Ozone National Ambient Air Quality Standard Health Exceedances on July 19, 2020

Exceedance Locations and Levels

On Sunday, July 19, 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 7/19/2020

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	54
Bayonne	63
Brigantine	43
Camden Spruce St	59
Chester	57
Clarksboro	58
Colliers Mills	54
Columbia	61
Flemington	60
Leonia	63
Millville	52
Monmouth University	49
Newark Firehouse	64
Ramapo	58
Rider University	67
Rutgers University	65
Washington Crossing*	65
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 six (6) 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 7/19/2020

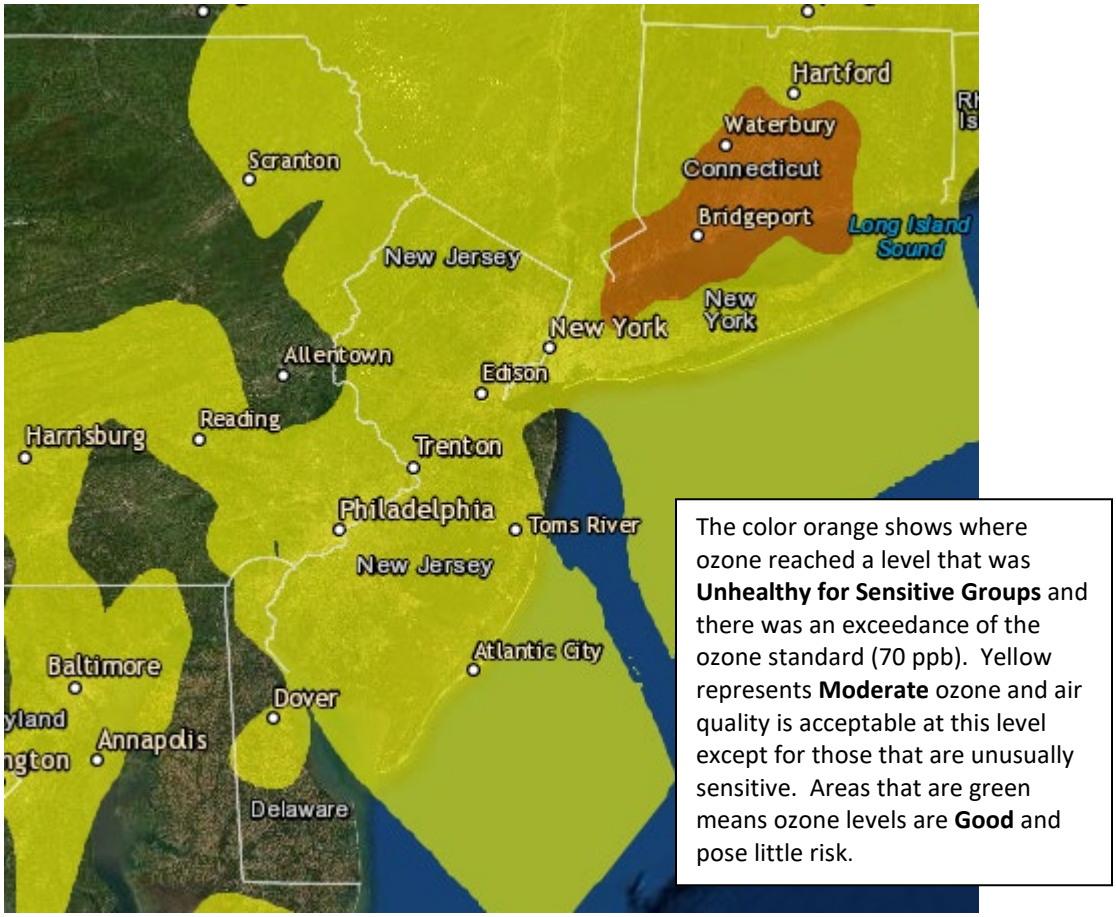
STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	67
CT	Greenwich	81
CT	Madison-Beach Road	71
CT	Middletown-CVH-Shed	79
CT	New Haven	82
CT	Stratford	83
CT	Westport	83
DE	BCSP (New Castle Co.)	52
DE	BELLFNT2 (New Castle Co.)	54
DE	KILLENS (Kent Co.)	55
DE	LEWES (Sussex Co.)	52
DE	LUMS 2 (New Castle Co.)	54
DE	MLK (New Castle Co.)	60
DE	SEAFORD (Sussex Co.)	44
MD	Fair Hill	53
NY	Babylon	61
NY	Bronx - IS52	66
NY	CCNY	70
NY	Fresh Kills	62
NY	Holtsville	58
NY	Pfizer Lab	70
NY	Queens	No Data
NY	Riverhead	60
NY	Rockland Cty	56
NY	White Plains	66
PA	BRIS (Bucks Co.)	65
PA	CHES (Delaware Co.)	60
PA	NEWG (Chester Co.)	54
PA	NORR (Montgomery Co.)	65
PA	LAB (Philadelphia Co.)	62
PA	NEA (Philadelphia Co.)	69
PA	NEW (Philadelphia Co.)	65
	TOTAL EXCEEDANCES	6

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 19, 2020 NAAQS = 70 ppb
Connecticut	4
Delaware	0
Maryland	0
New Jersey	2
New York	2
Pennsylvania	1

Figure 1. Ozone Air Quality Index for July 19, 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

High pressure dominated the weather pattern on Sunday July 19, 2020, while a surface trough extended from New England southward into the Mid-Atlantic region. Abundant sunshine, hot temperatures, and winds from the southwesterly direction allowed for widespread elevated levels of ozone throughout the non-attainment area with levels reaching the unhealthy for sensitive groups category (USG) along the Connecticut coastline.

A large high-pressure system established itself over the southeastern United States on July 19th. High pressure ridging extended northward into the non-attainment area allowing for favorable conditions for ozone formation. Sunny skies and temperatures exceeding 90 degrees were observed while southwesterly winds allowed for transport along the I-95 corridor. In addition, the broad nature of this high-pressure system allowed for long range transport of already polluted air from the Ohio River Valley / Great Lakes region into the non-attainment area. As air traveled east, a broad sinking motion allowed the polluted air aloft to mix toward the surface. Finally, a surface trough, extending from New England southward through the NYC metropolitan area and New Jersey into the Mid-Atlantic region, was noted throughout the day and provided another opportunity for any ozone aloft to mix toward the surface, enhancing already rising levels of ozone.

The ozone exceedances noted in Connecticut on July 19th can be attributed to favorable weather conditions for ozone formation as well as a combination of localized transport along the I-95 corridor and long-range transport from the Ohio River Valley region.

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 19, 2020. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedance. Six monitoring stations were chosen to run back trajectories and are listed in Table 4 below.

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	Greenwich	81
CT	Madison-Beach Road	71
CT	New Haven	82

CT	Stratford	83
CT	Westport	83
CT	Middletown	79

Back trajectories from July 19th show that the exceedances observed in Connecticut were heavily influenced by localized transport of emissions at the surface from the Long Island Sound in combination with transport from the west, where widespread moderate air quality was observed the previous day. The favorable meteorological conditions mentioned above, along with the transport of ozone precursors from local industry resulted in exceedances of the 8-hr average Ozone NAAQS in Connecticut.

Surface-level back trajectories (Figure 2) show air at the surface originated along the Maryland and Delaware coastline before traveling north-northeast along the New Jersey coastline. On July 18th, a sea breeze was detected along the New Jersey coastline, which may have blown pollutants out to sea along the surface trajectories. Air at the surface continued to travel northeastward through Long Island and the Sound where peaking units may have been operating on this day due to a prolonged period of heat and humidity. Additionally, surface trajectories traveled a very short distance during this 48-hour period allowing the air mass to pick up localized emissions, specifically in the Long Island Sound vicinity before reaching its endpoint in Connecticut.

Figure 3 depicts the mid-level trajectories at 500 meters. Air originating at higher levels in the atmosphere mixed down to 500 meters due to the subsidence related to high pressure. Midway through its path, air stalled in portions of southeastern Pennsylvania, allowing additional pollutants from industry to accumulate. The air then travelled over the I-95 corridor before arriving at the exceedance locations.

At 1500 meters (Figure 4), the air mass originated over Michigan, travelling over Lake Erie, in a southeasterly direction through Pennsylvania. Air then shifted to an easterly direction, before arriving at the exceedance locations. On the day prior, widespread moderate and isolated areas of unhealthy for sensitive groups ozone was observed in this region, as shown in Figure 5. Trajectories at this level followed a similar transport pathway to mid-level trajectory, as they descended due to high pressure influence.

Figure 5 shows the National Air Quality Index observed on July 18th, the day prior to the exceedances in Connecticut. As shown in the figure, moderate levels of ozone were observed in the Great Lakes and Ohio River Valley, indicating that previously polluted air may have been transported into the nonattainment area from this region in the mid- and upper levels of the atmosphere. This transport along with favorable weather conditions for ozone formation and a previously polluted air mass over the nonattainment area allowed ozone levels to reach the unhealthy for sensitive groups category in Connecticut on July 19th.

Figure 2. 48-hour Back Trajectories for July 19, 2020 at 10 meters

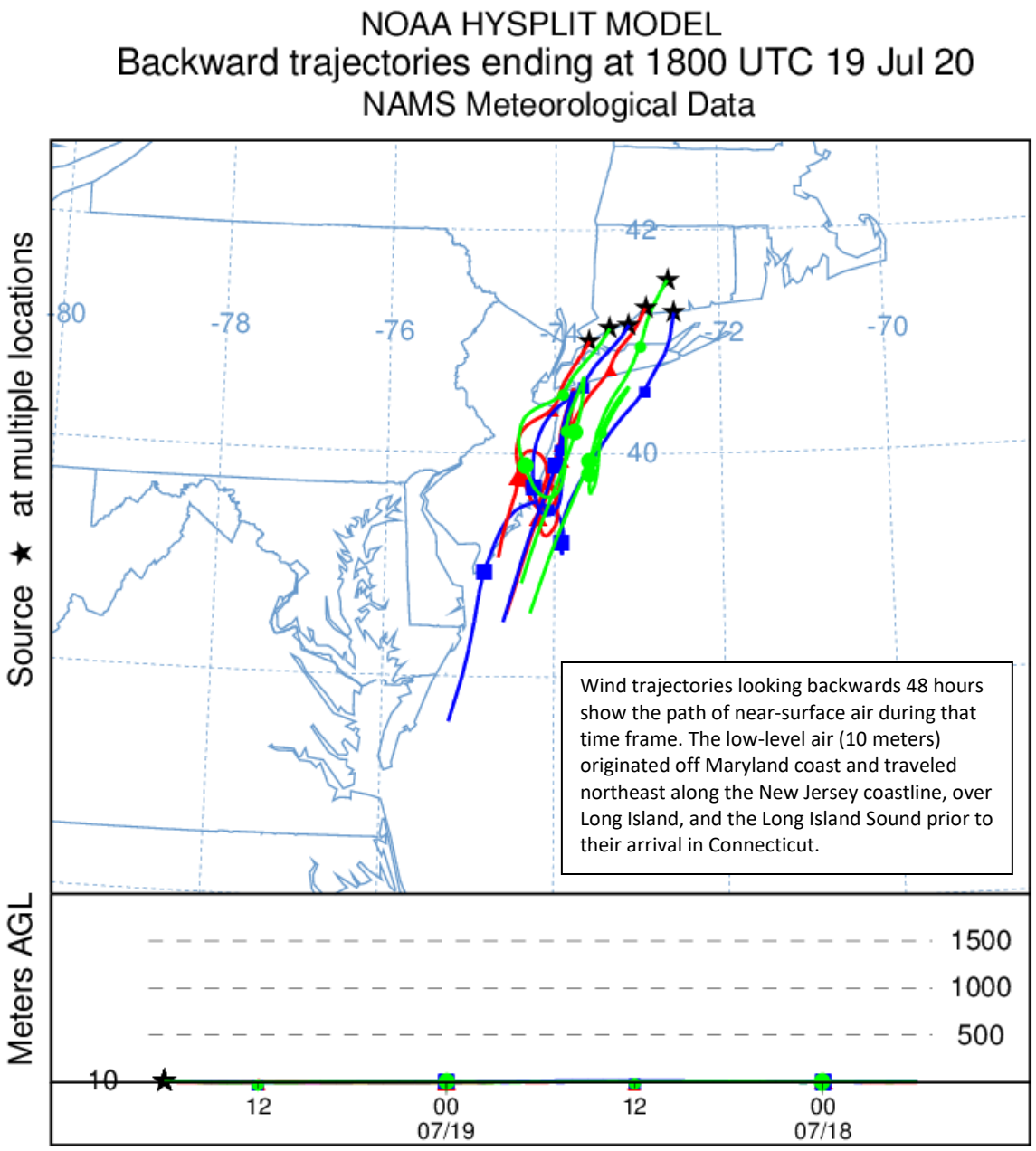


Figure 3. 48-hour Back Trajectories for July 19, 2020 at 500 meters

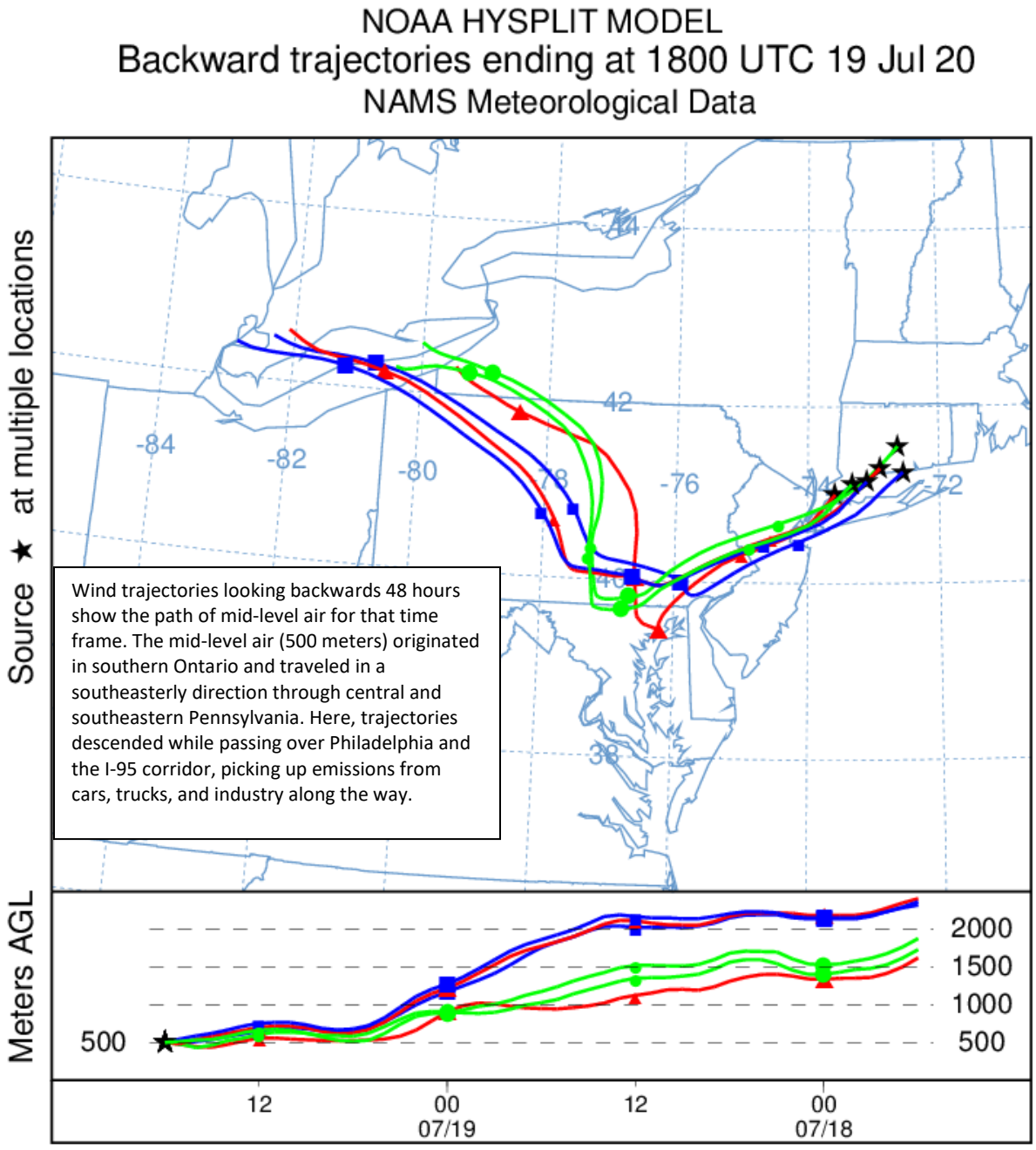


Figure 4. 48-hour Back Trajectories for July 19, 2020 at 1500 meters

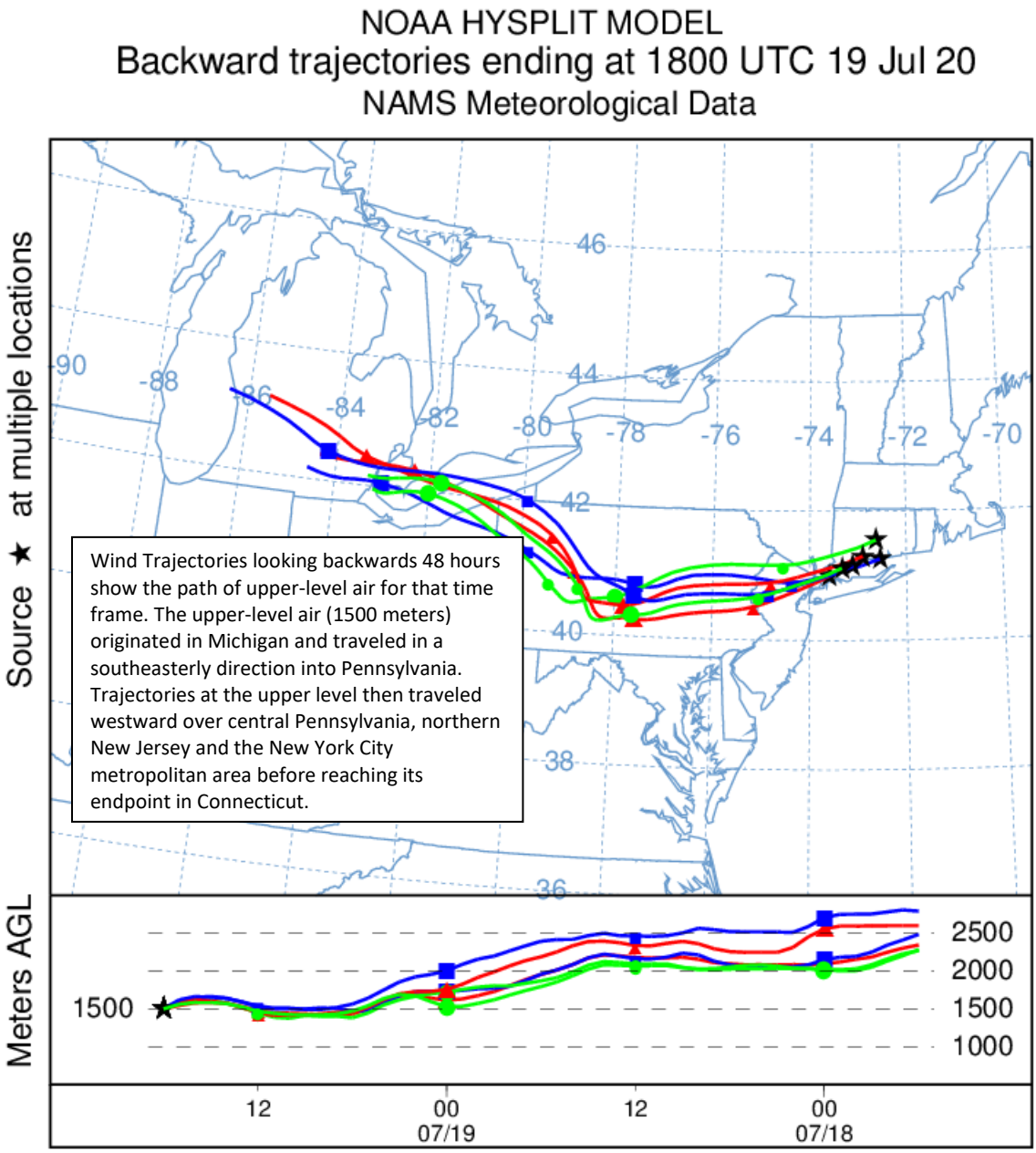
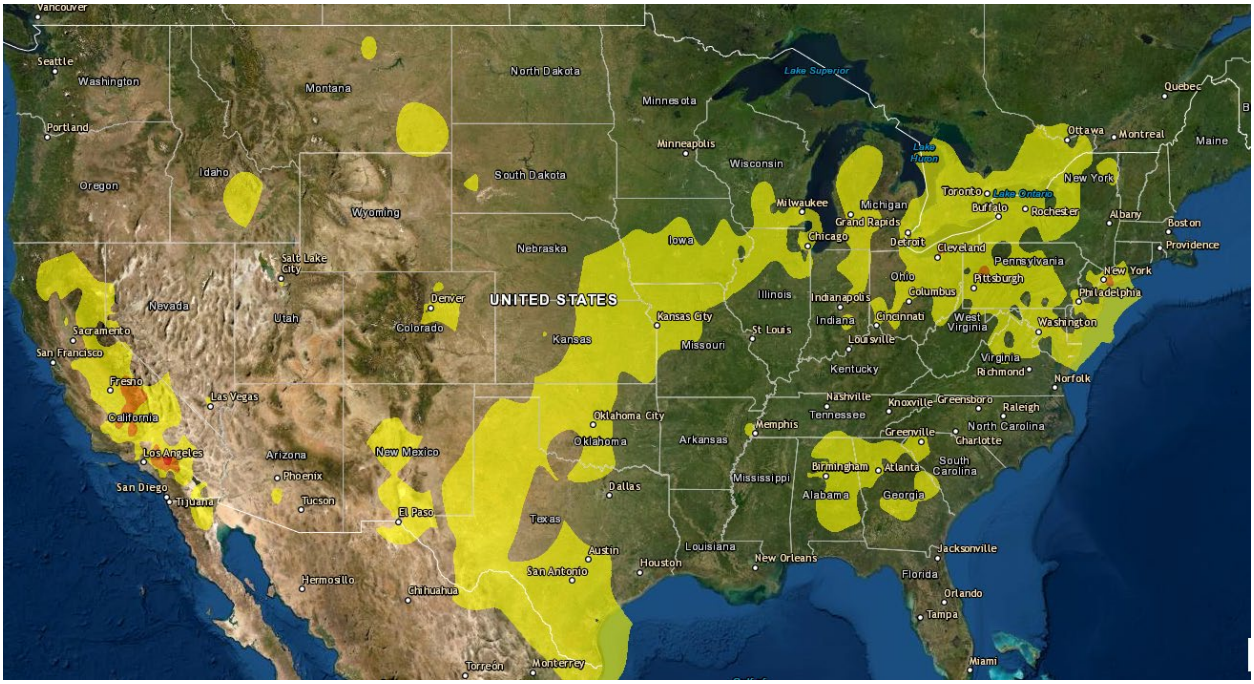


Figure 5. Combined Air Quality Index for the United States on July 18, 2020



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/ .