Ozone National Ambient Air Quality Standard Health Exceedances on August 22, 2020

Exceedance Locations and Levels

On Saturday, August 22, 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 8/22/2020

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	35
Bayonne	43
Brigantine	37
Camden Spruce St	40
Chester	46
Clarksboro	37
Colliers Mills	40
Columbia	38
Flemington	44
Leonia	47
Millville	36
Monmouth University	43
Newark Firehouse	47
Ramapo	44
Rider University	50
Rutgers University	49
Washington Crossing*	46
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 8/22/2020

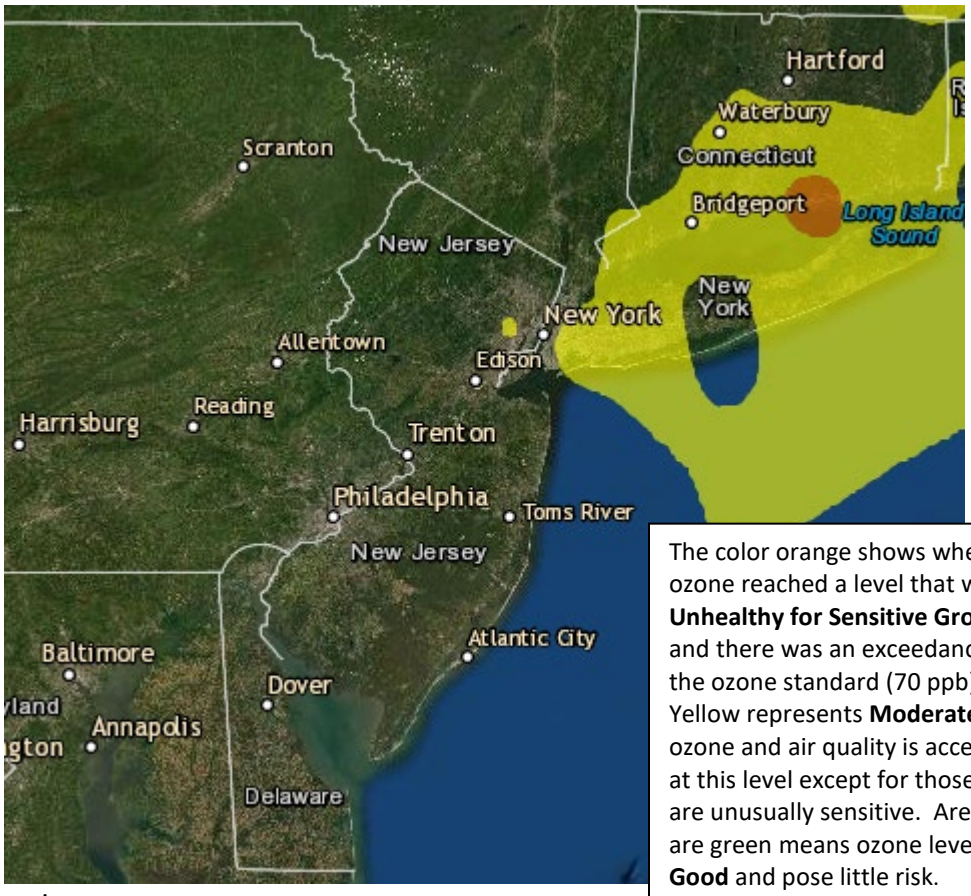
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	50
CT	Greenwich	64
CT	Madison-Beach Road	71
CT	Middletown-CVH-Shed	57
CT	New Haven	62
CT	Stratford	68
CT	Westport	59
DE	BCSP (New Castle Co.)	No Data
DE	BELLFNT2 (New Castle Co.)	33
DE	KILLENS (Kent Co.)	33
DE	LEWES (Sussex Co.)	32
DE	LUMS 2 (New Castle Co.)	35
DE	MLK (New Castle Co.)	41
DE	SEAFORD (Sussex Co.)	32
MD	Fair Hill	41
NY	Babylon	56
NY	Bronx - IS52	51
NY	CCNY	48
NY	Fresh Kills	44
NY	Holtsville	51
NY	Pfizer Lab	50
NY	Queens	62
NY	Riverhead	57
NY	Rockland Cty	45
NY	White Plains	50
PA	BRIS (Bucks Co.)	48
PA	CHES (Delaware Co.)	41
PA	NEWG (Chester Co.)	40
PA	NORR (Montgomery Co.)	46
PA	LAB (Philadelphia Co.)	42
PA	NEA (Philadelphia Co.)	48
PA	NEW (Philadelphia Co.)	45
	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 22, 2020 NAAQS = 70 ppb
Connecticut	16
Delaware	2
Maryland	0
New Jersey	5
New York	8
Pennsylvania	5

Figure 1. Ozone Air Quality Index for August 22, 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

A weak high-pressure system was noted over the non-attainment area on Saturday, August 22nd, 2020, allowing the influence of multiple stationary fronts and a surface trough over the region. This complex atmospheric arrangement allowed for favorable weather conditions and ozone formation in portions of the northern non-attainment area, specifically the Connecticut coastline, and limited ozone formation to the south.

A complex weather pattern was observed over the northeastern United States on August 22nd. On this day, two stationary fronts were noted in the vicinity while a weak high-pressure system persisted overhead. One stationary front, associated with an area of low pressure over the Mid-West, was draped to the north of the non-attainment area, extending from the Great Lakes region east, across New York State and New England. The second front, oriented east/west, was located over the Mid-Atlantic region and moved very little throughout the day. This secondary front allowed for widespread high clouds over southern portions of the non-attainment area, helping to limit ozone production despite warm temperatures and light southwesterly winds. Meanwhile, locations to the north were less influenced by this front, receiving more sunshine throughout the day. This sunshine along with the previously mentioned warm temperatures and southwesterly winds allowed for ozone production in the Long Island Sound vicinity. Additionally, late day thunderstorms in this location, associated with a surface trough, allowed for vertical mixing in the atmosphere, bringing any previously polluted air, toward the surface, and further increasing ozone levels along the Connecticut coastline.

The isolated ozone exceedance noted at the Madison-Beach Rd., CT monitor on August 22nd can be attributed to the transport of localized emissions and polluted air from both the I-95 corridor and locations to the west into a favorable weather environment for ozone formation.

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 22, 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	Madison-Beach Road	71

Back trajectories from August 22nd show that the isolated exceedance in Connecticut was likely influenced by the favorable weather conditions mentioned above, as well as, localized transport over Long Island and the Sound. In addition, the air mass over the area was already polluted the day prior, which most likely contributed to the exceedance in Connecticut.

The surface level back trajectory (Figure 2) shows that air originated off the New Jersey coast. The trajectory followed the clockwise flow of high pressure that was set up over the area. This caused air to travel along the Jersey shore before moving over Long Island, the Long Island Sound, and to its destination along the Connecticut coast, where it picked up local emissions from cars, trucks, industry, and power plants along the way. Localized areas of moderate air quality, as well as, an isolated area of USG was observed during the previous day. This air likely became more polluted due to the favorable weather conditions throughout the day.

Figure 3 shows mid-level back trajectories at 500 meters. Trajectories travelling into the Connecticut coastline originated in Virginia and traversed in a clockwise rotation following high-pressure flow over the northeast region of the United States, picking up emissions aloft from transportation and local industry. The air parcel then dips into the Long Island Sound region before arriving at its endpoint. In figure 4, upper-level back trajectories (1500 meters) began in Ohio and rotated slightly in a northeasterly direction following the high-pressure system in the region. The parcel then travelled in an easterly direction over northern Pennsylvania and the NYC metropolitan area, where moderate ozone was observed the day before, as shown in figure 5, before arriving at its destination at Madison-Beach Road, CT.

Figure 5 shows the National Air Quality Index observed on August 21st, the day prior to this high ozone event. As shown in the figure, scattered areas of moderate air quality were observed throughout southern New England with an isolated area of USG air quality observed near the exceedance location on the 22nd. This indicates that a polluted air mass was in place the previous day, and with little change in the transport pattern, it is very likely that localized transport and the previous day's pollution were the two main contributors for this exceedance. The localized transport of emissions from Long Island and New York City, in combination with favorable weather conditions, allowed ozone levels to rise into the unhealthy for sensitive group category along the Connecticut coastline. The combination of these factors ultimately led to an exceedance at the Madison Beach monitor in Connecticut.

Figure 2. 48-hour Back Trajectories for August 22, 2020 at 10 meters

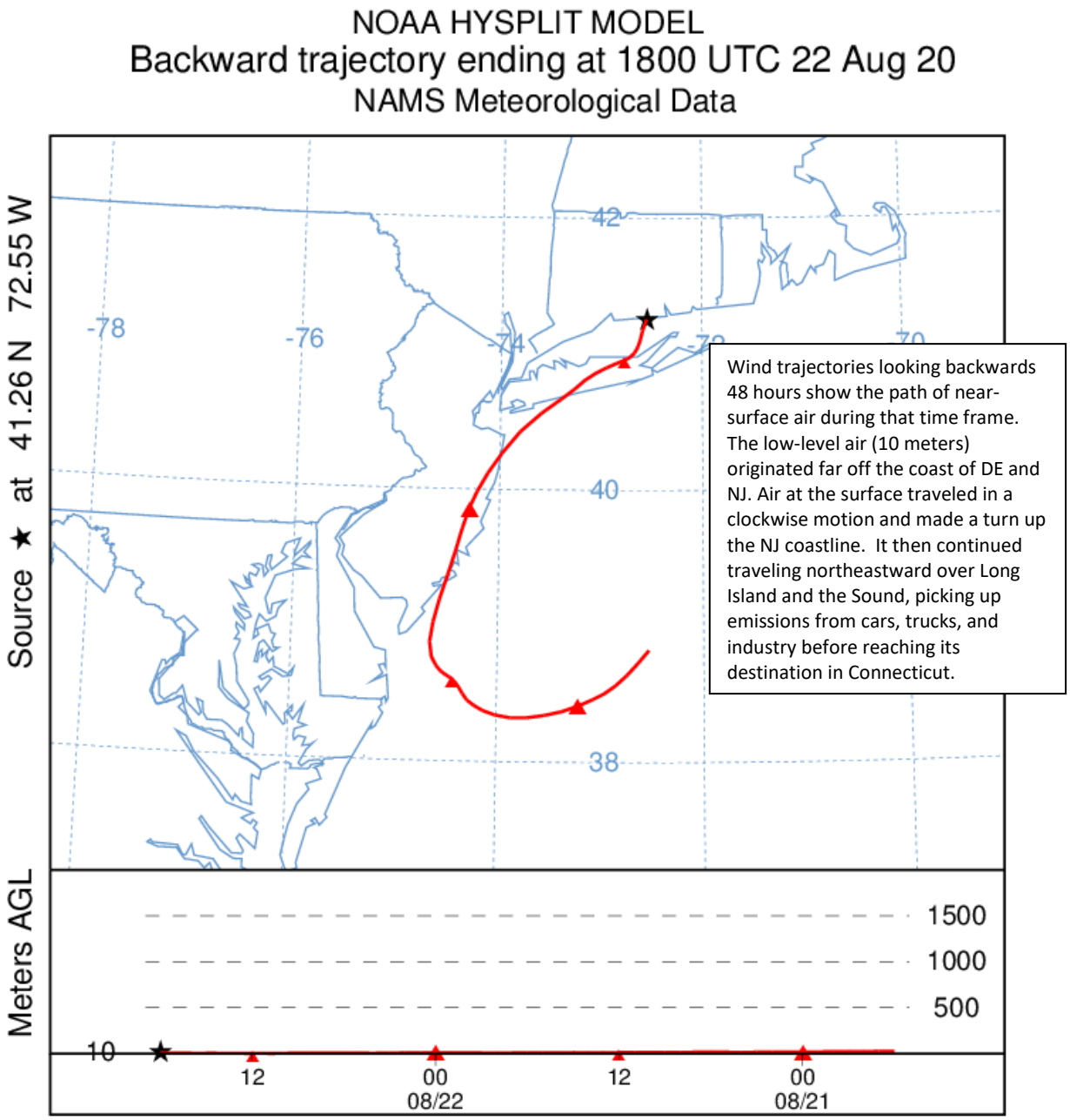


Figure 3. 48-hour Back Trajectories for August 22, 2020 at 500 meters

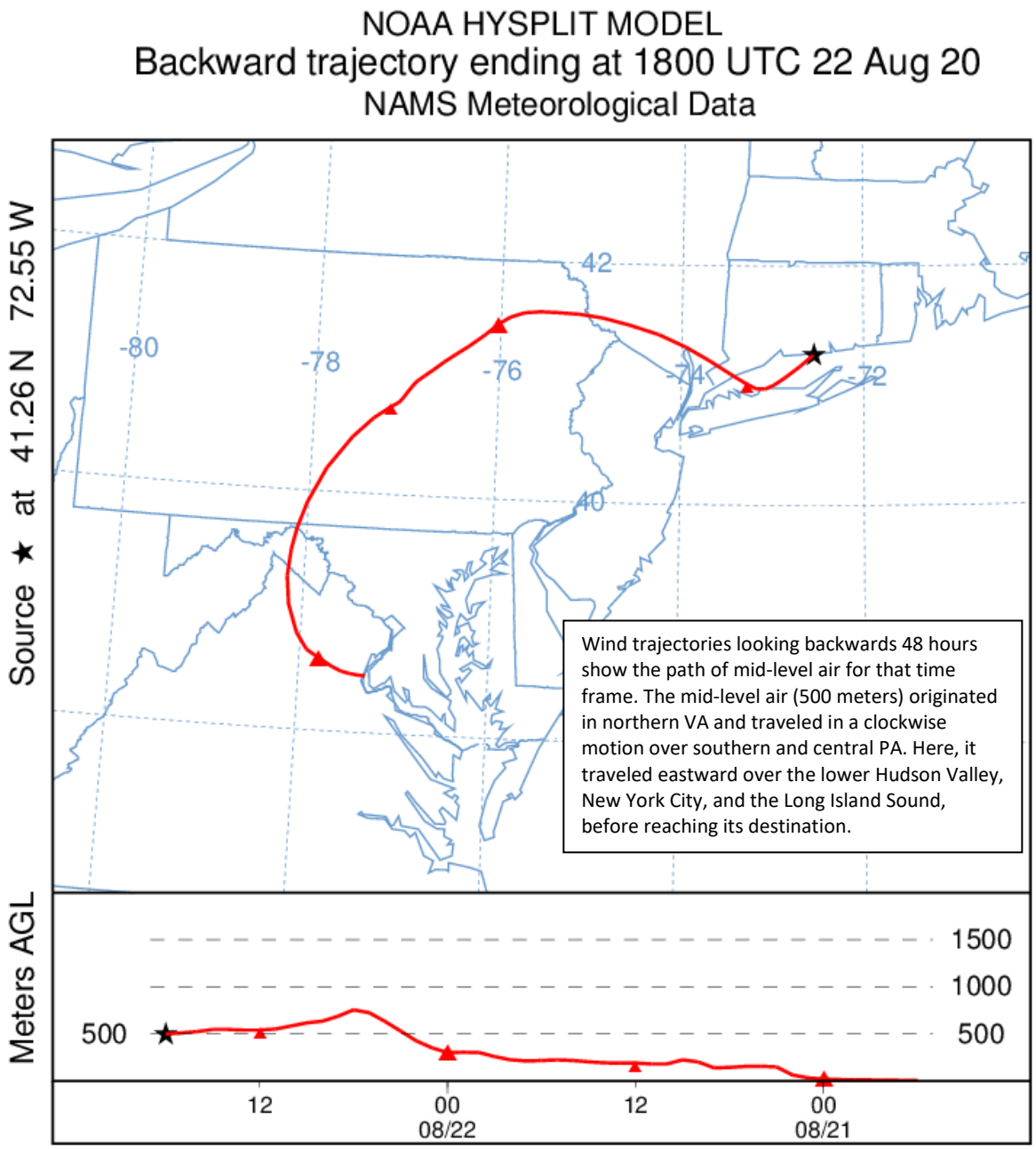


Figure 4. 48-hour Back Trajectories for August 22, 2020 at 1500 meters

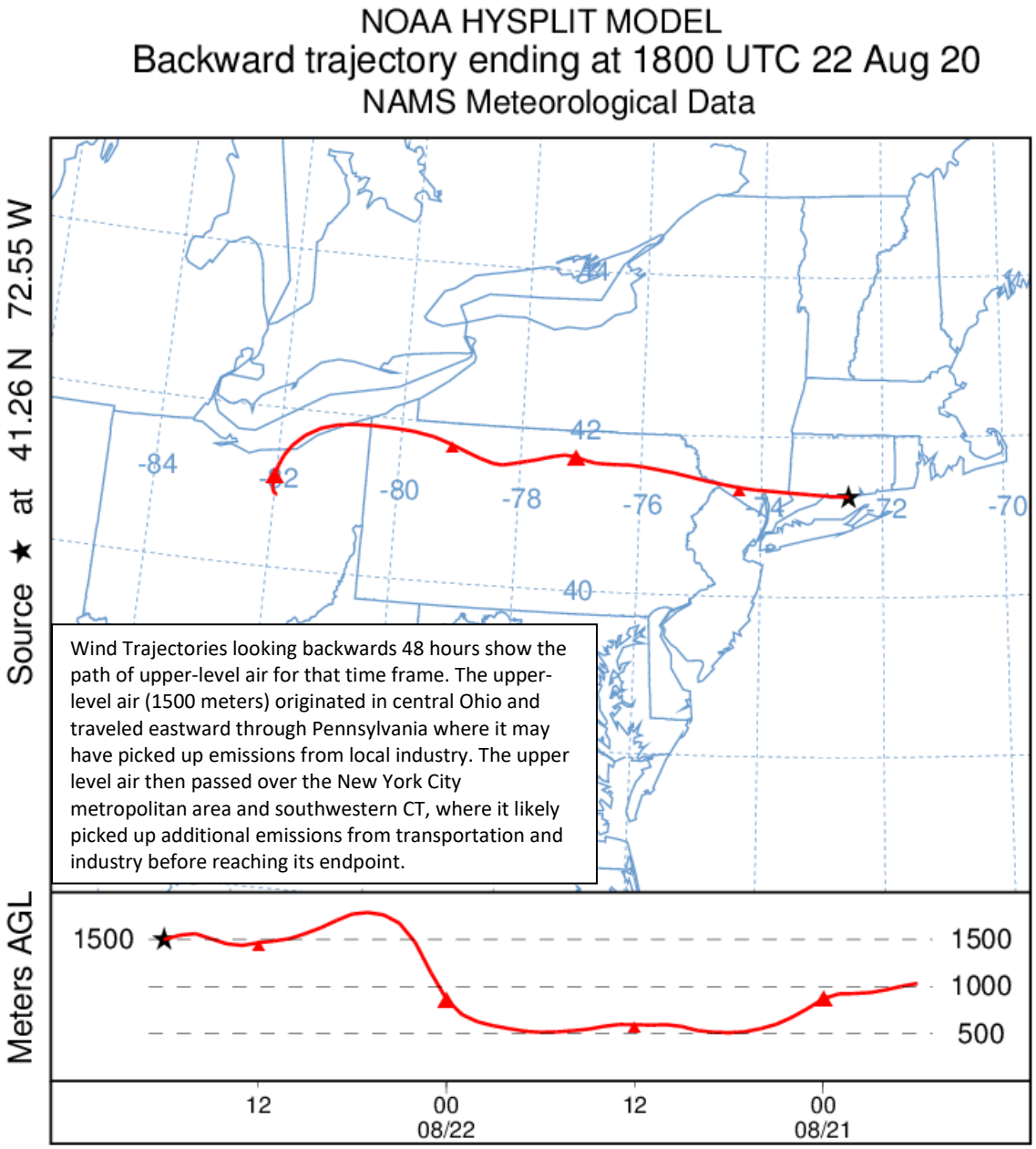
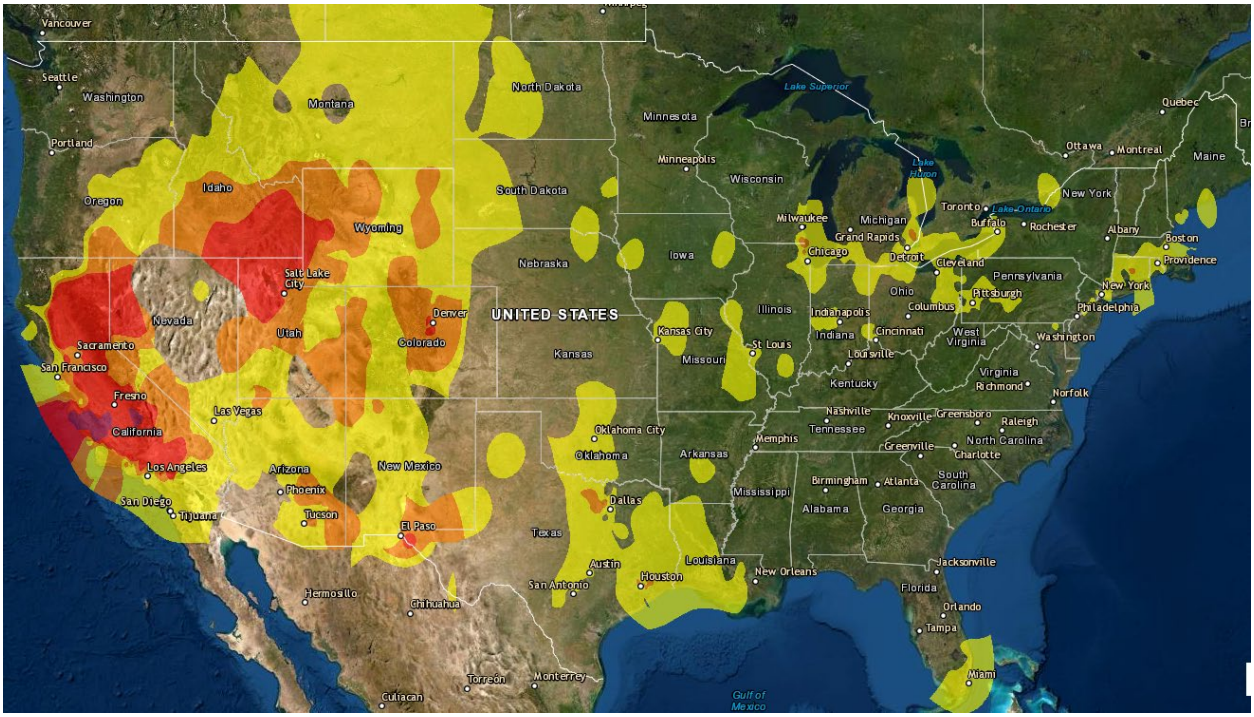


Figure 5. Combined Air Quality Index for the United States on August 21, 2020



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/ .