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

Exceedance Locations and Levels

On Wednesday, May 26, 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 5/26/2021

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	52
Bayonne	63
Brigantine	39
Camden Spruce St	51
Chester	53
Clarksboro	48
Colliers Mills	50
Columbia	58
Flemington	53
Leonia	53
Millville	49
Monmouth University	39
Newark Firehouse	60
Ramapo	55
Rider University	59
Rutgers University	59
Washington Crossing*	53
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 5/26/2021

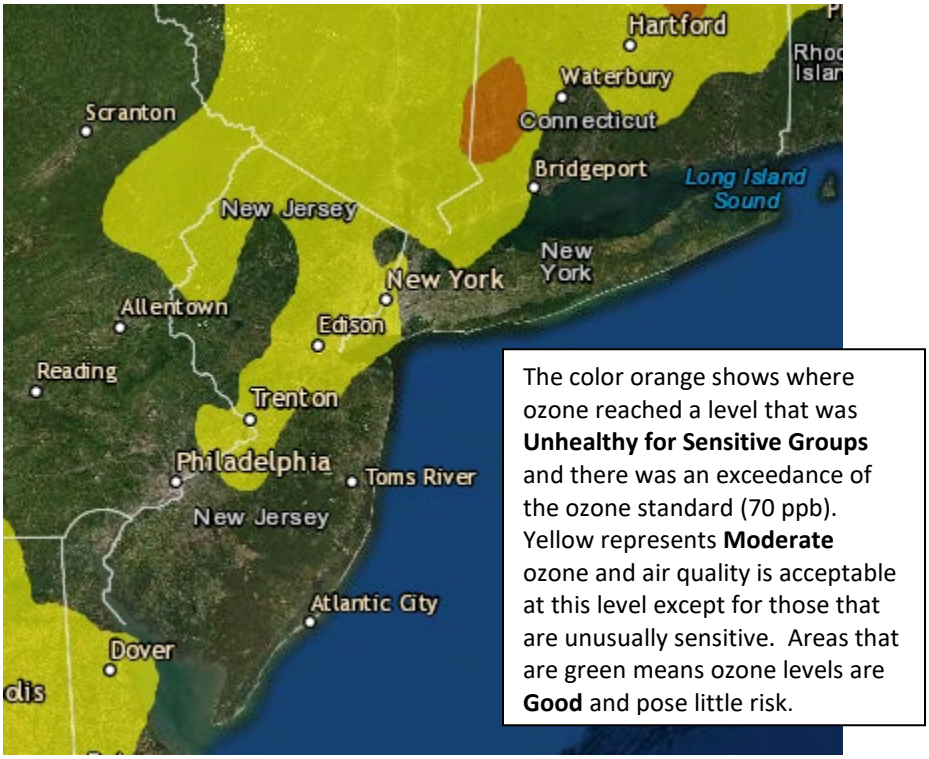
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	75
CT	Greenwich	59
CT	Madison-Beach Road	47
CT	Middletown-CVH-Shed	60
CT	New Haven	40
CT	Stratford	50
CT	Westport	56
DE	BCSP (New Castle Co.)	49
DE	BELLFNT2 (New Castle Co.)	52
DE	KILLENS (Kent Co.)	58
DE	LEWES (Sussex Co.)	50
DE	LUMS 2 (New Castle Co.)	49
DE	MLK (New Castle Co.)	53
DE	SEAFORD (Sussex Co.)	54
MD	Fair Hill	48
NY	Babylon	45
NY	Bronx - IS52	50
NY	CCNY	57
NY	Fresh Kills	63
NY	Holtsville	40
NY	Pfizer Lab	53
NY	Queens	44
NY	Riverhead	42
NY	Rockland Cty	61
NY	White Plains	61
PA	BRIS (Bucks Co.)	58
PA	CHES (Delaware Co.)	53
PA	NEWG (Chester Co.)	43
PA	NORR (Montgomery Co.)	52
PA	LAB (Philadelphia Co.)	45
PA	NEA (Philadelphia Co.)	55
PA	NEW (Philadelphia Co.)	55
	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 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 – May 26, 2021 NAAQS = 70 ppb
Connecticut	1
Delaware	1
Maryland	1
New Jersey	2
New York	0
Pennsylvania	1

Figure 1. Ozone Air Quality Index for May 26, 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

High pressure moved off the east coast United States on Wednesday May 26th as a weakening frontal boundary approached the region from the west. Generally favorable weather conditions for ozone formation as well as the transport of local/regional emissions allowed for elevated levels of ozone over portions of the northern nonattainment area, with an isolated exceedance observed at the Danbury, CT monitor.

The high-pressure system that dominated the weather pattern in the earlier part of the week, moved offshore, away from the region on Wednesday. Meanwhile, a weakening frontal boundary, ahead of a much more pronounced cold front, lingered just west of the nonattainment area for much of the day. This boundary then pushed east in the late afternoon and evening hours, providing widespread showers/thunderstorms to the nonattainment area. Prior to these thunderstorms, the entire region observed hot and humid conditions as well as a southwest or south wind. Additionally, daytime sunshine varied across the nonattainment area, which turned out to play an important role on this particular exceedance day. Locations in the southern nonattainment area as well as some portions of northern New Jersey experienced a broad area of low-level clouds and fog on Wednesday morning. This cloud cover unexpectedly lingered for much of the morning, slowly clearing by mid-day. Meanwhile, locations north, such as the lower Hudson Valley, NY and western Connecticut, saw sunshine for most of the day. It was this additional period of sunshine that the northern nonattainment area experienced, which helped increase ozone levels in this particular region. Finally, the arrival of the late day thunderstorms allowed for vertical motion in the atmosphere which could have mixed any transported ozone aloft toward the surface, further enhancing levels in some locations.

Overall, the isolated Danbury, CT exceedance on May 26th can be attributed to the transport of local/regional emissions into a favorable environment for ozone formation.

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 exceedance on May 26, 2021. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedance. One monitoring station was chosen to model back trajectories and is listed in Table 4.

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	Danbury	75

Back trajectories from May 26th show that the isolated exceedance observed in Connecticut was likely influenced by favorable weather conditions mentioned above, as well as, high pressure off the coast. This allowed for both localized transport of emissions from New York City and Long Island at the surface and regional transport of elevated levels of ozone. The combination of these features led to one isolated ozone exceedance in Connecticut on this day.

The surface-level back trajectory (Figure 2) shows that air at the surface was heavily influenced by high pressure moving offshore and traveled clockwise around the periphery of the pressure system. At the surface, air began traveling in a westward direction over the water. Upon reaching the New Jersey coastline, air at the surface made a turn northward. Here, the surface trajectory traveled northward through eastern portions of New Jersey and made its way through western Long Island and the lower Hudson Valley. At this time, air traveling at ground level picked up local emissions from cars, trucks, and industry in the greater New York City metropolitan center. As the air mass grew increasingly polluted, it continued to travel northward over Connecticut where it arrived at the exceedance location in Danbury.

The mid-level back trajectory (Figure 3) shows that air originated over the Atlantic Ocean, off the coast of the Carolinas. The trajectory follows a clockwise rotation around high pressure, moving west and onto the South Carolina coast, where it begins to show a gradual sinking motion. The trajectory then makes a northeastward turn and travels quickly over North Carolina, Maryland, and Pennsylvania. It eventually makes its way into northern New Jersey, where it begins to slow down, and travels along parts of the I-95 corridor and over the New York City Metropolitan area. After this, the trajectory reaches its destination in southwestern Connecticut.

Finally, upper-level back trajectory (Figure 4) shows that the air mass aloft originated in central Kentucky and traversed very slowly under the influence of overhead high pressure. The upper level air then passed over the Ohio River Valley, an area that observed widespread moderate ozone and isolated portions of unhealthy for sensitive groups (USG) the day prior, as seen in Figure 5. During transport, air began to sink slightly towards the surface, potentially allowing for previously polluted air from the Ohio River Valley to mix down to the surface. Here it also encountered a stalled frontal boundary that eventually transitioned into a warm front, allowing for the air mass to propel across Pennsylvania towards the nonattainment area. As the upper-level air approached Connecticut, it passed over portions of northwestern New Jersey and southern New York State before arriving at its destination.

Figure 5 shows the National Air Quality Index observed on May 25th, the day prior to this exceedance event. As shown in the figure, widespread moderate and an isolated area of unhealthy for sensitive groups (USG) ozone levels were observed over the Ohio River Valley region, and portions of the Connecticut and New York border. The localized and regional transport of ozone pre-cursors in the upper atmosphere, in combination with the favorable meteorological conditions mentioned previously, helped lead to the exceedance in Danbury, CT.

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

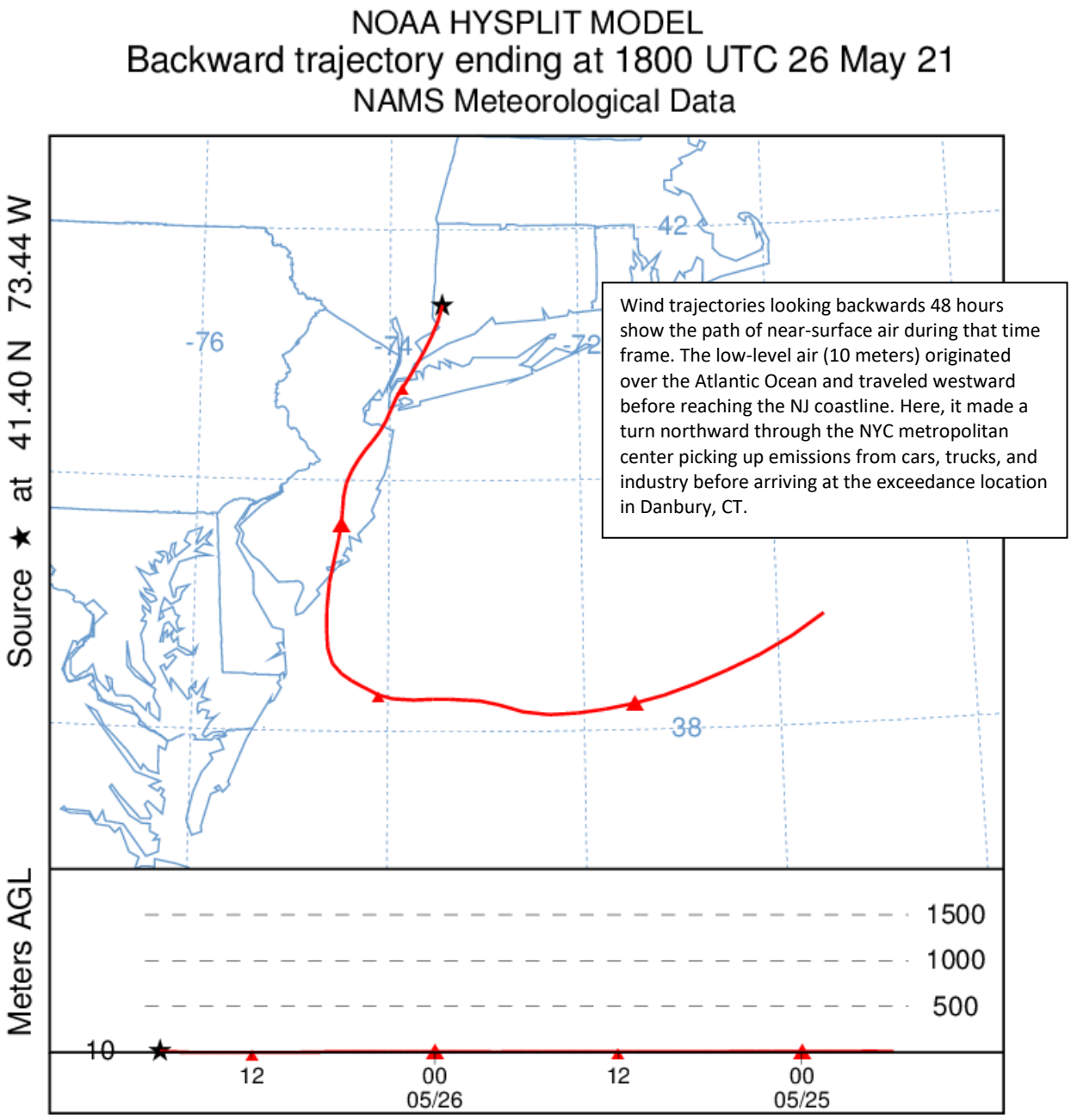


Figure 3. 48-hour Back Trajectories for May 26, 2021 at 500 meters

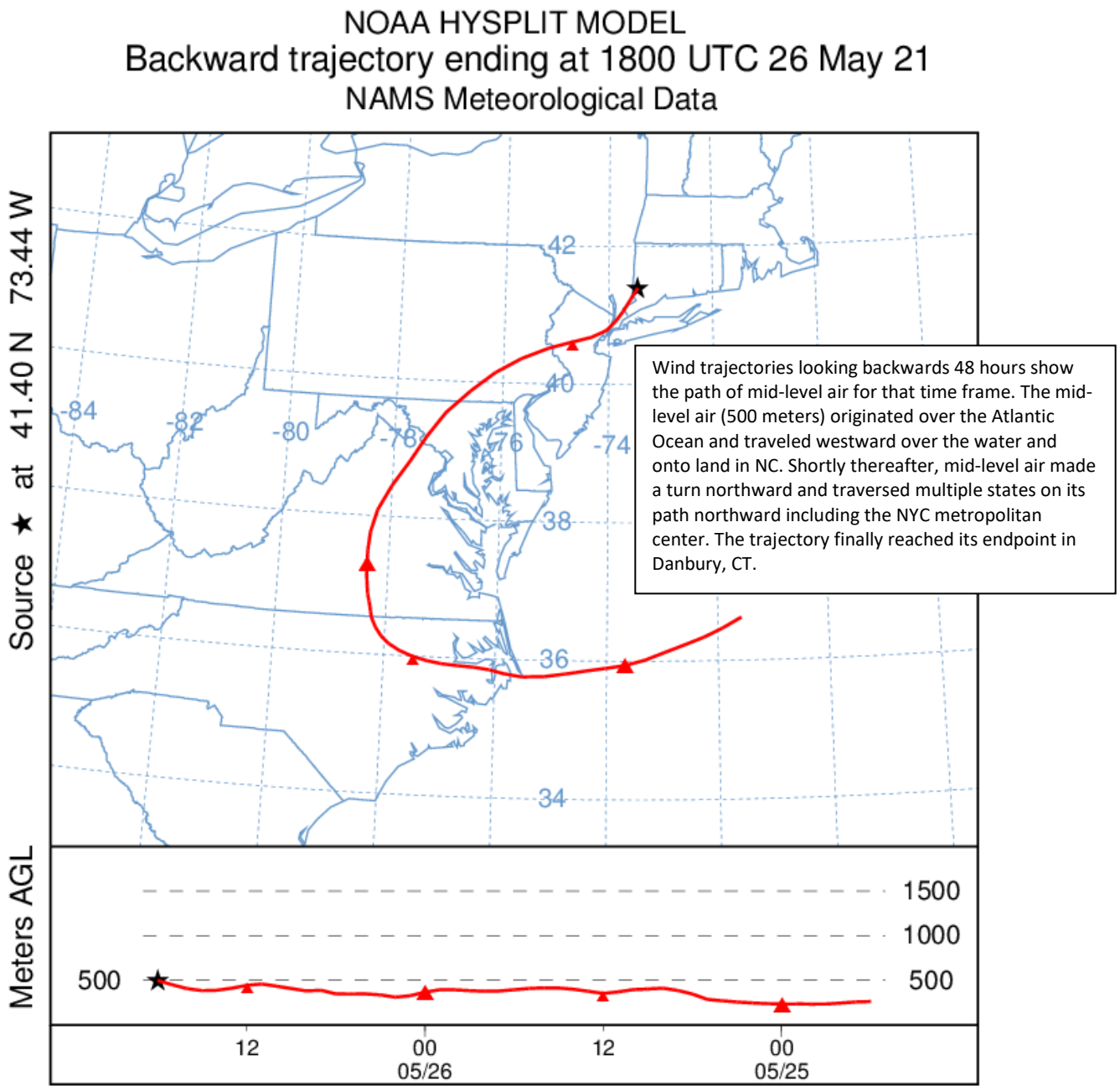


Figure 4. 48-hour Back Trajectories for May 26, 2021 at 1500 meters

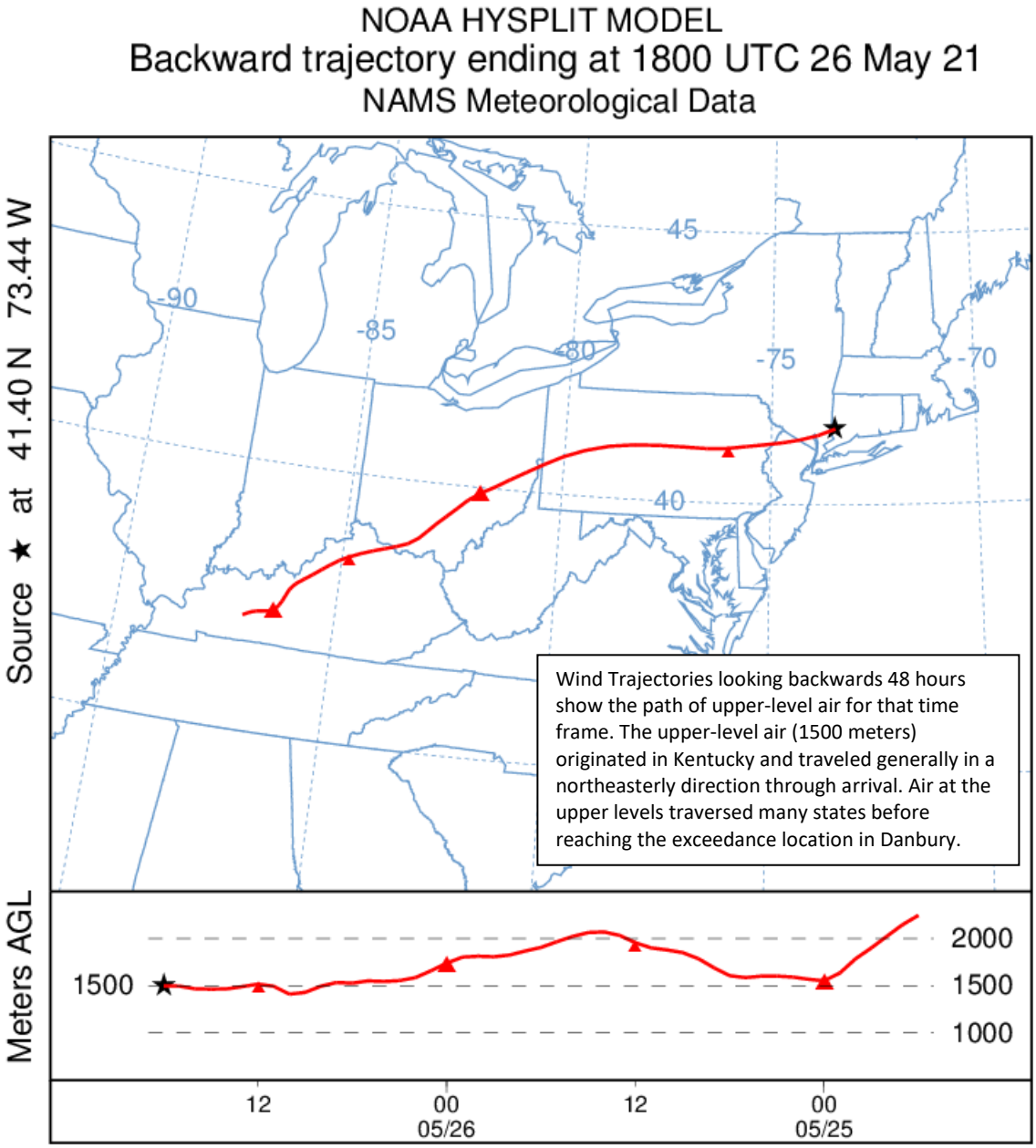
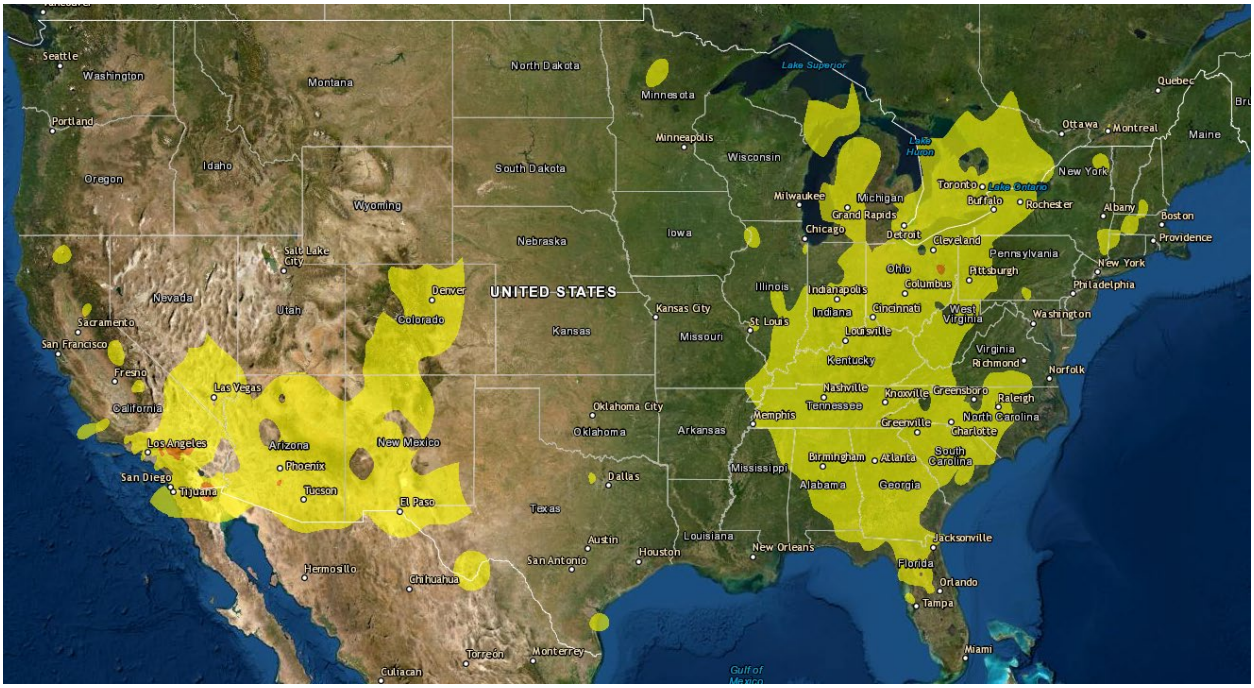


Figure 5. Combined Air Quality Index for the United States on May 25, 2021



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/ .