Ozone National Ambient Air Quality Standard Health Exceedances on August 28, 2018

Exceedance Locations and Levels

On Tuesday, August 28, 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 28, 2018

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	46
Bayonne	51
Brigantine	38
Camden Spruce St	59
Chester	57
Clarksboro	62
Colliers Mills	71
Columbia	45
Flemington	60
Leonia	60
Millville	44
Monmouth University	68
Newark Firehouse	57
Ramapo	52
Rider University	54
Rutgers University	59
Washington Crossing*	56
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 six (6) 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 28, 2018

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	56
CT	Greenwich	83

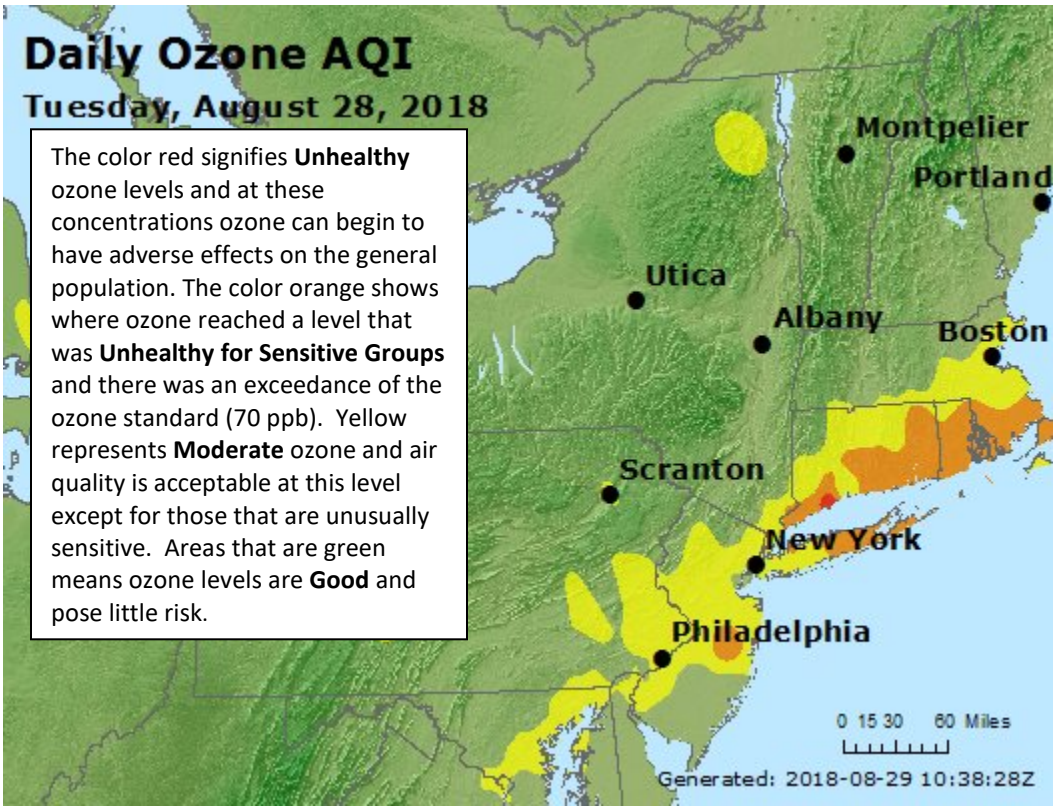
CT	Madison-Beach Road	77
CT	Middletown-CVH-Shed	77
CT	New Haven	68
CT	Stratford	87
CT	Westport	84
DE	BCSP (New Castle Co.)	52
DE	BELLFNT2 (New Castle Co.)	57
DE	KILLENS (Kent Co.)	43
DE	LEWES (Sussex Co.)	46
DE	LUMS 2 (New Castle Co.)	53
DE	MLK (New Castle Co.)	55
DE	SEAFORD (Sussex Co.)	50
MD	Fair Hill	56
NY	Babylon	68
NY	Bronx - IS52	60
NY	CCNY	57
NY	Fresh Kills	53
NY	Holtsville	70
NY	Pfizer Lab	61
NY	Queens	68
NY	Riverhead	74
NY	Rockland Cty	52
NY	White Plains	61
PA	BRIS (Bucks Co.)	62
PA	CHES (Delaware Co.)	53
PA	NEWG (Chester Co.)	53
PA	NORR (Montgomery Co.)	55
PA	LAB (Philadelphia Co.)	60
PA	NEA (Philadelphia Co.)	58
PA	NEW (Philadelphia Co.)	60
	TOTAL EXCEEDANCES	6

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 28, 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 28, 2018 NAAQS = 70 ppb
Connecticut	21
Delaware	8
Maryland	6
New Jersey	20
New York	19
Pennsylvania	14

Figure 1. Ozone Air Quality Index for August 28, 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

Light surface winds and multiple days of hot, sunny weather allowed for locally generated emissions occurring the previous day in Maryland and Delaware to be transported along the I-95 corridor into the northern portion of the nonattainment area as shown in the trajectories in Figure 2. In addition, a surface trough created a mechanism for polluted air aloft to mix down to the surface combining with local emissions generated during the day. The combination of these features led to exceedances in the northern nonattainment area and at Colliers Mills, NJ on August 28th, 2018.

The high pressure system that was anchored over the southeastern United States on August 27th remained in place extending from the Gulf of Mexico into the Great Lakes and Northeastern U.S. through August 28th. This large high pressure system was the source of mostly sunny skies, temperatures reaching the mid-90s, and light southwest winds throughout the nonattainment area. While much of the nonattainment area saw moderate and isolated USG ozone levels the previous day, light southwest winds allowed locally generated emissions from the southern portion of this region to travel along the I-95 corridor to the northern portion of the nonattainment area. In addition, upper level ridging allowed for warm temperatures aloft to surge northward creating favorable conditions for ozone production at higher levels of the atmosphere. Meanwhile, a surface trough was draped over the nonattainment area crossing through the I-95 corridor allowing for any ozone aloft to mix down to the surface.

Based on this weather analysis, the observed exceedances on August 28th can be attributed to multiple days of moderate/isolated USG ozone levels throughout the nonattainment area, favorable weather conditions enhancing ozone levels at the surface, and locally generated emissions being transported into/throughout the nonattainment area.

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 28, 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	Greenwich	83
CT	Madison-Beach	77
CT	Stratford	87
CT	Westport	84
NJ	Colliers Mills	71
NY	Riverhead	74

Back trajectories from August 28th show that localized ozone transport along the U.S. east coast and potential influence from industrialized locations to the west, in favorable weather conditions, led to multiple ozone exceedances throughout the nonattainment area.

Most surface-level back trajectories (Figure 2) originated along the Mid-Atlantic Coast before traveling northeast as they were influenced by high pressure as well as a persistent surface trough. Air impacting central New Jersey traveled through the Delaware Bay and near the Philadelphia metropolitan. Meanwhile, air impacting eastern Long Island and the central Connecticut coastline traveled further east along the New Jersey coast and through the Long Island Sound region. Finally, air impacting Connecticut's southwest coastline originated further west in northern Maryland and Pennsylvania. Air then traveled generally east or northeast through southeastern Pennsylvania, central New Jersey, and the New York City metropolitan area through arrival.

Mid- and upper-level back trajectories (Figure 3 &4) followed very similar paths as air was steered by high pressure circulation. At both levels, air originated in the lower Mississippi River Valley before traveling northeast through the Ohio River Valley. Air then made a turn more eastward through Pennsylvania to its endpoint. Air impacting central New Jersey passed near the Philadelphia metropolitan area while air impacting Connecticut and Long Island passed through the Northern New Jersey/New York City Metropolitan area.

Figure 5 shows the national ozone concentrations observed on August 27th, the day prior to this exceedance episode. As shown in the figure, widespread moderate and isolated USG levels of ozone were observed throughout the nonattainment area on this day. Back trajectories for August 28th suggest that localized transport along the east coast (in an increasingly polluted environment) and influence from industrial locations further west, combined with favorable weather conditions led to multiple exceedances throughout the nonattainment area.

Figure 2. 48-hour Back Trajectories for August 28, 2018 at 10 meters

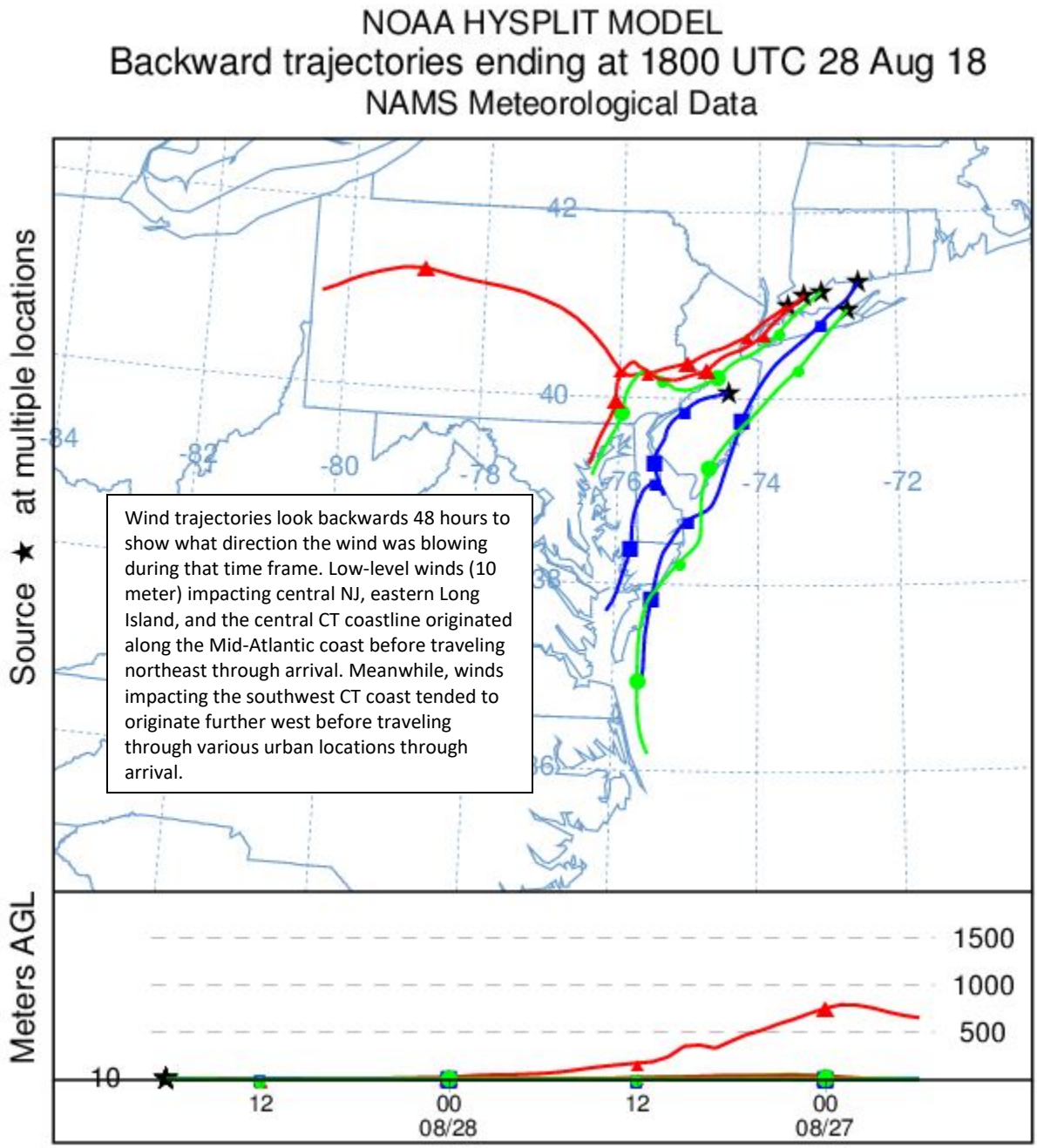


Figure 3. 48-hour Back Trajectories for August 28, 2018 at 500 meters

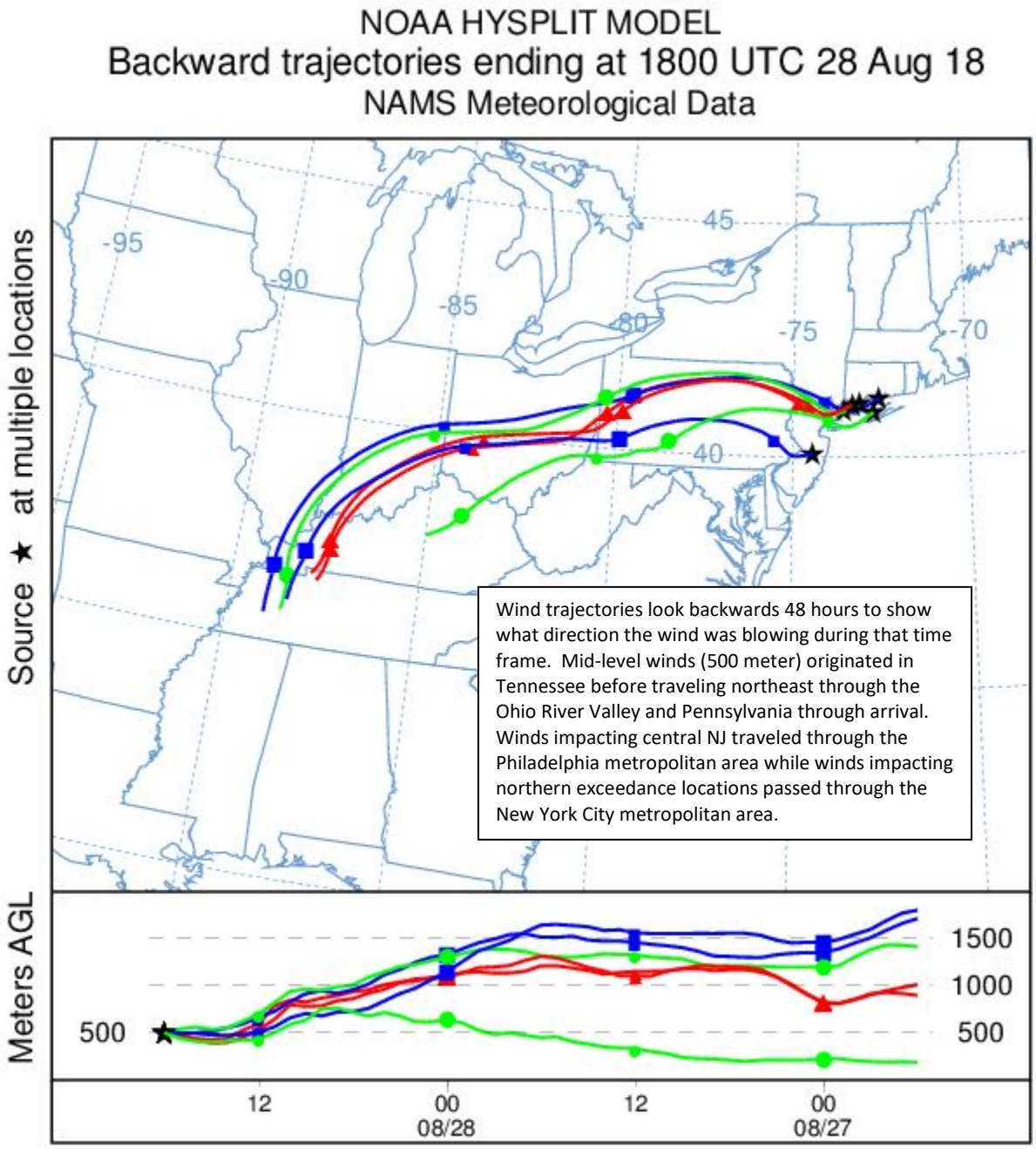


Figure 4. 48-hour Back Trajectories for August 28, 2018 at 1500 meters

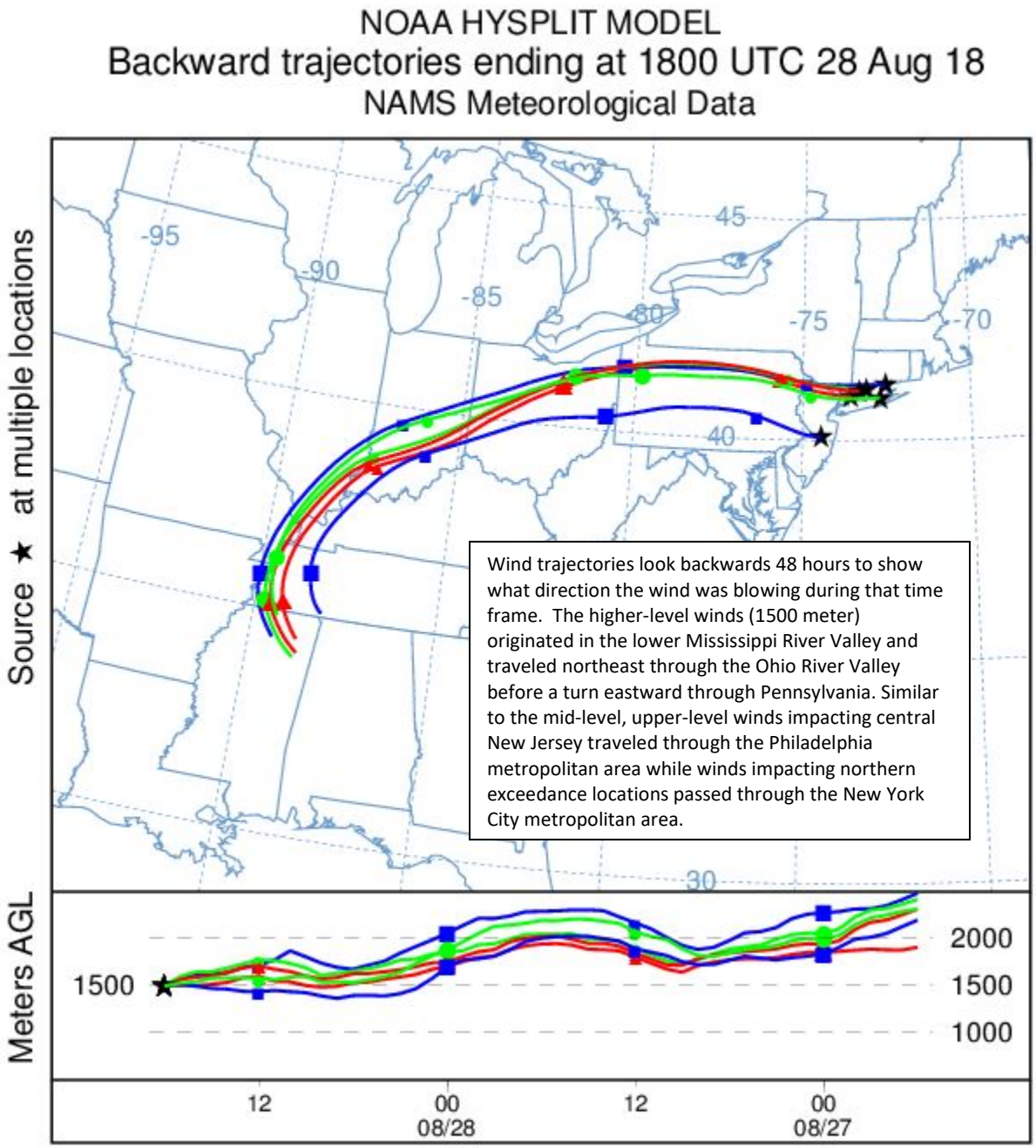
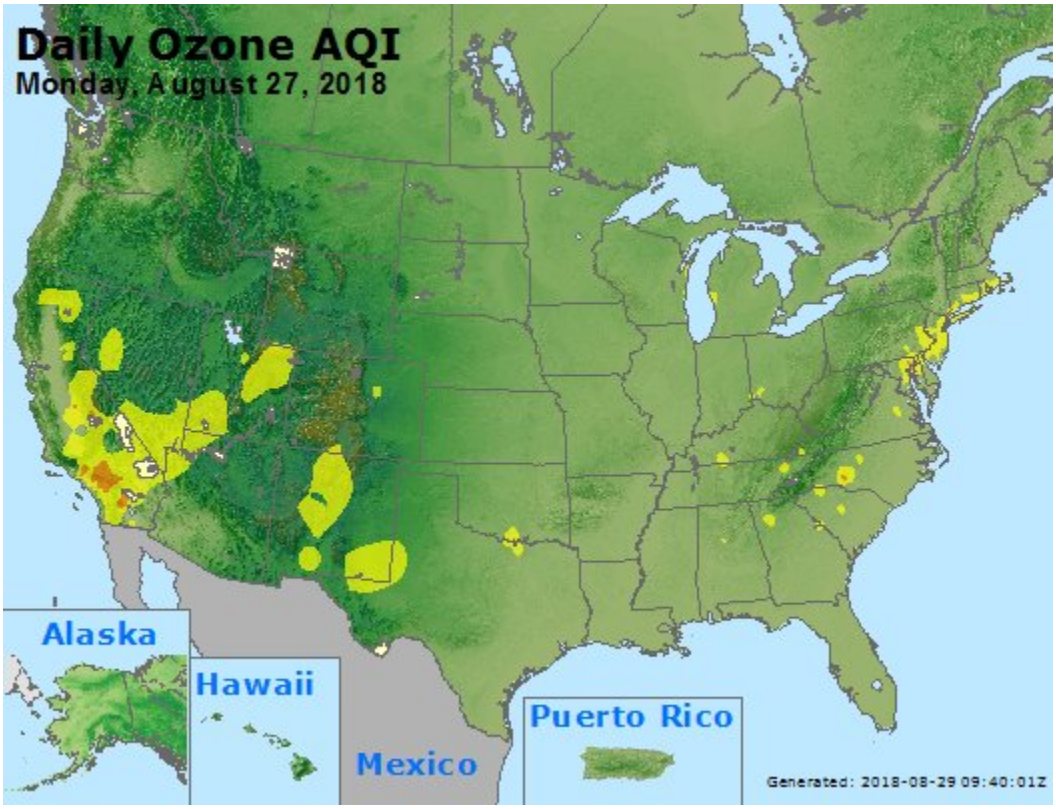


Figure 5. Ozone Air Quality Index for the United States on August 27, 2018



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.