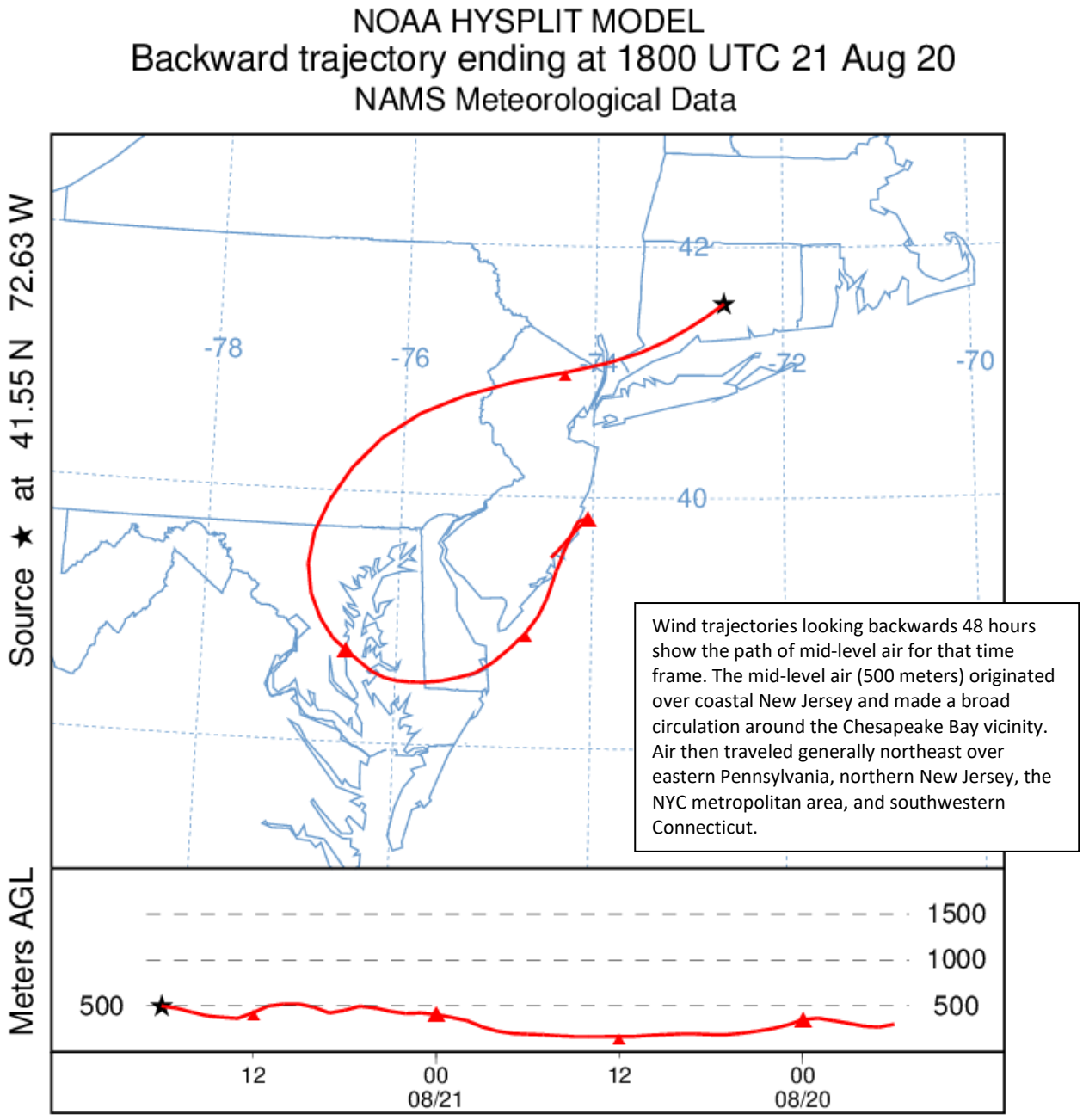


Figure 4. 48-hour Back Trajectories for August 21, 2020 at 1500 meters

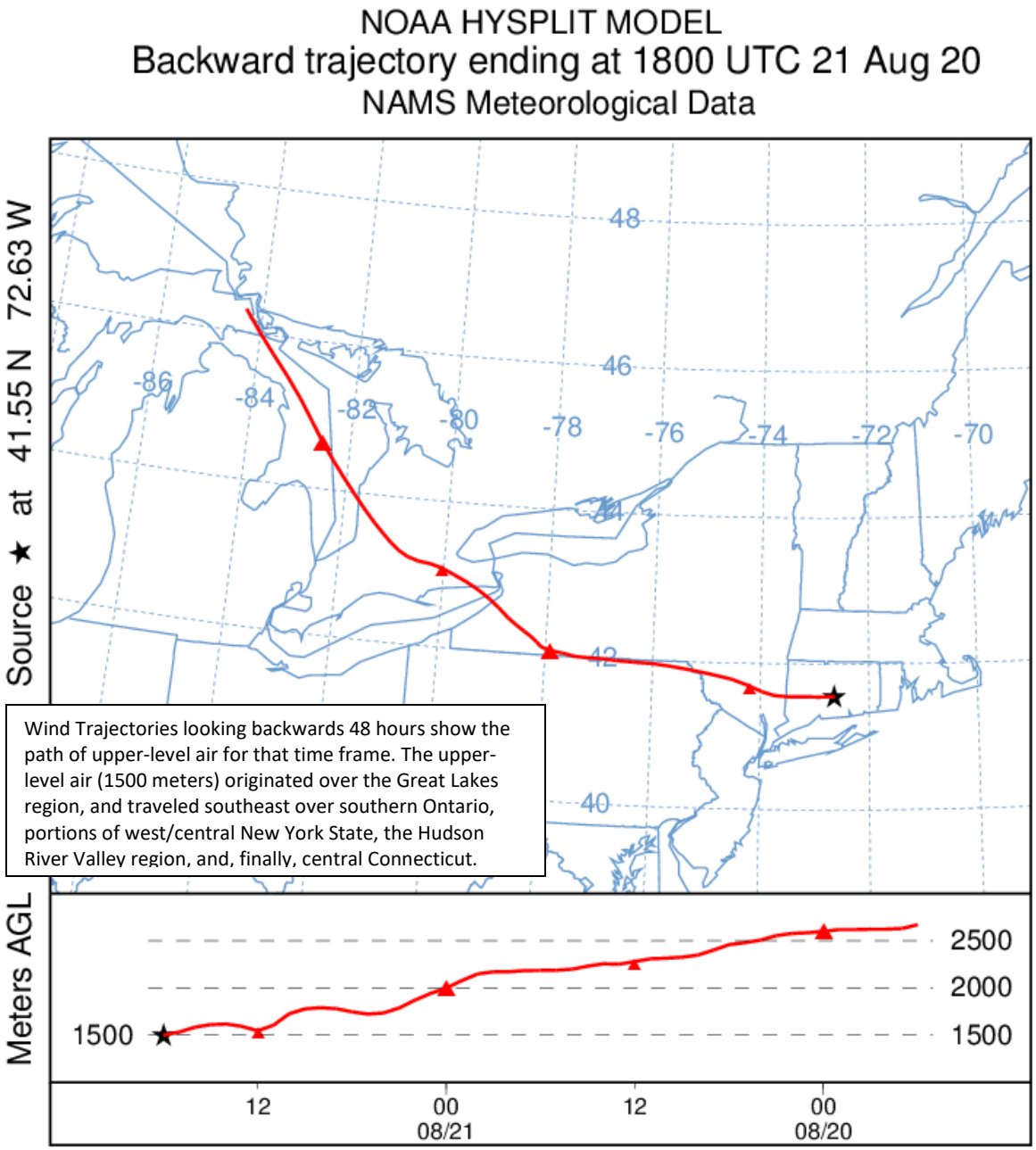
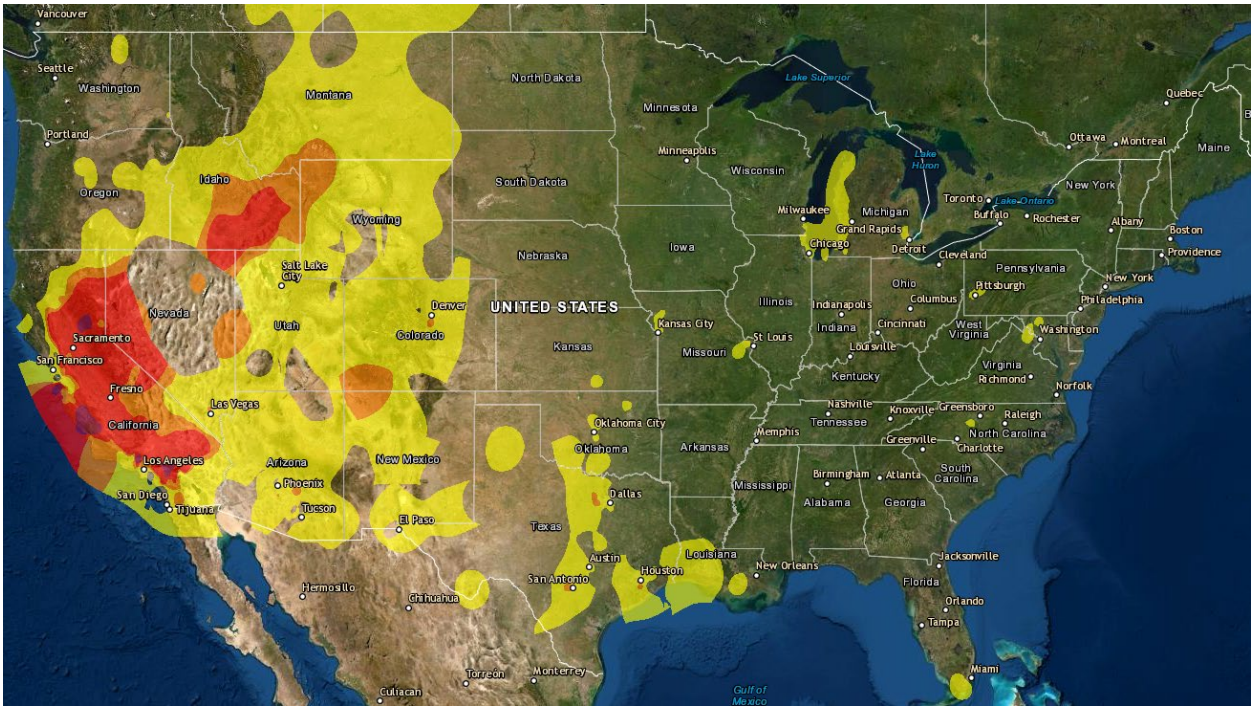


Figure 5. Combined Air Quality Index for the United States on August 20, 2020



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/ .