Ozone National Ambient Air Quality Standard Health Exceedances on August 29, 2018

Exceedance Locations and Levels

On Wednesday, August 29, 2018, 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 8-hr Maximum Ozone Concentrations on August 29, 2018

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	49
Bayonne	56
Brigantine	39
Camden Spruce St	65
Chester	55
Clarksboro	69
Colliers Mills	71
Columbia	46
Flemington	62
Leonia	61
Millville	47
Monmouth University	69
Newark Firehouse	59
Ramapo	53
Rider University	60
Rutgers University	66
Washington Crossing*	61
TOTAL EXCEEDANCES	1

*The Washington Crossing station is operated and maintained by EPA as part of the nationwide Clear Air Status and Trends Network (CASTNET).

From the out-of-state stations within New Jersey's ozone non-attainment areas, there were five (5) exceedances of the ozone NAAQS. See Table 2.

Table 2. 8-hr Maximum Ozone Concentrations for Out-of-State Monitoring Stations in New Jersey's Ozone Non-Attainment Areas on August 29, 2018

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	58
CT	Greenwich	69
CT	Madison-Beach Road	87

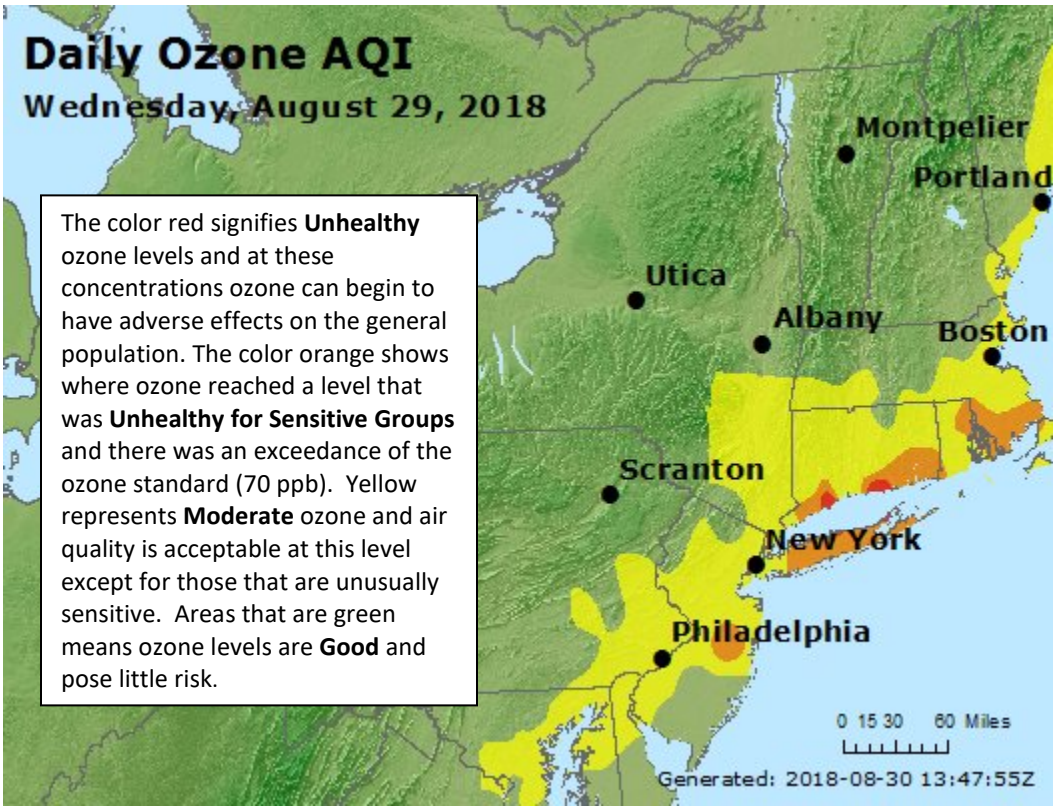
CT	Middletown-CVH-Shed	66
CT	New Haven	58
CT	Stratford	90
CT	Westport	77
DE	BCSP (New Castle Co.)	58
DE	BELLFNT2 (New Castle Co.)	63
DE	KILLENS (Kent Co.)	46
DE	LEWES (Sussex Co.)	46
DE	LUMS 2 (New Castle Co.)	67
DE	MLK (New Castle Co.)	61
DE	SEAFORD (Sussex Co.)	50
MD	Fair Hill	62
NY	Babylon	73
NY	Bronx - IS52	No Data
NY	CCNY	57
NY	Fresh Kills	58
NY	Holtsville	64
NY	Pfizer Lab	62
NY	Queens	No Data
NY	Riverhead	71
NY	Rockland Cty	55
NY	White Plains	66
PA	BRIS (Bucks Co.)	64
PA	CHES (Delaware Co.)	55
PA	NEWG (Chester Co.)	56
PA	NORR (Montgomery Co.)	58
PA	LAB (Philadelphia Co.)	63
PA	NEA (Philadelphia Co.)	61
PA	NEW (Philadelphia Co.)	61
	TOTAL EXCEEDANCES	5

The number of days in 2018 on which exceedances of the ozone NAAQS were recorded for all the states is summarized in Table 3. Figure 1 shows graphically the regions ozone concentrations on August 29, 2018.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ's Non-Attainment Areas in 2018

STATE	# of Days NAAQS was Exceeded January 1 – August 29, 2018 NAAQS = 70 ppb
Connecticut	22
Delaware	8
Maryland	6
New Jersey	21
New York	20
Pennsylvania	14

Figure 1. Ozone Air Quality Index for August 29, 2018



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

Multiple exceedances were noted in the nonattainment area on August 29th as the region continued to be influenced by a strong high pressure system. Localized transport along the east coast and I-95 corridor as well as upper level influence from industrialized locations to the south and west, enhanced an already polluted air mass leading to these exceedances.

A large Bermuda high pressure circulation extended west covering much of the eastern United States for a second day in a row. This once again provided favorable conditions for ozone production with mostly sunny skies and hot temperatures. This high pressure system also provided an opportunity for transport both at the surface and in the upper levels of the atmosphere. At the surface, winds were generally southwest and were noted to be gusty, especially in the early afternoon. These winds allowed for localized transport along the east coast and I-95 corridor for a second day. Additionally, winds in the upper levels traveled along the periphery of this high pressure circulation into our region allowing for transport from industrialized locations from the south and west. This transport, both the surface and aloft, enhanced an already polluted air mass and, with the support of favorable weather conditions, allowed multiple exceedances on this day.

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 August 29, 2018. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. Six (6) monitoring stations with 8-hr ozone exceedances were used to run back trajectories. The selected sites and the maximum 8-hr ozone levels recorded are 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)
CT	Madison-Beach Road	87
CT	Stratford	90
CT	Westport	77
NJ	Colliers Mills	71
NY	Babylon	73
NY	Riverhead	71

Back trajectories from August 29th show that localized transport along the I-95 corridor and the potential transport from industrial units operating in the west. Persistence from the previous day, light southwest winds, and favorable weather conditions mentioned above all played a role in the high ozone event observed on August 29th.

Low level trajectories (Figure 2) originated in the Chesapeake Bay and off the coast of Virginia where some moderate air quality was observed the previous day. Air at the surface traveled northeastward through the Chesapeake Bay and Delaware, passing through the metropolitan center of Wilmington. Air

at the surface entered southern New Jersey and traveled up the I-95 corridor and passed through/near Philadelphia picking up emissions from cars, trucks, and industry along the way. At this time, some trajectories passed through the New York City metropolitan area before reaching their destinations while other trajectories passed farther east over the Long Island Sound. Low level winds that entered Long Island likely picked up additional emissions from industrial units operating on the island while traveling to their destinations in Connecticut. In addition, moderate, USG, and unhealthy ozone levels were observed in this region the previous day allowing the air mass to become increasingly polluted through transport.

Mid and upper level trajectories (Figures 3 & 4) followed similar transport pathways. Air at higher levels originated in southern Tennessee and traveled northeastward into the Ohio River Valley traversing many states on its path. Air at the mid and upper levels crossed through Pennsylvania and the Philadelphia metropolitan area which saw widespread moderate ozone levels the previous day. Upper air then passed through northern New Jersey and the New York City metropolitan area before passing through Long Island to its destination or proceeding into Connecticut. Although air at both the mid and upper levels were mixed down to lower levels upon arrival, they remained aloft for the duration of their path.

It should be noted that August 28th, 2018 was deemed a High Electric Demand Day (HEDD) for power plants within the PJM Mid-Atlantic sector. A HEDD is called when (HEDD, i.e., peak hourly loads will be greater than 50,000 MWh). During HEDD events, additional generating units are called upon to operate to meet the demand on the electrical grid caused by increased cooling needs. The addition of ozone precursor emissions from these upwind generating units to satisfy that demand likely contributed to more ozone production, which was then transported into the region and contributed to the ozone exceedances.

Figure 5 shows the national ozone concentration observed on August 28th, the day prior to this high ozone event. As shown in the figure, widespread moderate and isolated USG and unhealthy air quality was observed throughout the nonattainment area. Back trajectories from August 29th suggest that localized transport up the I-95 corridor and the potential influence from industry in the west enhanced an already polluted environment under favorable weather conditions.

Figure 2. 48-hour Back Trajectories for August 29, 2018 at 10 meters

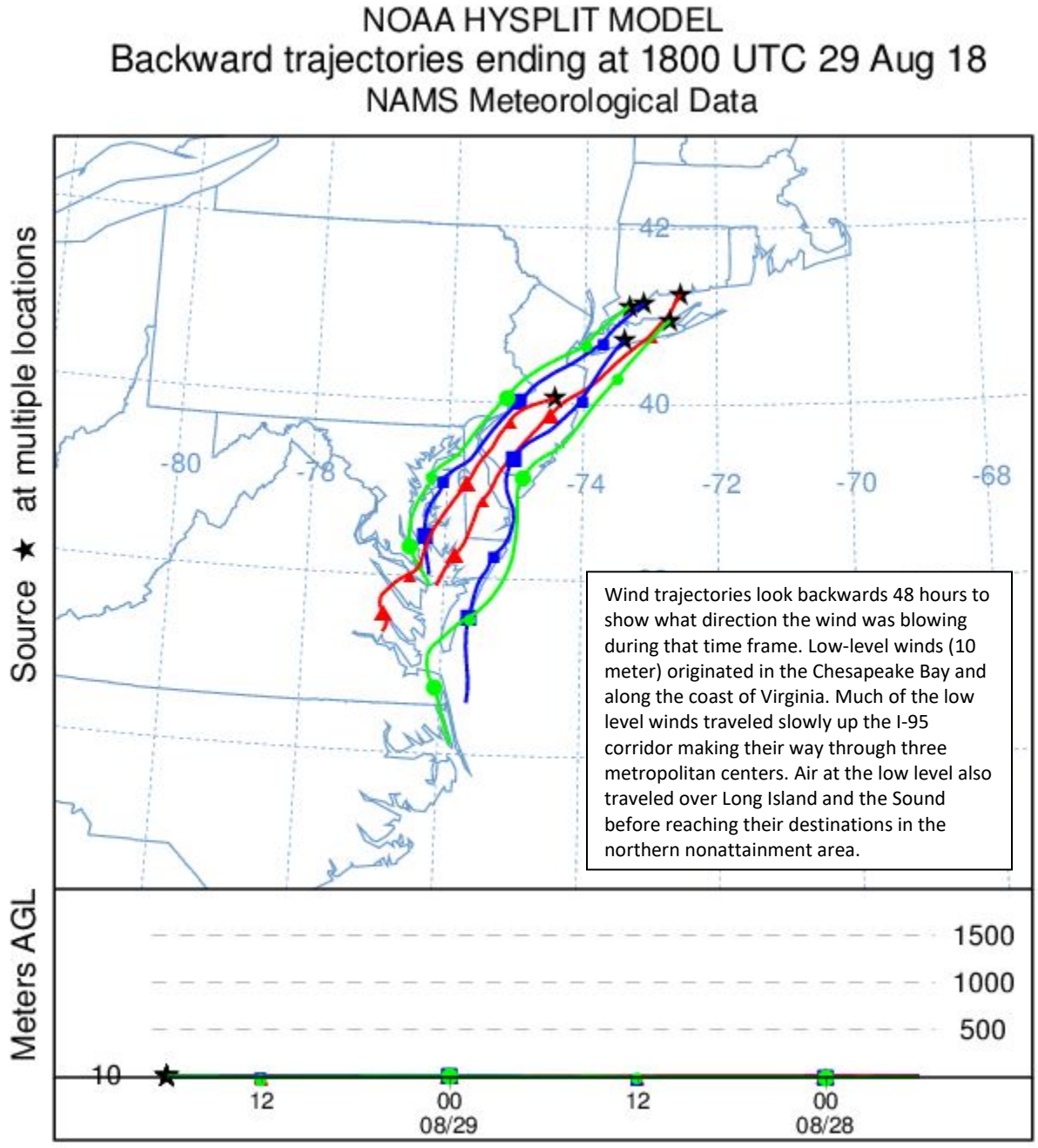


Figure 3. 48-hour Back Trajectories for August 29, 2018 at 500 meters

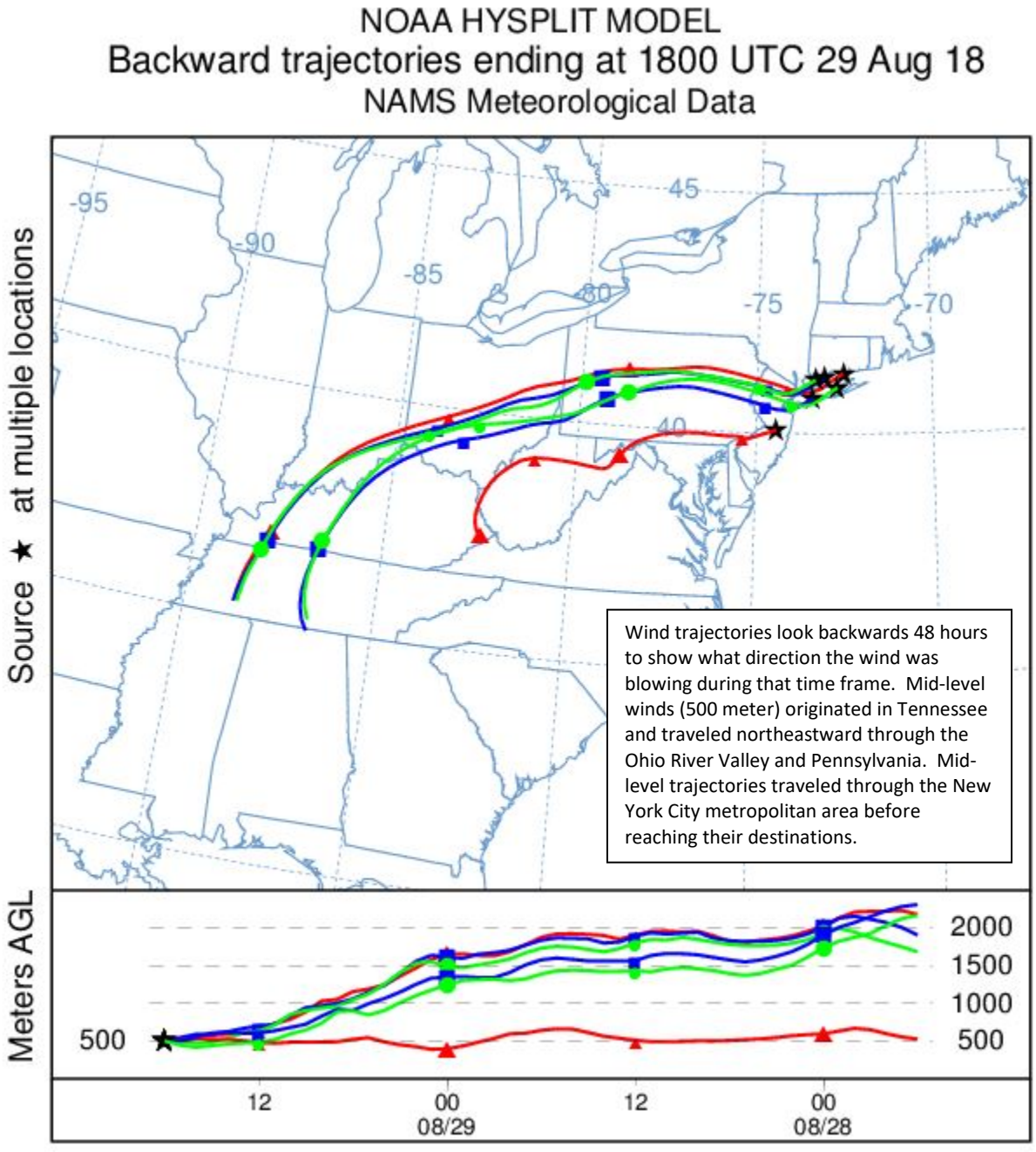


Figure 4. 48-hour Back Trajectories for August 29, 2018 at 1500 meters

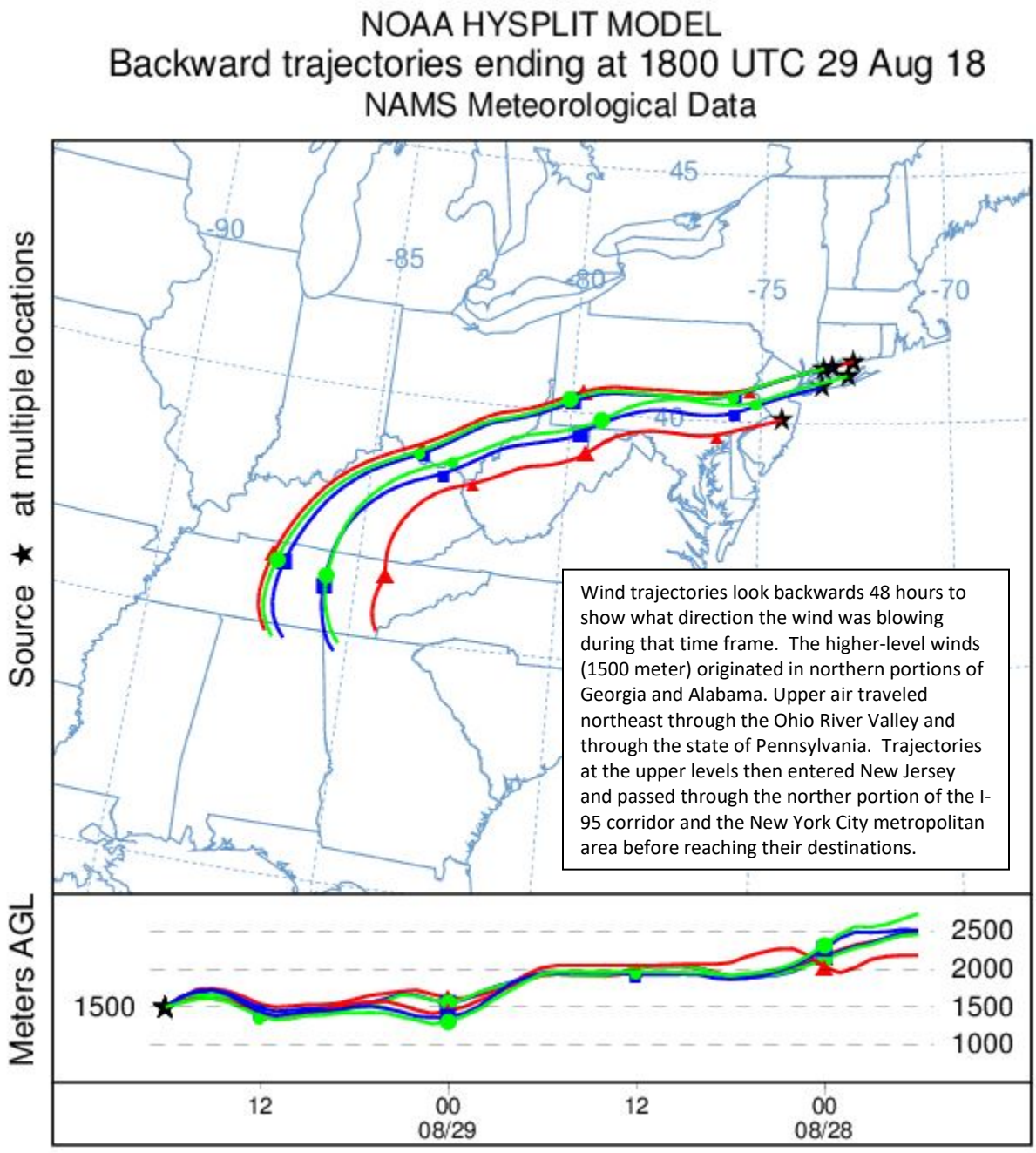
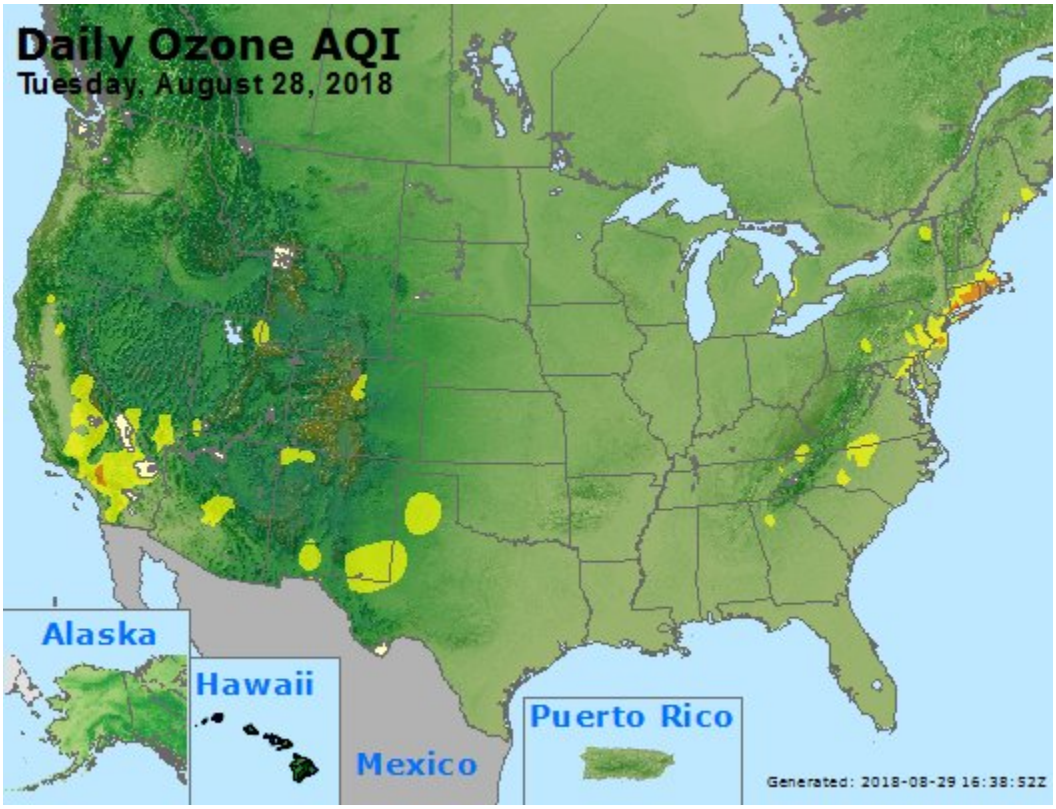


Figure 5. Ozone Air Quality Index for the United States on August 28, 2018



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

The "What's Your Air Quality Today?" page at http://www.nj.gov/dep/cleanairnj/ tells you how to sign up to receive notifications and find out when your local air has reached unhealthy ozone levels.