

Ozone National Ambient Air Quality Standard Health Exceedances on August 12, 2021

On Thursday, August 12, 2021, 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. A table listing all the ozone exceedances for 2021 in New Jersey may be found at <https://www.nj.gov/dep/airmon/pdf/2021-nj-aqi-exceedence-days.pdf>.

Table 1. New Jersey Ozone Concentrations on 8/12/2021

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	43
Bayonne	47
Brigantine	40
Camden Spruce St	No Data
Chester	45
Clarksboro	51
Colliers Mills	52
Columbia	40
Flemington	45
Leonia	49
Millville	48
Monmouth University	51
Newark Firehouse	49
Ramapo	42
Rider University	58
Rutgers University	54
Washington Crossing*	51
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 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 8/12/2021

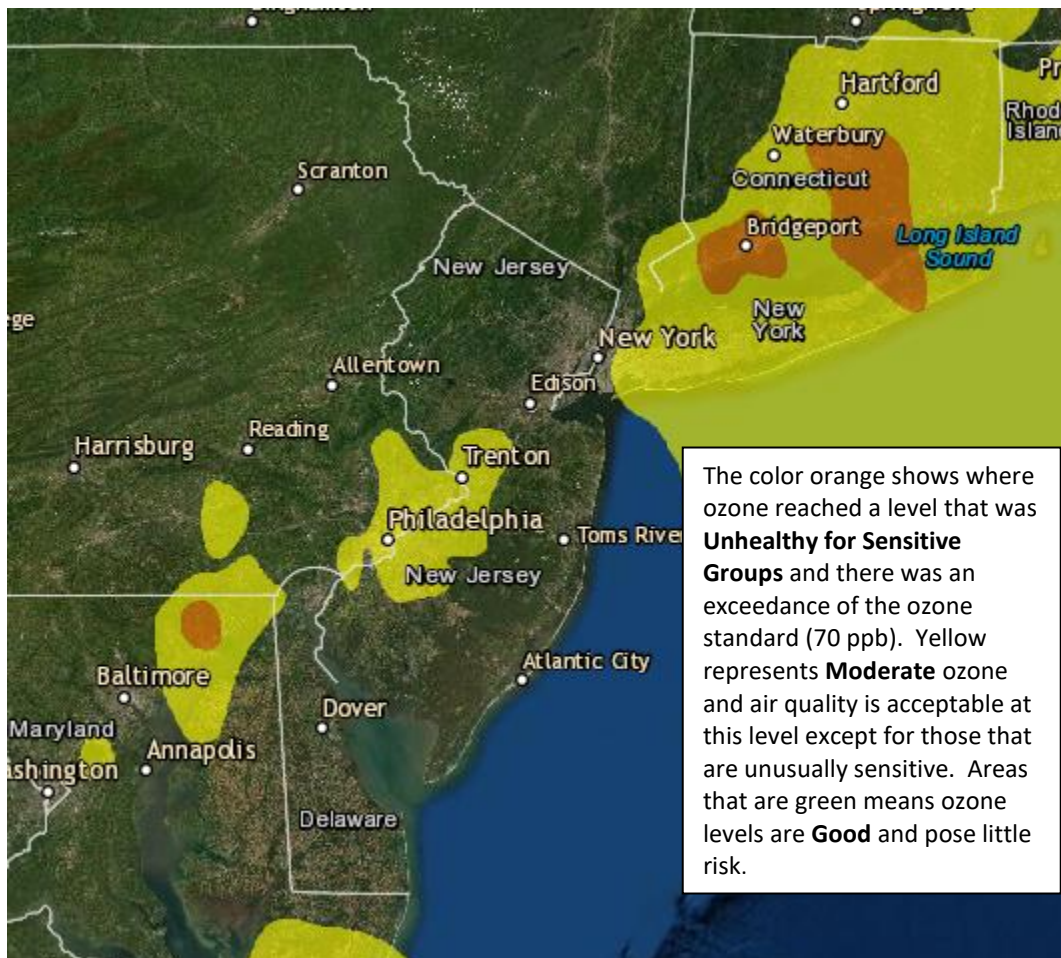
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	52
CT	Greenwich	62
CT	Madison-Beach Road	78
CT	Middletown-CVH-Shed	79
CT	New Haven	60
CT	Stratford	73
CT	Westport	73
DE	BCSP (New Castle Co.)	45
DE	BELLFNT2 (New Castle Co.)	52
DE	KILLENS (Kent Co.)	43
DE	LEWES (Sussex Co.)	41
DE	LUMS 2 (New Castle Co.)	47
DE	MLK (New Castle Co.)	52
DE	SEAFORD (Sussex Co.)	41
MD	Fair Hill	64
NY	Babylon	59
NY	Bronx - IS52	51
NY	CCNY	49
NY	Flax Pond	68
NY	Fresh Kills	54
NY	Holtsville	59
NY	Pfizer Lab	53
NY	Queens	59
NY	Riverhead	65
NY	Rockland Cty	46
NY	White Plains	54
PA	BRIS (Bucks Co.)	70
PA	CHES (Delaware Co.)	55
PA	NEWG (Chester Co.)	52
PA	NORR (Montgomery Co.)	52
PA	LAB (Philadelphia Co.)	61
PA	NEA (Philadelphia Co.)	65
PA	NEW (Philadelphia Co.)	62
	TOTAL EXCEEDANCES	4

The number of days in 2021 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 2021

STATE	# of Days NAAQS was Exceeded January 1 – August 12, 2021 NAAQS = 70 ppb
Connecticut	17
Delaware	3
Maryland	3
New Jersey	8
New York	13
Pennsylvania	8

Figure 1. Ozone Air Quality Index for August 12, 2021



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

Widespread high pressure anchored over the eastern United States created a favorable environment for the deterioration of air quality across the nonattainment area on Thursday, August 12th. Similar meteorological conditions in the days leading up to this high ozone event allowed for pollutants at the surface to accumulate. These favorable weather conditions, as well as a previously polluted air mass at the surface and aloft, contributed to the ozone exceedances that occurred in Connecticut.

High pressure established itself over the eastern section of the United States in the days leading up to this event, where it remained through August 12th. Along with continuous high pressure dominating the area, a defined surface trough lingered throughout the nonattainment area, which allowed any polluted air aloft to mix down to the surface and further enhance ozone levels. Favorable meteorological conditions for ozone production were present, including light southwesterly winds, abundant sunshine, and temperatures soaring into the low 90s. This allowed for the localized transport of emissions from cars, trucks, and industry along the I-95 corridor, as well as previously polluted air from upwind states. Additionally, in contrast to monitors in Connecticut, New Jersey monitors recorded extreme heat, with values reaching the mid-90s. As noted in previous occasions, this extreme heat could be what inhibited ozone production in New Jersey and could be a reason why exceedance locations were not as widespread across the nonattainment area.

The favorable meteorological conditions mentioned above in combination with a previously deteriorated air mass at the surface and aloft, allowed for ozone concentrations to reach the unhealthy for sensitive groups (USG) category across Connecticut.

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 prevailing winds and reacts with sunlight and other ozone precursors to create poor air quality. An analysis of the meteorology and back trajectories from August 12th shows that the exceedances in Connecticut were influenced by high pressure over the western Atlantic, along with hot and humid conditions. The transport of localized and regional emissions and previously polluted air, along with favorable weather conditions for ozone formation, led to elevated ozone levels in Connecticut.

Figures 2, 3, and 4 show the back trajectories starting at different wind heights for the monitored exceedances on August 12, 2021. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. Four 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)
CT	Madison-Beach Road	78
CT	Middletown-CVH-Shed	79
CT	Stratford	73
CT	Westport	73

The surface-level back trajectories (Figure 2) show that air originated off the Virginia coast and traveled in a northeasterly direction, circulating around high pressure. A few of the trajectories traveled over the Chesapeake Bay, while one traveled over the Delaware Bay. From here, they traveled northeast over Delaware and the Philadelphia Metropolitan area where they likely picked up emissions from cars, trucks, and local industry. The air continued to travel northeast, moving along the I-95 corridor and over New York City and Long Island, picking up additional pollution from local sources, before finally reaching their destinations along the Connecticut coastline.

Mid-level trajectories (Figure 3) started over Arkansas and Tennessee, circulating clockwise around high pressure, and moved over the Ohio River Valley. From here, air moved over northern Pennsylvania, northern New Jersey, and New York City, where it likely picked up emissions from poorly controlled electric generating units and large industrial sources. The trajectories finally reached their endpoints along coastal Connecticut after passing over Long Island Sound. The sinking motion at this level indicates that pollutants were able to mix down to the surface from aloft, further enhancing ozone levels in a meteorologically favorable environment. Upper-level trajectories (Figure 4) originated over Arkansas and, similar to the mid-level trajectories, traveled over the Ohio River Valley and over northern Pennsylvania, northern New Jersey, New York City, and Long Island Sound, before reaching their final destinations. Air at this level also shows a sinking motion under the influence of high pressure, which means that polluted air at all levels was regionally transported and able to mix down to the surface.

Figure 5 shows the National Air Quality Index observed on August 11th, the day prior to this exceedance event. As shown in the figure, air quality conditions were mostly clean, especially in the areas upstream of the exceedance locations. Some moderate air quality was observed along the I-95 corridor, the NYC Metropolitan area, with an isolated area in Connecticut that reached the unhealthy for sensitive groups category. This indicates that localized emissions from the NYC metropolitan area, an already polluted air mass, and favorable meteorological conditions greatly contributed to the exceedances along the Connecticut coastline.

Figure 2. 48-hour Back Trajectories for August 12, 2021 at 10 meters

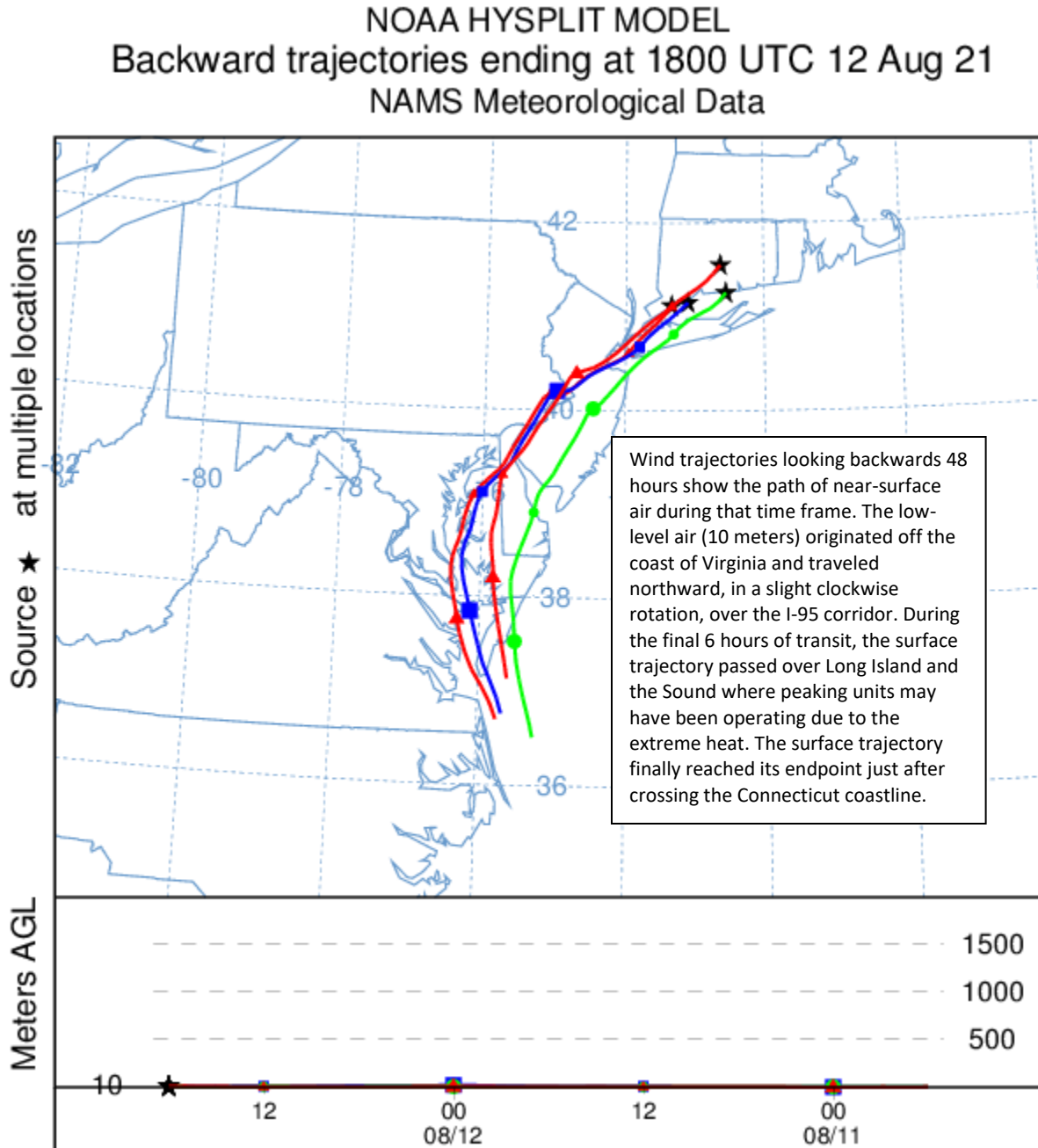


Figure 3. 48-hour Back Trajectories for August 12, 2021 at 500 meters

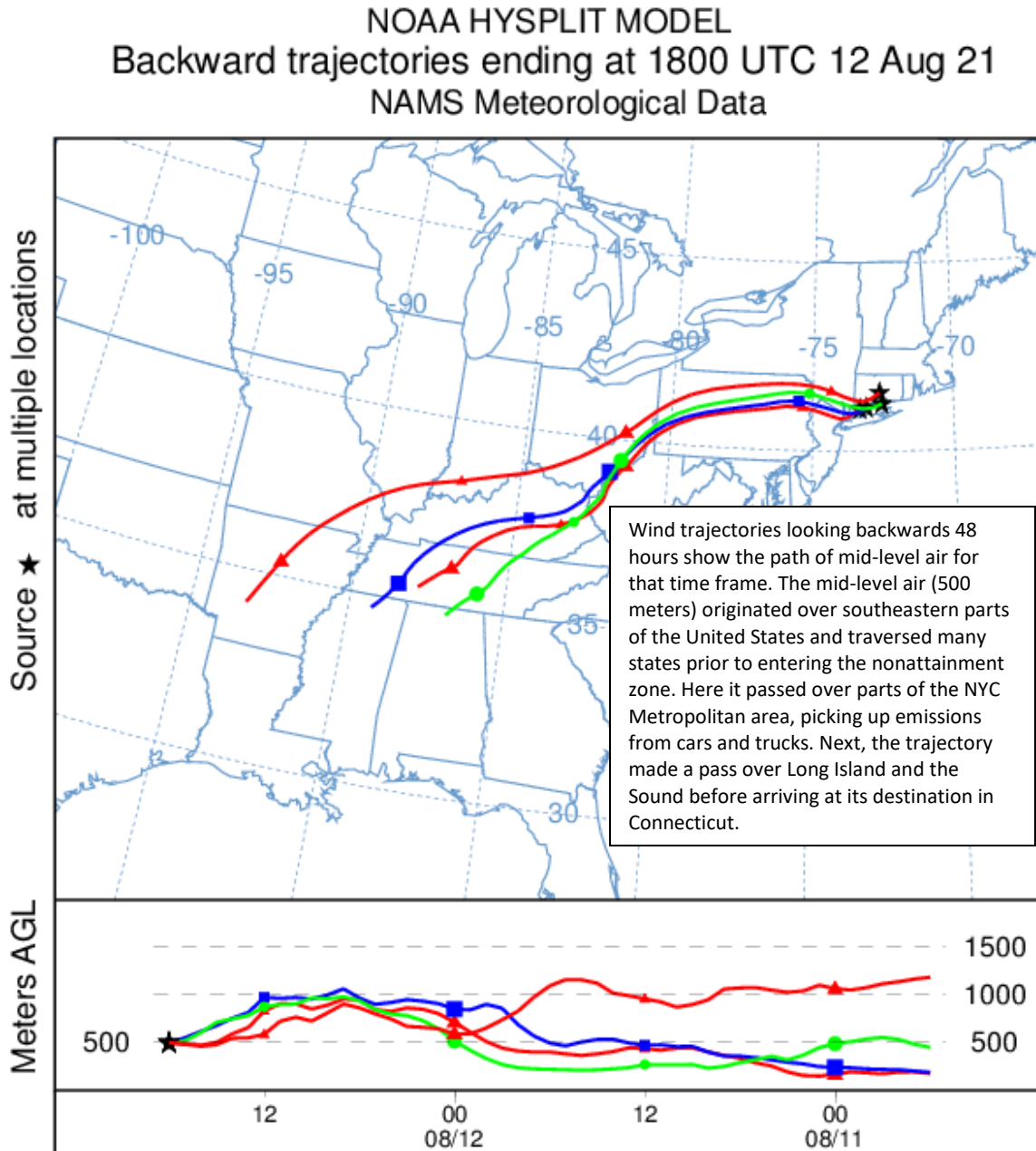


Figure 4. 48-hour Back Trajectories for August 12, 2021 at 1500 meters

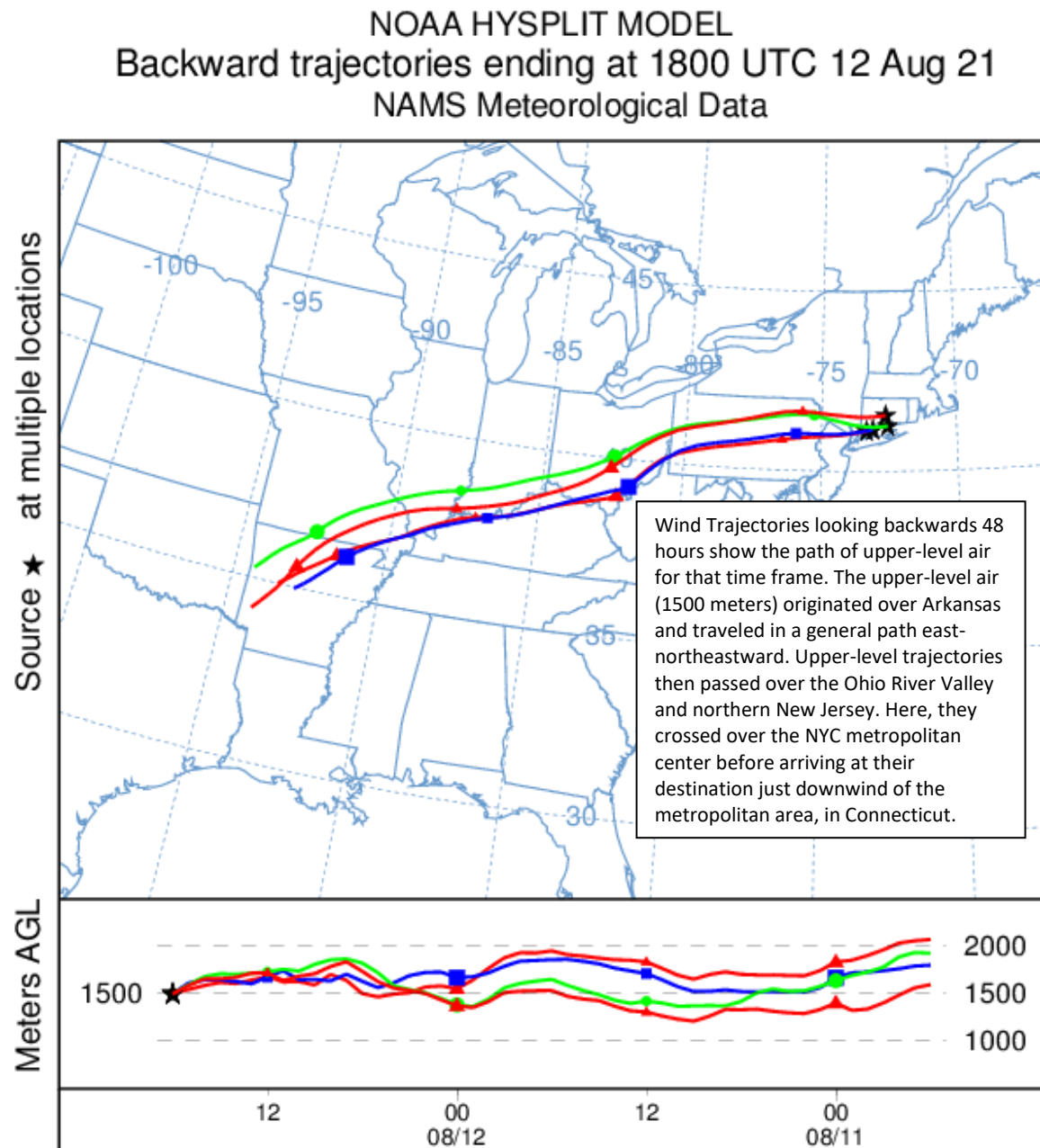


Figure 5. Ozone Air Quality Index for the United States on August 11, 2021



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 (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/>.