Ozone National Ambient Air Quality Standard Health Exceedances on June 7, 2021

Exceedance Locations and Levels

On Monday, June 7, 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.

Table 1. New Jersey Ozone Concentrations on 6/7/2021

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	49
Bayonne	56
Brigantine	40
Camden Spruce St	53
Chester	45
Clarksboro	48
Colliers Mills	43
Columbia	42
Flemington	47
Leonia	47
Millville	44
Monmouth University	36
Newark Firehouse	49
Ramapo	52
Rider University	61
Rutgers University	57
Washington Crossing*	58
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 nonattainment areas, there were two (2) exceedances 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 6/7/2021

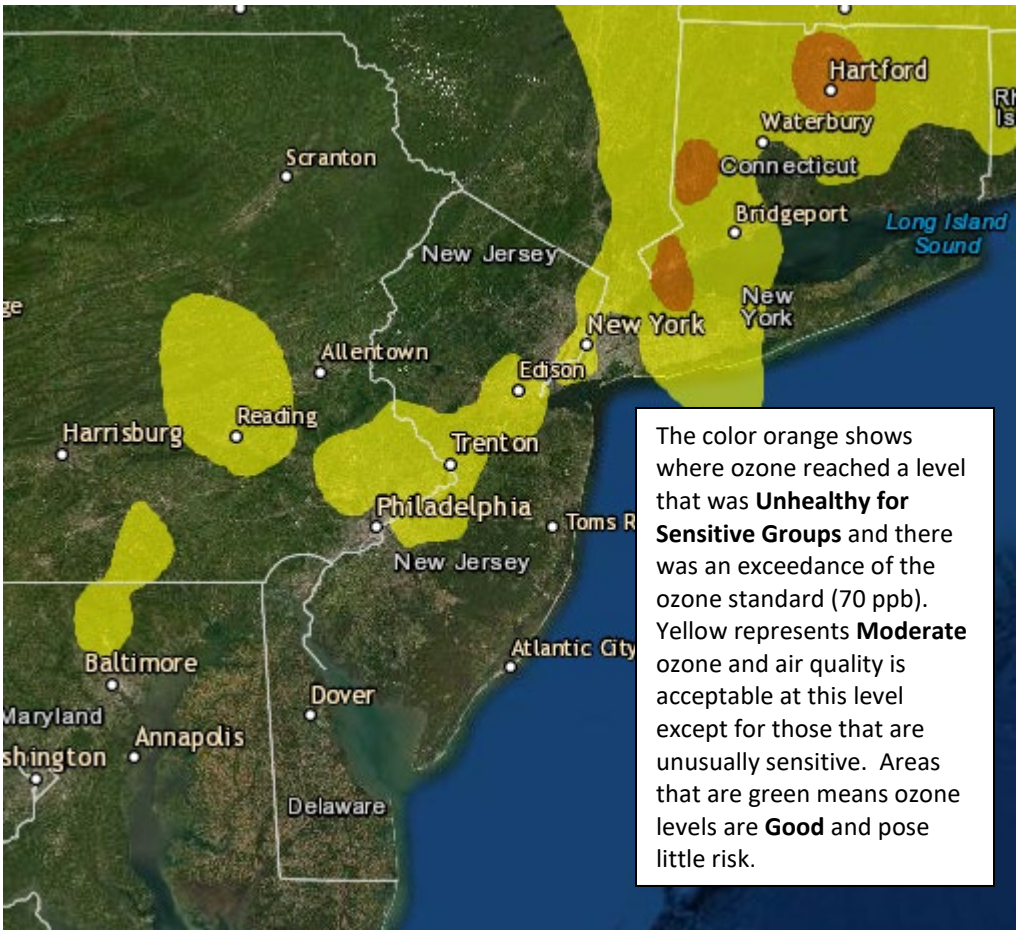
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	71
CT	Greenwich	72
CT	Madison-Beach Road	51
CT	Middletown-CVH-Shed	68
CT	New Haven	49
CT	Stratford	57
CT	Westport	66
DE	BCSP (New Castle Co.)	48
DE	BELLFNT2 (New Castle Co.)	47
DE	KILLENS (Kent Co.)	41
DE	LEWES (Sussex Co.)	36
DE	LUMS 2 (New Castle Co.)	43
DE	MLK (New Castle Co.)	52
DE	SEAFORD (Sussex Co.)	34
MD	Fair Hill	39
NY	Babylon	38
NY	Bronx - IS52	49
NY	CCNY	56
NY	Fresh Kills	No Data
NY	Holtsville	36
NY	Pfizer Lab	57
NY	Queens	46
NY	Riverhead	42
NY	Rockland Cty	51
NY	White Plains	65
PA	BRIS (Bucks Co.)	63
PA	CHES (Delaware Co.)	52
PA	NEWG (Chester Co.)	39
PA	NORR (Montgomery Co.)	56
PA	LAB (Philadelphia Co.)	52
PA	NEA (Philadelphia Co.)	59
PA	NEW (Philadelphia Co.)	59
	TOTAL EXCEEDANCES	2

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 – June 7, 2021 NAAQS = 70 ppb
Connecticut	4
Delaware	2
Maryland	2
New Jersey	4
New York	2
Pennsylvania	3

Figure 1. Ozone Air Quality Index for June 7, 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

Monday June 7th marked the third day of a multi-day exceedance event across the nonattainment zone. For the third day in a row, expansive high pressure remained anchored off the southeastern U.S. coast. With no largescale weather features to help disrupt this persistent pattern, portions of Connecticut saw yet another day of warm temperatures, mostly sunny skies, and light winds generally out of the southwest. These favorable weather features, the transport of ozone precursors from upwind states, and the accumulation of pollutants at the surface over several days resulted in two exceedances of the ozone NAAQS in Danbury and Greenwich, Connecticut.

High pressure positioned itself off the southeast U.S. coast on Saturday June 5th, where it remained anchored through the weekend and into Monday, June 7th. This allowed for a third day of high temperatures in the upper 80s to low 90s, mostly sunny skies, and light winds generally out of the southwest for inland regions. Coastal portions of the northeast saw winds shift in a more southerly direction, allowing for an influx of moisture off the Atlantic Ocean and a generally cleaner air mass for most of the nonattainment zone. This moisture off the Atlantic, combined with sunny skies and hot temperatures, created a buoyant airmass and allowed for increased cloud cover and isolated showers and thunderstorms to develop across New Jersey, eastern Pennsylvania, and the lower Hudson Valley by early afternoon. Isolated showers, thunderstorms, and increasing cloud cover swept across the region from west to east throughout mid-afternoon, limiting ozone production throughout the majority of the nonattainment zone. However, portions of Connecticut saw an extended period of sunny skies and transport from the New York City metropolitan area, resulting in a prolonged period of ozone production.

The ozone exceedances observed in Danbury and Greenwich occurred as a result of the favorable weather conditions mentioned above, as well as the transport of a polluted air mass from the I-95 corridor and New York City metropolitan area to a previously polluted air mass at the surface.

Where Did the Air Pollution that Caused Ozone Come From?

Figures 2, 3, and 4 show the back trajectories starting at different wind heights for the monitored exceedances on June 7, 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)
CT	Danbury	71
CT	Greenwich	72

Back trajectories from June 7th show that exceedances observed in the nonattainment area were influenced by the transport from regions that saw widespread moderate, and isolated USG and unhealthy levels, in the days leading up to this event, as well as an established, persistent, high-pressure center influencing the area. All of this, in combination with a previously polluted air mass over the region and the favorable meteorological conditions mentioned above, led to air quality reaching the unhealthy for sensitive groups (USG) category in Connecticut.

Surface-level back trajectories (Figure 2) show air at the surface originated off the North Carolina coastline, before traveling generally north-northeast along the New Jersey coastline, through eastern Long Island and the Long Island Sound, before reaching their destinations in Connecticut. Air traveled at the surface for much of its path, picking up not only emissions from cars, trucks, and industry but, transporting air from locations that saw elevated levels of ozone the day prior. As this air approached its destination, it slowed significantly, allowing for the build-up of ozone. This region saw multiple days of high ozone prior to this event, and it is likely that the localized transport of precursors impacted portions of Connecticut, leading to the exceedances on June 7th.

Mid-level trajectories (Figure 3) originated just off the Carolina coast and in South Carolina. At the mid-levels, trajectories show that air was highly influenced by the high-pressure system anchored off the coast. Here, trajectories followed the exterior periphery of high pressure following similar transport pathways. While one trajectory traveled northward up the Atlantic coastline the other followed a northeastward path further inland traversing multiple states and metropolitan centers before entering New Jersey. Both trajectory pathways merged directly over the New York City metropolitan center, picking up emissions from cars and trucks during the morning commute hours. Just a few hours later, trajectories crossed the Connecticut border, depositing the polluted air mass downwind of the city leading to enhanced ozone production at the exceedance monitors.

Upper-level back trajectories (Figure 4) originated over Virginia and were highly influenced by the high-pressure system, traveling in a northeastward direction. Vertical motion was present for both trajectories, with the air showing general sinking before reaching its destination. This motion allowed pollutants aloft to mix down to the surface. From Virginia, air slowly passed over parts of Maryland and Pennsylvania, before traveling over northern New Jersey and the NYC metropolitan area. From there, the air reached its destination at the southwestern corner of Connecticut.

Figure 5 shows the National Air Quality Index observed on June 6th, the day prior to this exceedance event. As shown in the figure, widespread elevated levels of ozone were observed throughout the Northeastern United States and Mid-Atlantic region. The localized and regional transport of ozone precursors and previously polluted air, in combination with favorable meteorological conditions mentioned previously, helped lead to two exceedances in western Connecticut.

Figure 2. 48-hour Back Trajectories for June 7, 2021 at 10 meters

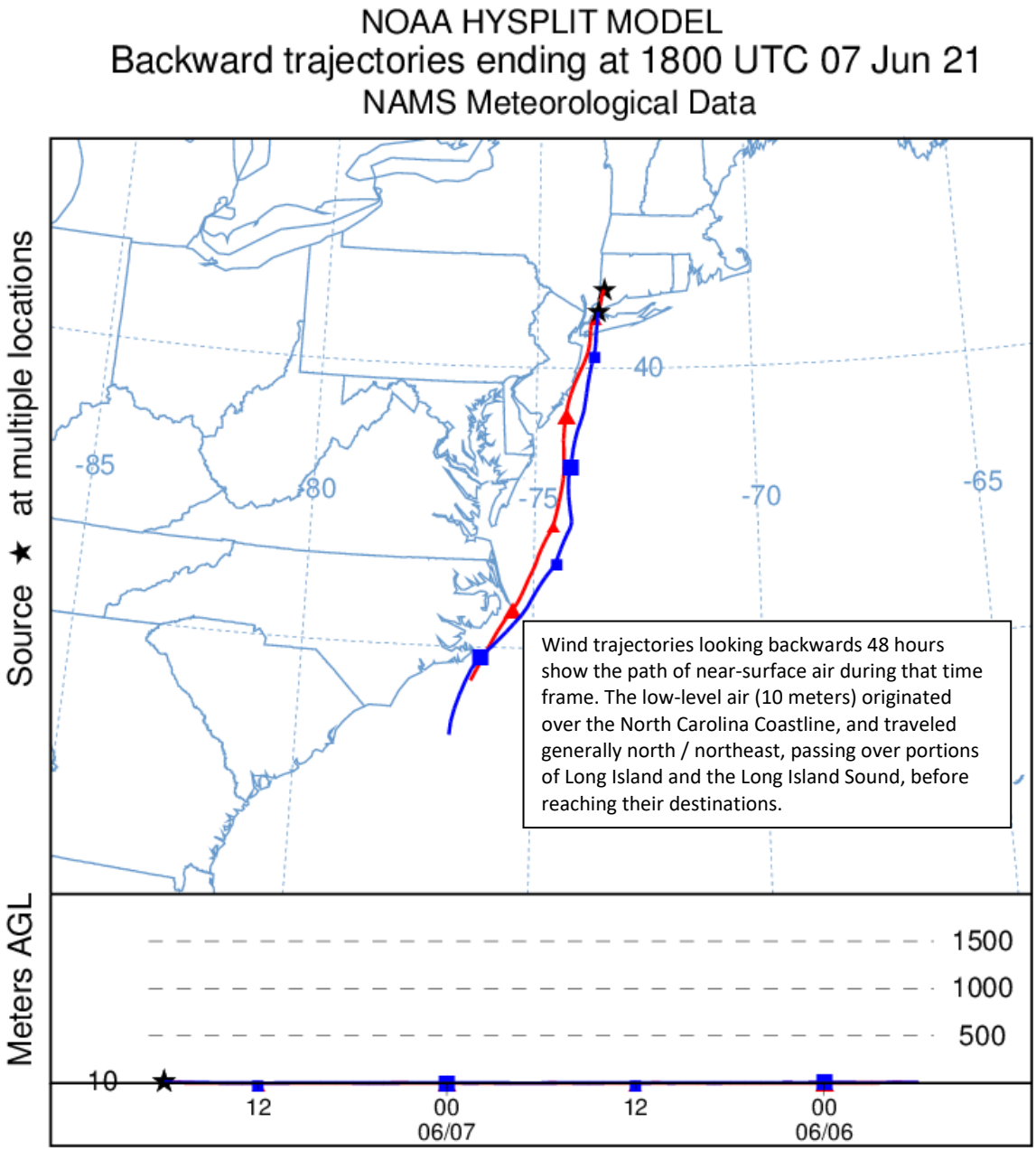


Figure 3. 48-hour Back Trajectories for June 7, 2021 at 500 meters

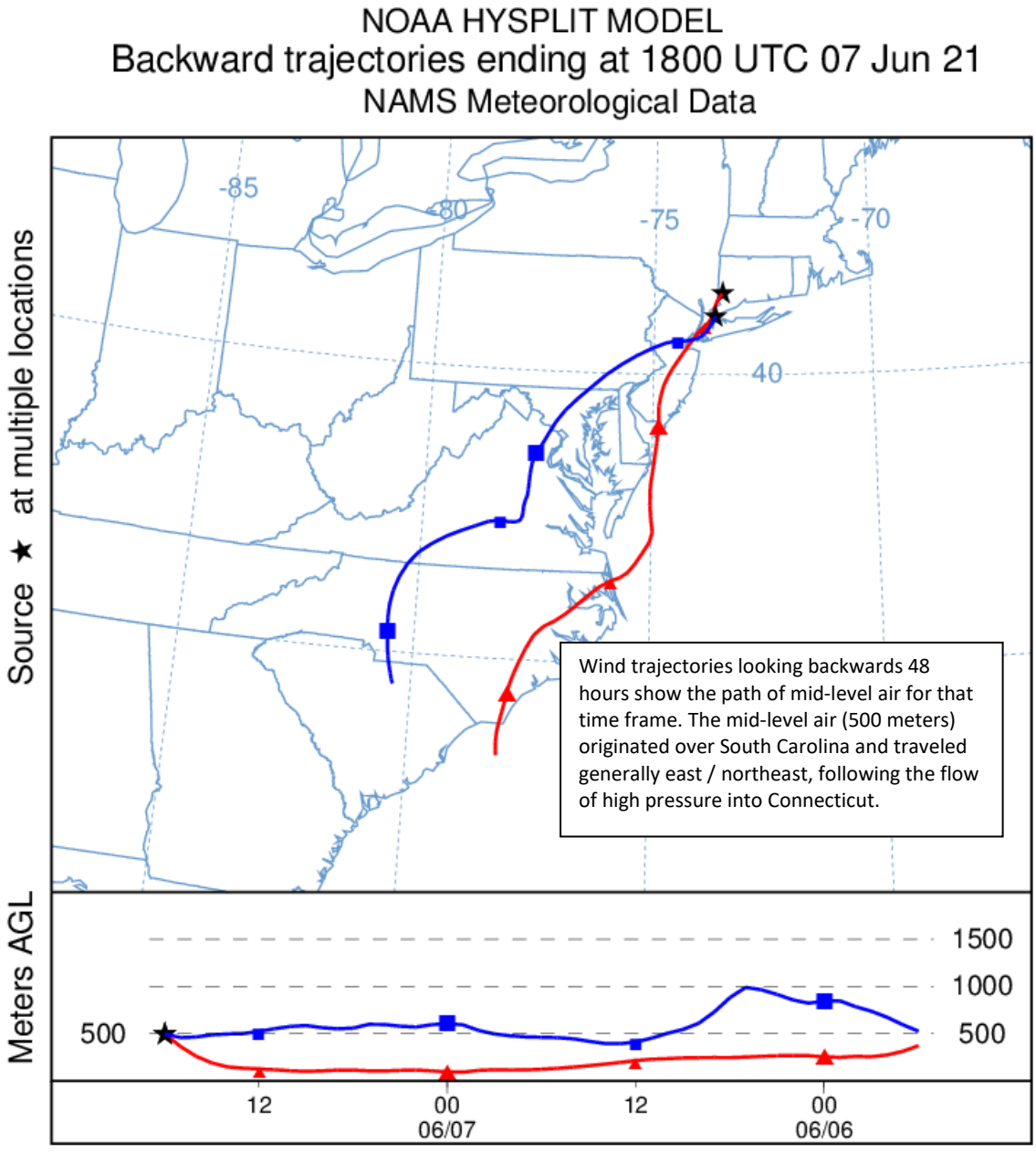


Figure 4. 48-hour Back Trajectories for June 7, 2021 at 1500 meters

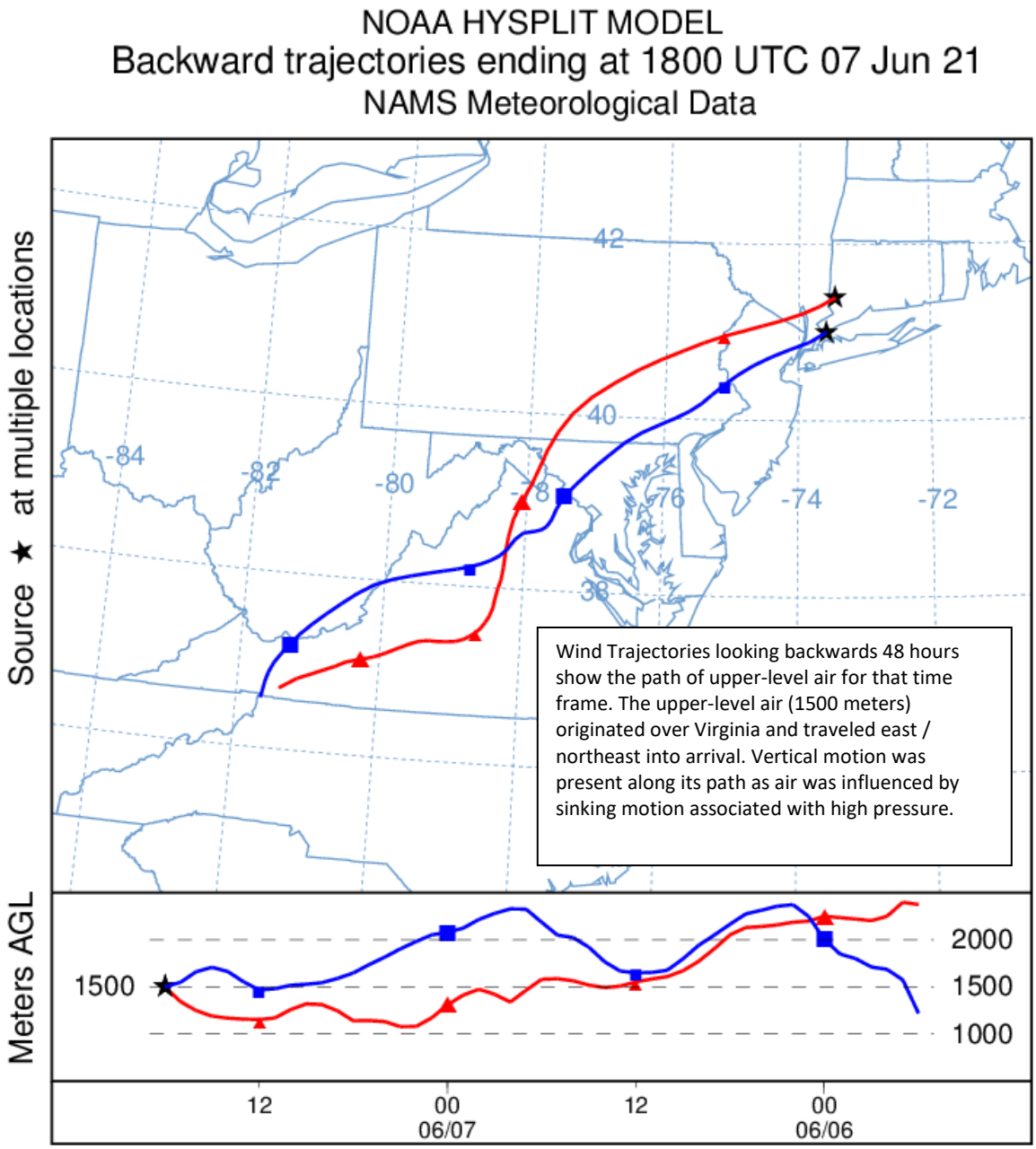
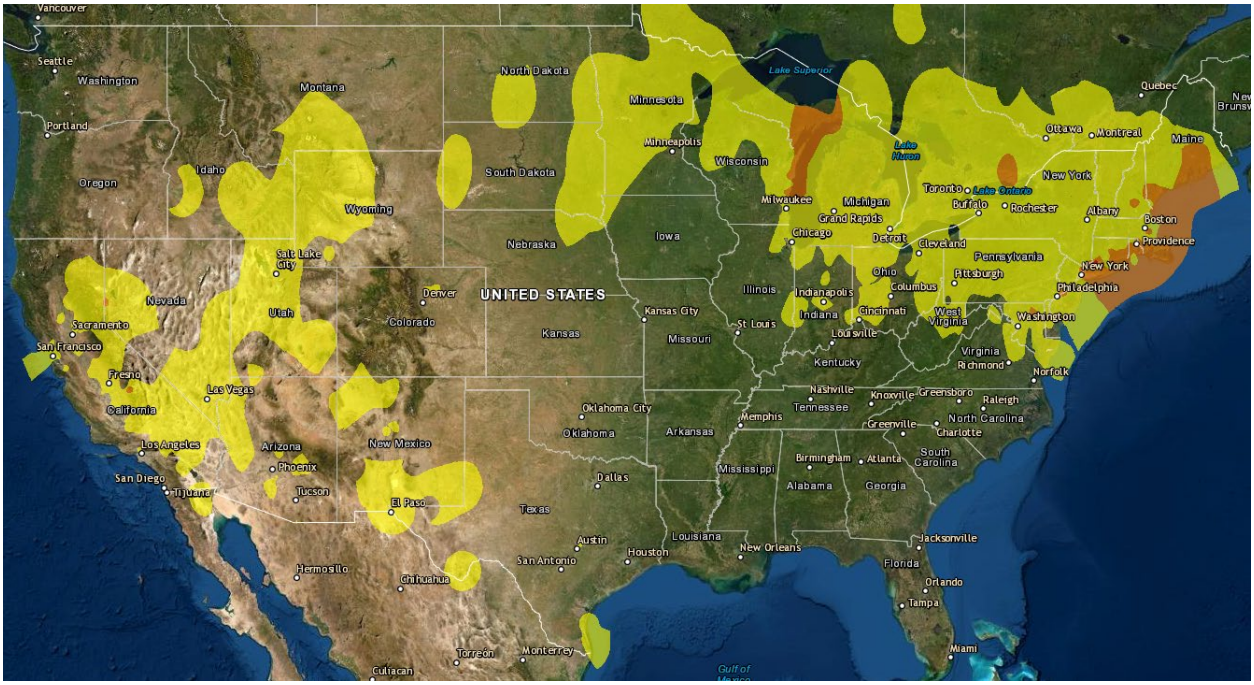


Figure 5. Combined Air Quality Index for the United States on June 6, 2021



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/ .