Ozone National Ambient Air Quality Standard Health Exceedances on July 26, 2020

Exceedance Locations and Levels

On Sunday, July 26, 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 7/26/2020

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	45
Bayonne	52
Brigantine	No Data
Camden Spruce St	51
Chester	52
Clarksboro	52
Colliers Mills	50
Columbia	No Data
Flemington	52
Leonia	50
Millville	42
Monmouth University	52
Newark Firehouse	56
Ramapo	45
Rider University	54
Rutgers University	53
Washington Crossing*	54
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 7/26/2020

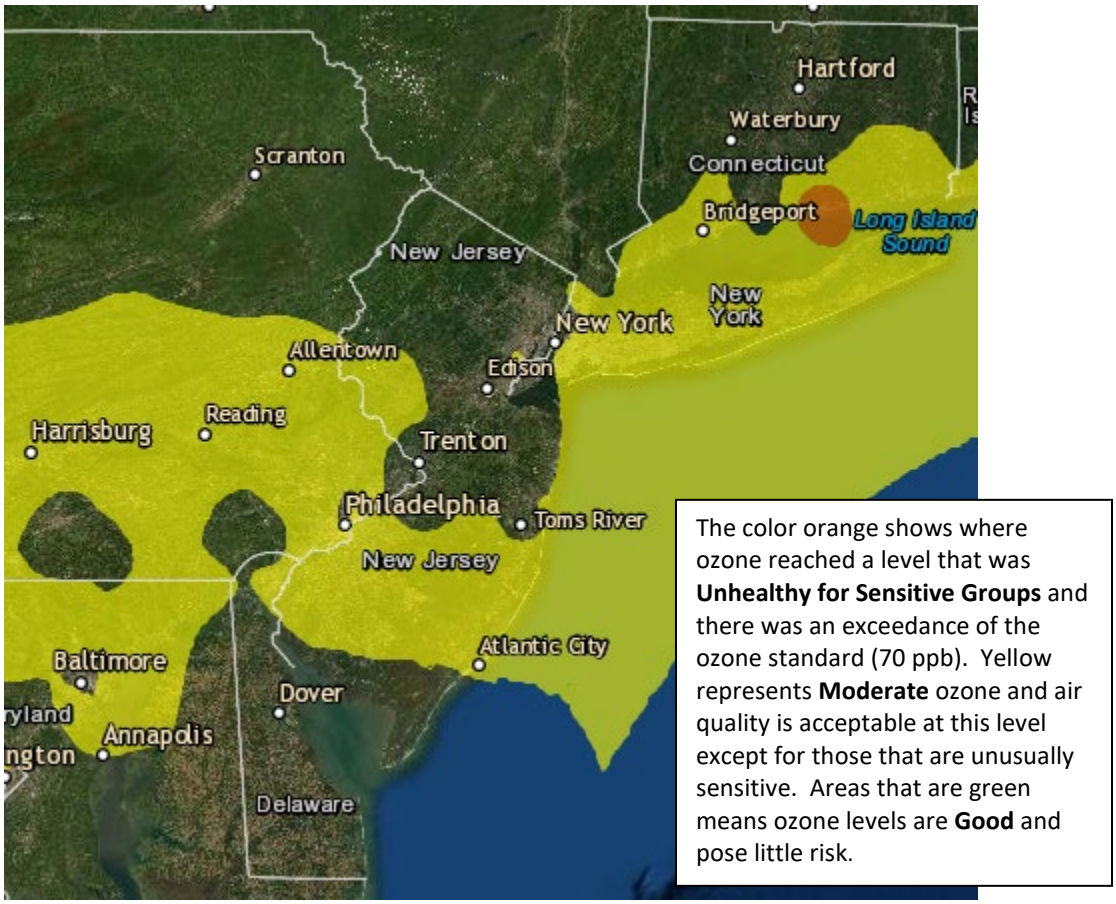
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	48
CT	Greenwich	55
CT	Madison-Beach Road	71
CT	Middletown-CVH-Shed	50
CT	New Haven	52
CT	Stratford	65
CT	Westport	56
DE	BCSP (New Castle Co.)	51
DE	BELLFNT2 (New Castle Co.)	55
DE	KILLENS (Kent Co.)	50
DE	LEWES (Sussex Co.)	50
DE	LUMS 2 (New Castle Co.)	51
DE	MLK (New Castle Co.)	56
DE	SEAFORD (Sussex Co.)	50
MD	Fair Hill	56
NY	Babylon	64
NY	Bronx - IS52	52
NY	CCNY	52
NY	Fresh Kills	52
NY	Holtsville	58
NY	Pfizer Lab	55
NY	Queens	62
NY	Riverhead	60
NY	Rockland Cty	46
NY	White Plains	50
PA	BRIS (Bucks Co.)	53
PA	CHES (Delaware Co.)	56
PA	NEWG (Chester Co.)	52
PA	NORR (Montgomery Co.)	62
PA	LAB (Philadelphia Co.)	51
PA	NEA (Philadelphia Co.)	57
PA	NEW (Philadelphia Co.)	58
	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 – July 26, 2020 NAAQS = 70 ppb
Connecticut	8
Delaware	1
Maryland	0
New Jersey	4
New York	4
Pennsylvania	3

Figure 1. Ozone Air Quality Index for July 26, 2020



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

Beginning on July 25th, the day prior to this event, high pressure was in control of the weather pattern for much of the northeastern United States. This pattern continued into July 26th providing similar weather conditions as the previous day such as: partly sunny skies, warm temperatures, and light/variable winds. Two consecutive days of similar conditions with little variation allowed for isolated pockets of elevated ozone along the Connecticut coastline.

The previously established high pressure system remained anchored over the northeast on July 26th persisting as the primary weather story for another day. This provided the region with temperatures soaring into the 90s with partly to mostly sunny skies observed. Meteorological data from across the region identified that winds along the Connecticut coastline were very light and variable while surrounding areas experienced winds generally from the westerly direction. This likely helped to influence the localized transport of emissions from the New York City metropolitan area into Connecticut. Meanwhile, isolated areas of cumulus clouds were noted on satellite imagery which may have played a role in limiting ozone formation in those locations. Additionally, a surface trough developed and extended from Maine, through central Connecticut and into the Mid-Atlantic. At this time, the surface trough combined with favorable weather conditions at the exceedance location provided the opportunity for any ozone aloft to mix down to the surface.

This exceedance occurring exclusively in Madison Beach, CT can be attributed to favorable localized meteorology in combination with the transport of ozone precursors from the New York City area. These factors allowed ozone levels to rise into the unhealthy for sensitive groups (USG) category at the monitor leading to an exceedance on July 26th.

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 July 26, 2020. 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 run back trajectories and is listed in Table 4 below.

Table 4. Monitoring Station 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	71

Back trajectories from July 26th show that the isolated Connecticut coastline exceedance was influenced by the local transport of emissions from the NYC metropolitan area as well as the transport of ozone from both the Long Island Sound region and the Ohio River Valley, areas that saw elevated ozone levels in the day preceding this event.

The surface level back trajectory (Figure 2) for the Madison-Beach Rd. monitor shows that air originated over southern New Jersey and traveled north-northeast toward the NYC metropolitan area through early July 26th, before making a turn more eastward, racing over the Long Island Sound into arrival. Air traveled along the surface during the duration of its path, picking up localized emissions from cars, trucks, and industry along the way. Additionally, the NYC metropolitan area and Long Island Sound region saw elevated levels of ozone in the days leading up to the July 26th event. As such, it is likely that any residual ozone at the surface was transported east, enhancing an increasingly polluted airmass.

Meanwhile, both the mid-level (Figure 3) and upper-level (Figure 4) trajectories originated over Ohio and traveled generally eastward through the heavily industrialized Ohio River Valley, Pennsylvania, the lower Hudson Valley, and portions of southwestern Connecticut into arrival. Air at both the mid- and upper-levels was steered by high pressure, allowing for the long-range transport of elevated levels of ozone from the Ohio River Valley into the non-attainment area. Additionally, vertical motion was present in the atmosphere on this day, associated with both the sinking motion of high pressure as well as the surface trough described above. These mechanisms for vertical motion allowed for any ozone aloft, transported from points west, to be mixed toward the surface, enhancing levels along the Connecticut coastline.

Figure 5 shows the National Air Quality Index observed on July 25th, the day prior to the Madison-Beach Rd., CT exceedance. As shown in the figure, portions of the Ohio / Great Lakes region as well as the Long Island Sound region saw widespread moderate levels of ozone on this day, with isolated locations reaching USG levels. Both the localized transport of emissions and residual ozone within the non-attainment area as well as long range transport from points west allowed for the enhancement of an atmosphere favorable for ozone formation, leading to the isolated exceedance along the Connecticut coastline on July 26th.

Figure 2. 48-hour Back Trajectories for July 26, 2020 at 10 meters

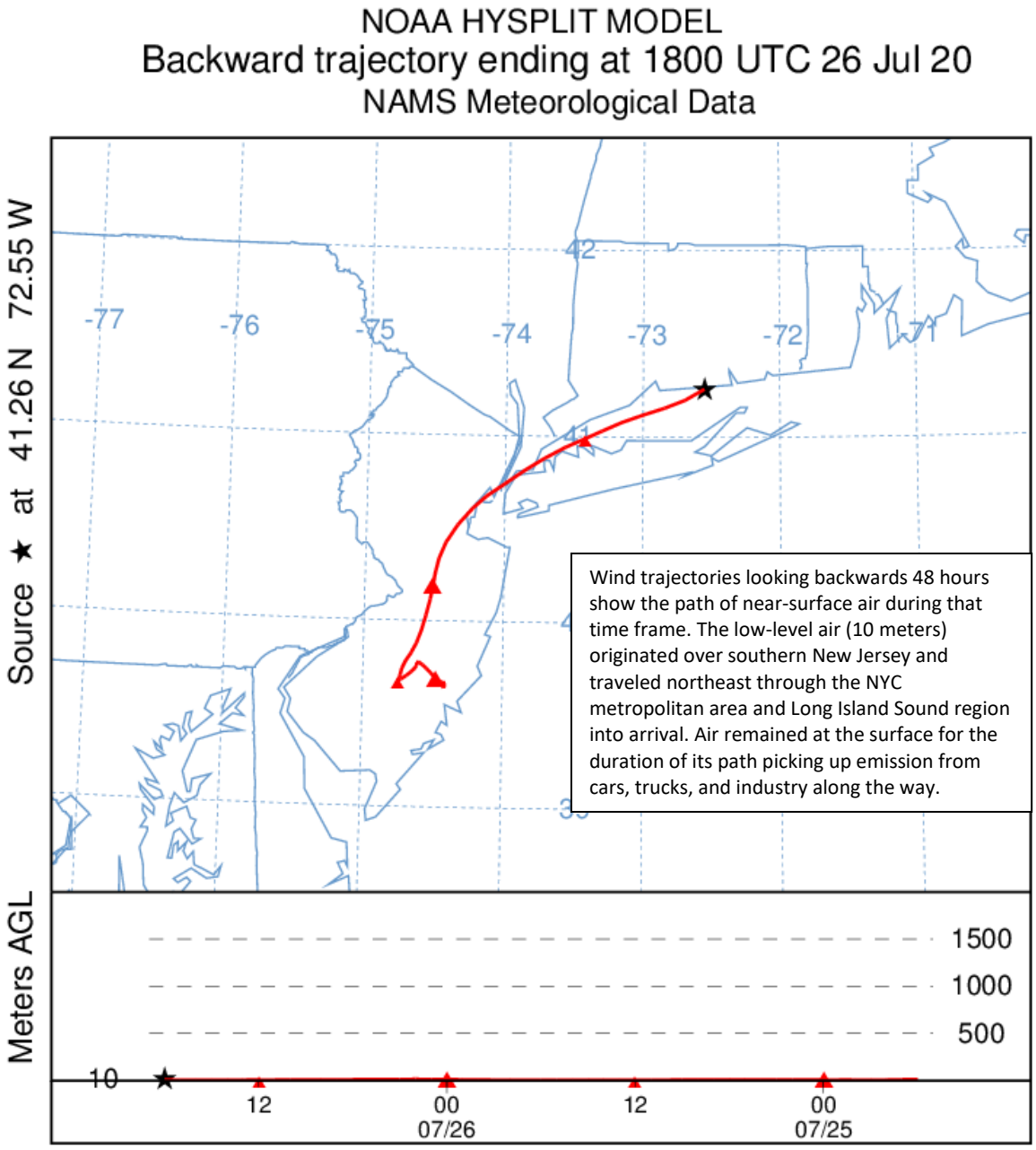


Figure 3. 48-hour Back Trajectories for July 26, 2020 at 500 meters

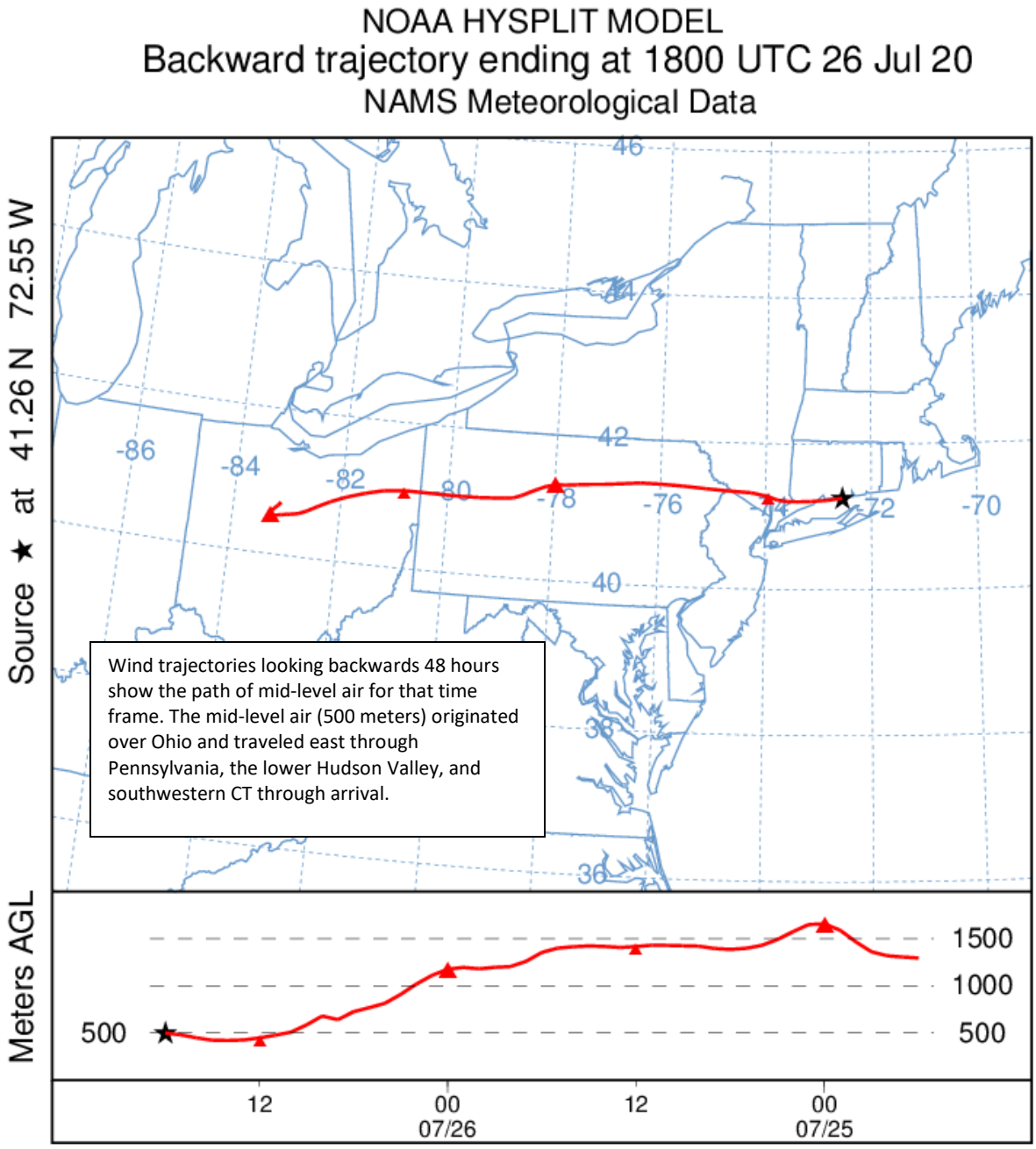


Figure 4. 48-hour Back Trajectories for July 26, 2020 at 1500 meters

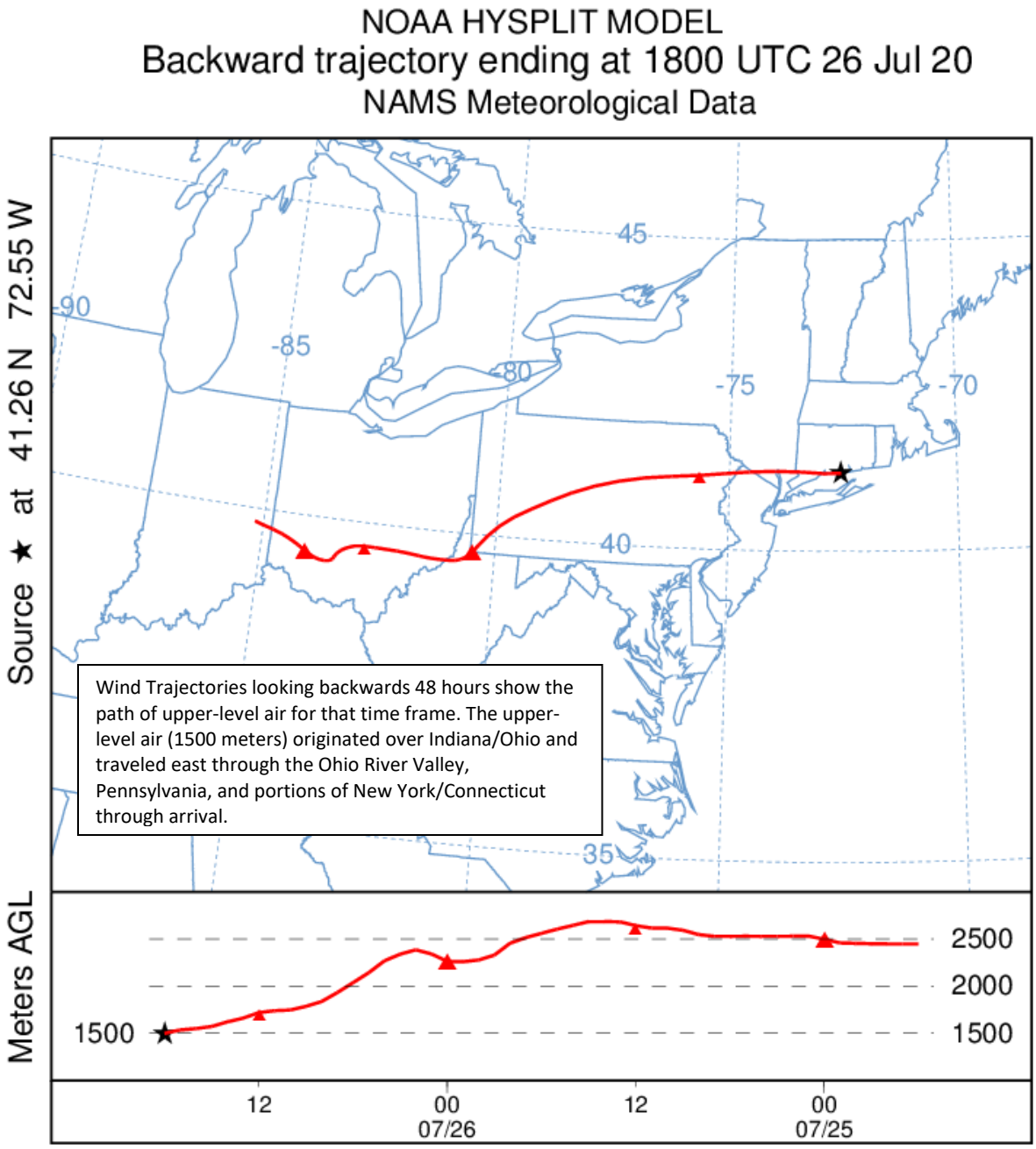
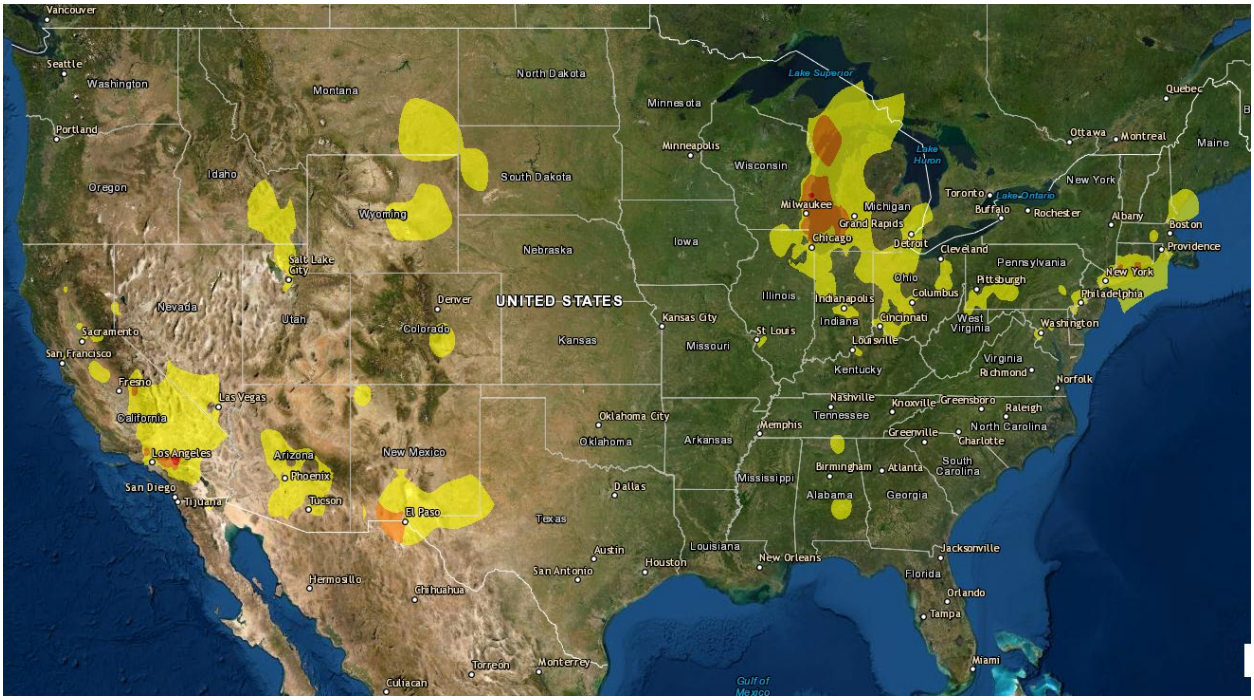


Figure 5. Combined Air Quality Index for the United States on July 25, 2020



Source: www.airnow.gov

How is Ozone Created?

Ground-level ozone is an air pollutant known to cause a number of 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/ .