Ozone National Ambient Air Quality Standard Health Exceedances on July 6, 2020

Exceedance Locations and Levels

On Monday, July 6, 2020, there was one (1) exceedance 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 7/6/2020

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	43
Bayonne	63
Brigantine	No Data
Camden Spruce St	44
Chester	49
Clarksboro	No Data
Colliers Mills	45
Columbia	No Data
Flemington	52
Leonia	73
Millville	46
Monmouth University	58
Newark Firehouse	64
Ramapo	60
Rider University	54
Rutgers University	65
Washington Crossing*	51
TOTAL EXCEEDANCES	1

*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 no 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 7/6/2020

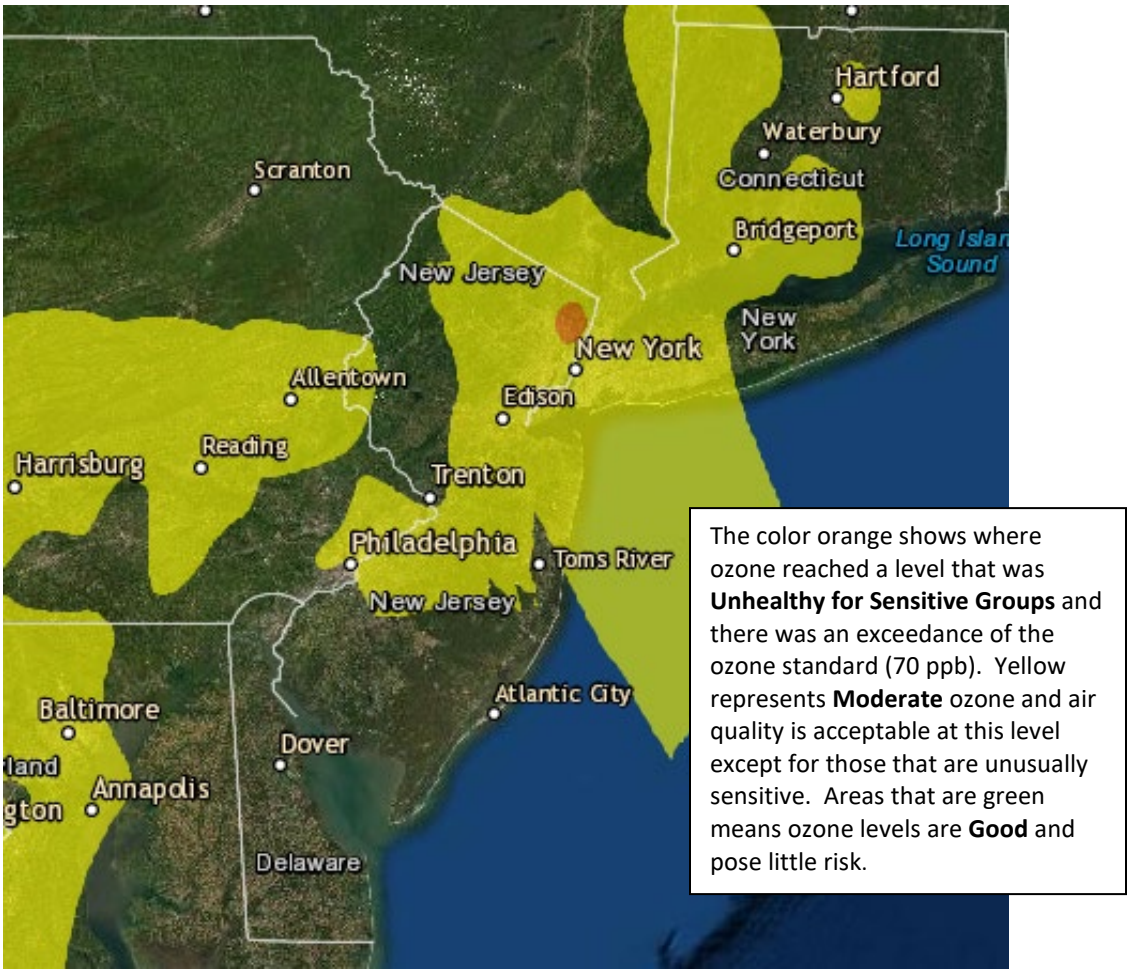
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	49
CT	Greenwich	58
CT	Madison-Beach Road	52
CT	Middletown-CVH-Shed	49
CT	New Haven	52
CT	Stratford	58
CT	Westport	56
DE	BCSP (New Castle Co.)	45
DE	BELLFNT2 (New Castle Co.)	45
DE	KILLENS (Kent Co.)	47
DE	LEWES (Sussex Co.)	No Data
DE	LUMS 2 (New Castle Co.)	47
DE	MLK (New Castle Co.)	49
DE	SEAFORD (Sussex Co.)	42
MD	Fair Hill	41
NY	Babylon	61
NY	Bronx - IS52	60
NY	CCNY	66
NY	Fresh Kills	56
NY	Holtsville	50
NY	Pfizer Lab	61
NY	Queens	63
NY	Riverhead	45
NY	Rockland Cty	58
NY	White Plains	58
PA	BRIS (Bucks Co.)	48
PA	CHES (Delaware Co.)	48
PA	NEWG (Chester Co.)	45
PA	NORR (Montgomery Co.)	51
PA	LAB (Philadelphia Co.)	39
PA	NEA (Philadelphia Co.)	51
PA	NEW (Philadelphia Co.)	47
	TOTAL EXCEEDANCES	0

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 6, 2020 NAAQS = 70 ppb
Connecticut	3
Delaware	0
Maryland	0
New Jersey	2
New York	2
Pennsylvania	1

Figure 1. Ozone Air Quality Index for July 6, 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

On Monday July 6th, a cold front moved through New Jersey. Areas to the north of the front saw light easterly winds and warm temperatures in the mid to upper 80s. Sea breezes also developed along the Connecticut coast and Long Island. The buildup of pollutants due to this sea breeze combined with the light easterly winds were conducive to ozone development to areas west of New York City, specifically the Leonia monitor. Here, ozone concentrations were able to build up and the monitor reached the unhealthy for sensitive groups (USG) category.

On Sunday, July 5th, a weak cold front began to make its way through the region. The front stalled over central New Jersey Sunday night and meandered back and forth before moving through New Jersey as a cold front once again on the morning of July 6th. This cold front brought widespread showers and thunderstorms to southern New Jersey which were able to keep these areas around the good/moderate threshold. Winds to the south of the front were from a southeasterly direction while winds to the north, including the Leonia monitor, were light and mainly from an easterly direction.

Strong sea breeze fronts along Long Island and Connecticut coastline also developed and moved inland throughout the day. As a result of this sea breeze, coastal Connecticut and Long Island were able to remain in the good/moderate category. The sea breeze also allowed more pollutants to build up over New York City, where conditions were favorable for ozone development. Because of the easterly wind over this region, pollutants were then transported to downwind areas which included the Leonia monitor. During the early afternoon, thunderstorms began to develop over northern New Jersey and cleaned out the area. Unfortunately, high ozone concentrations had already built up over Leonia and therefore the monitor was still able to reach the unhealthy for sensitive groups (USG) category.

The exceedance occurring only in Leonia is due to many factors. The sea breeze front likely brought in more pollutants inland to the New York City area, and as a result of light easterly winds, transported these pollutants to areas west of the city. Ozone concentrations were able to build and reach the USG category in Leonia due to these favorable weather conditions.

Where Did the Air Pollution that Caused Ozone Come From?

Please note, these exceedances are 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 exceedance on July 6th, 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 was Selected to Run 48-hr Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
NJ	Leonia	73

Back trajectories from July 6th show that air was heavily influenced by weak circulation throughout the region in the days leading up to the exceedance. While most of the nonattainment area observed moderate air quality, Leonia was able to reach the unhealthy for sensitive groups category due to light winds out of Manhattan transporting ozone precursors into New Jersey.

Surface level trajectories (Figure 2) show that air originated in upstate New York and traveled very slowly in a southerly direction allowing the air mass to grow increasingly polluted over a short distance. Surface trajectories passed through the lower Hudson Valley and recirculated over the New York City metropolitan area picking up emissions from cars, trucks, peaking electrical generating units located in New York City and/or distributed generating units before reaching its endpoint. Additionally, air traveling at the surface mixed down from higher elevations indicating that polluted air aloft may have been mixed down to the surface through transit.

Mid-level trajectories (Figure 3) followed a similar pathway to surface trajectories. Air at the mid-level originated in southern Ontario and traveled in a southeasterly direction through upstate New York where moderate air quality was observed the previous day. Trajectories then passed through the lower Hudson Valley making a similar recirculation around the New York City metropolitan area before entering New Jersey and reaching Leonia.

Upper level trajectories (Figure 4) also originated in southern Ontario and traveled through western New York and northeastern Pennsylvania where it may have picked up additional emissions from industry along the way. Air at the upper levels then passed through northern New Jersey before reaching its destination.

Figure 5 shows the national Air Quality Index observed on July 5th, the day prior to the exceedance event. As shown in the figure, widespread moderate air quality was observed throughout the northeast on this day and was likely enhanced by localized transport of ozone precursors from the New York City metropolitan area, weak circulation and favorable weather conditions mentioned above.

Figure 2. 48-hour Back Trajectories for July 6, 2020 at 10 meters

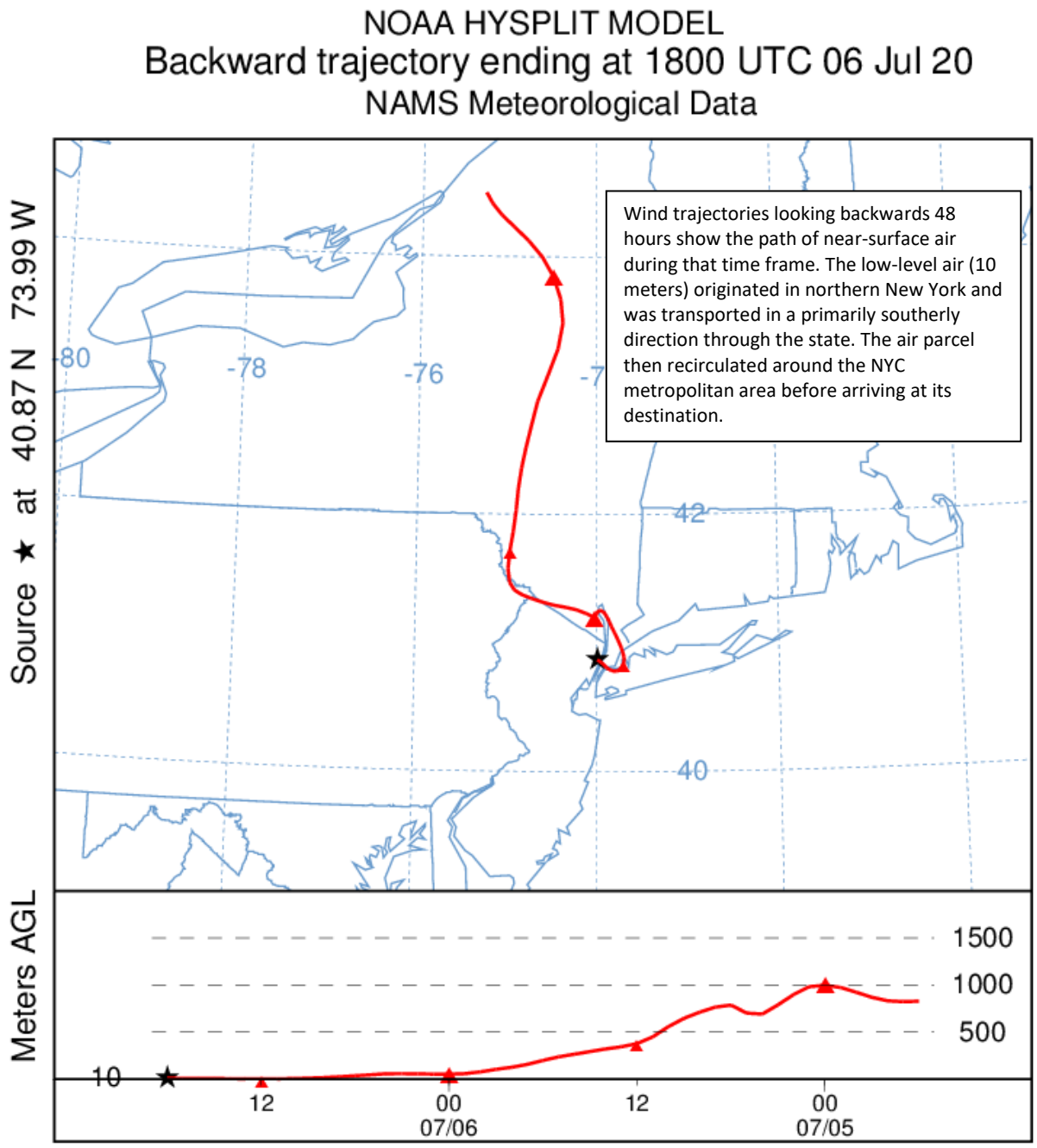


Figure 3. 48-hour Back Trajectories for July 6, 2020 at 500 meters

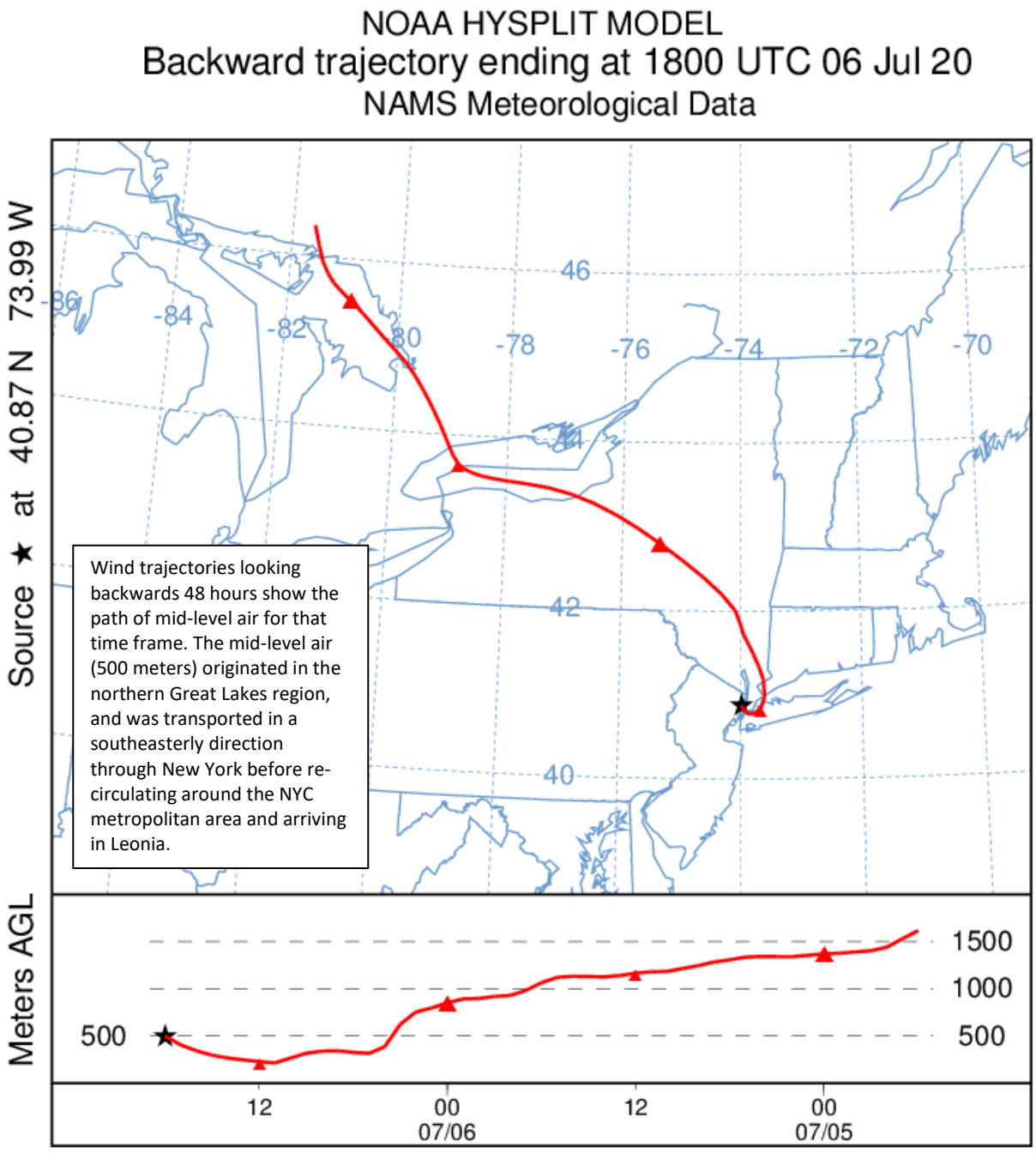


Figure 4. 48-hour Back Trajectories for July 6, 2020 at 1500 meters

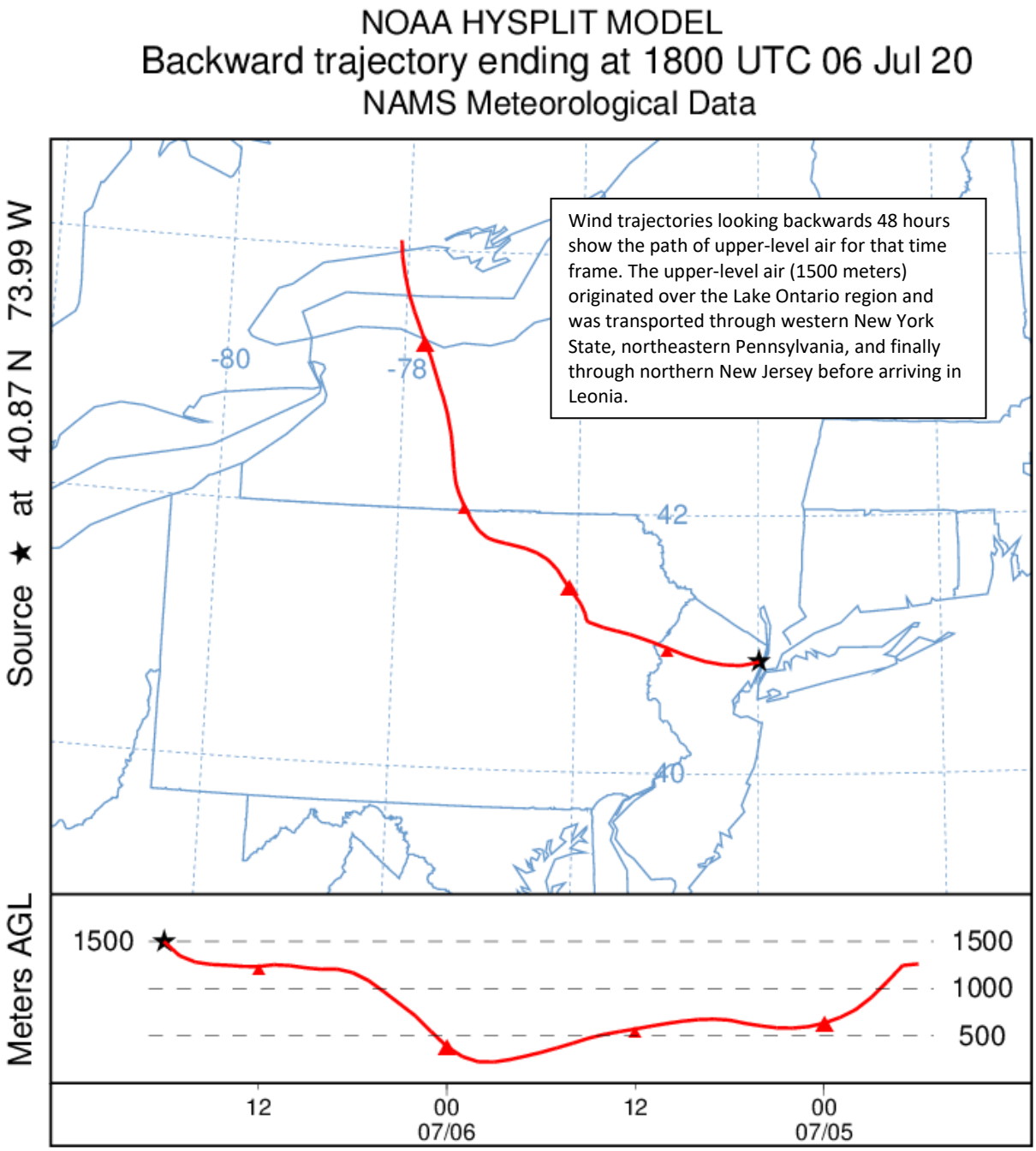
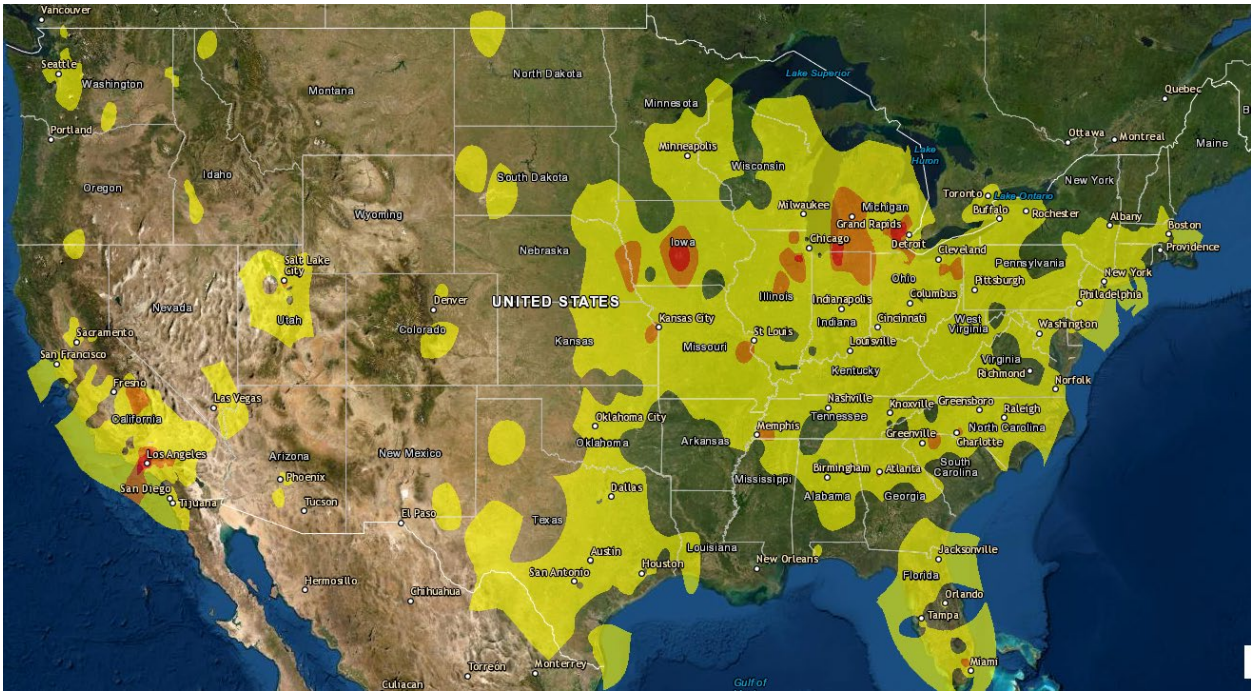


Figure 5. Combined Air Quality Index for the United States on July 5, 2020



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/ .