Ozone National Ambient Air Quality Standard Health Exceedances on August 27, 2018

Exceedance Locations and Levels

On Monday, August 27, 2018, 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 8-hr Maximum Ozone Concentrations on August 27, 2018

STATION	Daily Maximum 8-Hr Average (ppb)
Ancora State Hospital	66
Bayonne	56
Brigantine	49
Camden Spruce St	58
Chester	52
Clarksboro	64
Colliers Mills	63
Columbia	43
Flemington	56
Leonia	59
Millville	53
Monmouth University	55
Newark Firehouse	57
Ramapo	45
Rider University	53
Rutgers University	56
Washington Crossing*	No Data
TOTAL EXCEEDANCES	0

*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 two (2) 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 27, 2018

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
CT	Danbury	49
CT	Greenwich	73

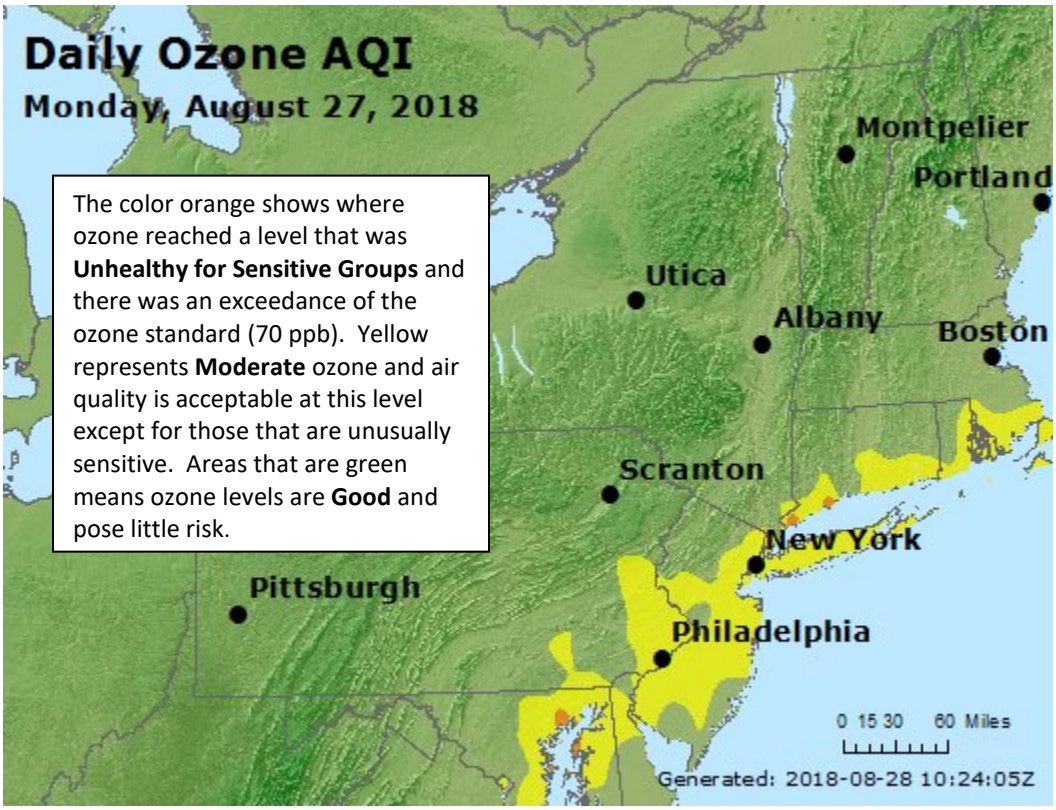
CT	Madison-Beach Road	61
CT	Middletown-CVH-Shed	55
CT	New Haven	47
CT	Stratford	71
CT	Westport	64
DE	BCSP (New Castle Co.)	49
DE	BELLFNT2 (New Castle Co.)	56
DE	KILLENS (Kent Co.)	53
DE	LEWES (Sussex Co.)	52
DE	LUMS 2 (New Castle Co.)	57
DE	MLK (New Castle Co.)	53
DE	SEAFORD (Sussex Co.)	53
MD	Fair Hill	58
NY	Babylon	58
NY	Bronx - IS52	58
NY	CCNY	60
NY	Holtsville	57
NY	Pfizer Lab	59
NY	Queens	62
NY	Riverhead	58
NY	Rockland Cty	41
NY	White Plains	51
NY	Fresh Kills	36
PA	BRIS (Bucks Co.)	61
PA	CHES (Delaware Co.)	55
PA	NEWG (Chester Co.)	49
PA	NORR (Montgomery Co.)	55
PA	LAB (Philadelphia Co.)	61
PA	NEA (Philadelphia Co.)	62
PA	NEW (Philadelphia Co.)	59
	TOTAL EXCEEDANCES	2

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 27, 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 27, 2018 NAAQS = 70 ppb
Connecticut	20
Delaware	8
Maryland	6
New Jersey	19
New York	18
Pennsylvania	14

Figure 1. Ozone Air Quality Index for August 27, 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

Localized transport with the support of favorable weather conditions enhanced ozone levels in the nonattainment area on Monday, August 27th, leading to isolated exceedances along the Connecticut coastline.

A high pressure center was noted over the southeastern United States on August 27th which was an extension of a much larger Bermuda High circulation. In the presence of this high pressure, mostly sunny skies were observed throughout the nonattainment area with temperatures ranging from the mid-80s to near 90 degrees. Meanwhile, winds were generally from the westerly direction and provided an opportunity for localized transport in an already favorable environment for ozone production. In addition, a surface trough was detected along the east coast and extended from southern New England southwest into the Mid-Atlantic. This surface trough provided the opportunity for vertical mixing at various locations along the coastline.

For much of the nonattainment area, locations west were generally clean in the days preceding this episode. However, with portions of the northern nonattainment area reaching moderate levels the day prior, it is likely that localized transport enhanced ozone levels along the Connecticut coastline, leading to the two isolated exceedances on this day.

In addition to the above, dilute smoke was noted over the northeastern United States on August 27th. This smoke, transported into our region, may have played a role in the isolated nature of the exceedances. The NJDEP's Division of Air Quality will continue to evaluate the potential effects this smoke plume may have on the air quality within the state.

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 27, 2018. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. Two (2) 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	73
Ct	Stratford	71

Back trajectories for August 27th show localized transport at the surface from the Chesapeake Bay and industrialized areas of West Virginia and Pennsylvania. Trajectories also show transport from the Mid-West where dilute smoke from the Californian wildfires was observed in the days prior to the ozone exceedances on August 27th, 2018. Trajectories at all three levels traveled through the New York City metropolitan area and southwestern Connecticut where moderate ozone levels were recorded the day prior to the ozone exceedances. Air from these regions was transported into the northern

nonattainment area where it was exacerbated under the presence of high pressure and favorable weather conditions mentioned above.

Low level back trajectories (Figure 2) followed different transport pathways while traveling to their endpoints in Connecticut. Air traveling to Greenwich, CT originated in western Virginia and traveled northward through West Virginia and across the state of Pennsylvania which are both known to be heavily industrialized. Air likely picked up emissions from industry while traveling through these states en route to its destination. Surface air then traveled through northern New Jersey and the New York City metropolitan area picking up emissions from cars and trucks along the way. In addition, air at the low level traveling to Greenwich originated at 500m above the surface and was mixed down to lower levels prior to reaching its destination. This is consistent with a higher ozone value being observed at Greenwich compared to Stratford. Meanwhile, air traveling to Stratford originated in the Chesapeake Bay and traveled through southeastern Pennsylvania and Lancaster. Air at the surface then entered northern New Jersey and the New York City metropolitan area before arriving at its destination in Stratford, CT. Low level air traveling to Stratford remained at the surface for the duration of its path picking up emissions from cars, trucks, and industry along the way. Mid-level back trajectories (Figure 3) originated in Wisconsin and traveled through the Great Lakes region where wildfire smoke was detected in the days prior to the ozone exceedances in Connecticut. Air at the mid-levels then traveled through New York State and the New York City metropolitan area before reaching its destinations. Upper level back trajectories (Figure 4) originated in southwestern Ontario and traveled southwestward along the southern Ontario border and Toronto. Air at the upper levels then entered New York and the New York City metropolitan area upon arrival in Connecticut. Air at both the mid and upper levels originated at higher levels of the atmosphere and were mixed down to lower levels due to the high pressure system mentioned above.

Figure 5 shows the national ozone concentrations observed on August 26th, the day prior to the exceedance. As shown in the figure, New York City and portions of Connecticut observed moderate air quality on August 26th. The trajectories suggest that transport from the mid-west (although not visible in Figure 5) in combination with light winds, favorable weather conditions mentioned above, and the presence of wildfire smoke enhanced ozone levels at the surface leading to ozone exceedances in Connecticut.

Figure 2. 48-hour Back Trajectories for August 27, 2018 at 10 meters

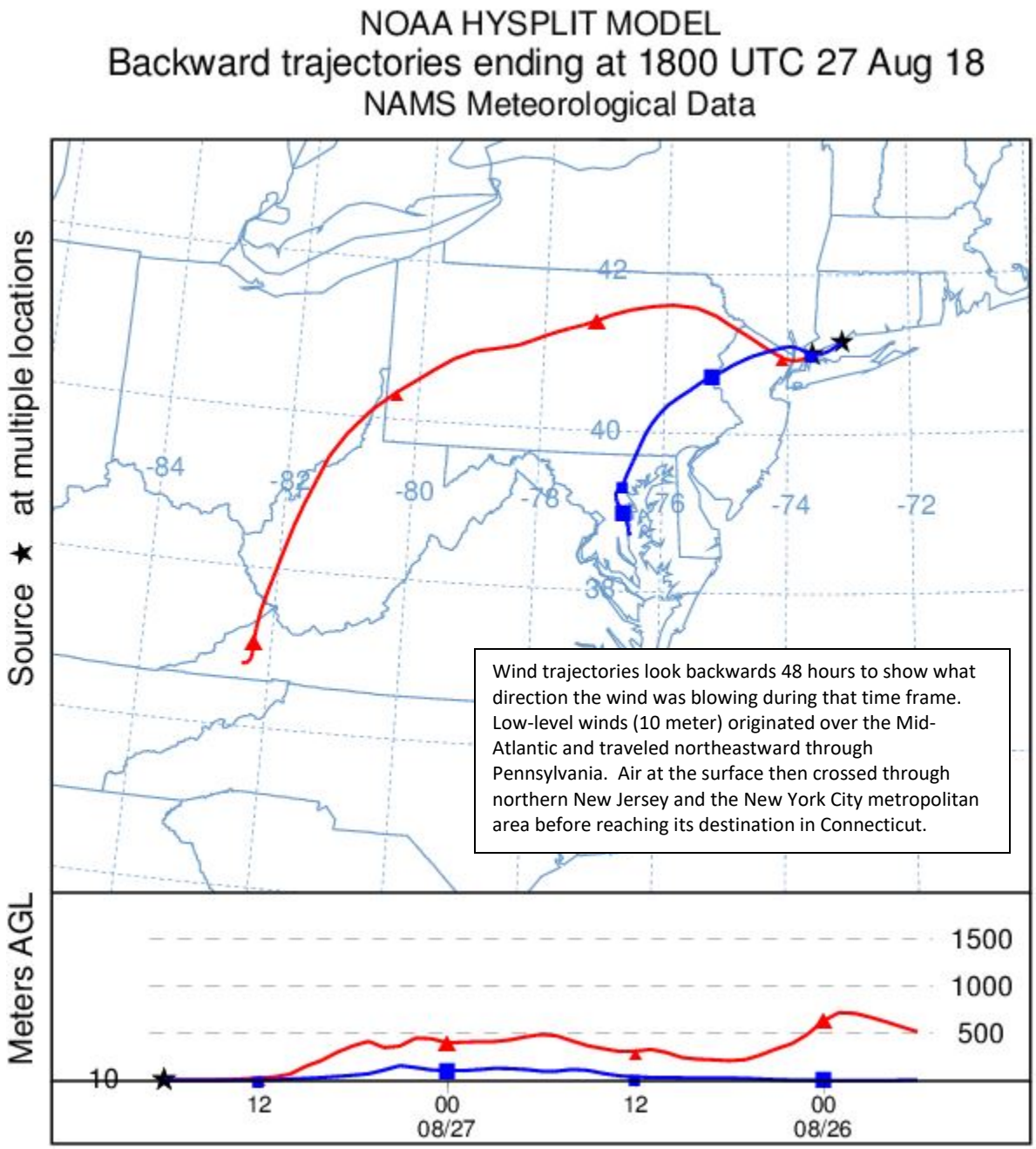


Figure 3. 48-hour Back Trajectories for August 27, 2018 at 500 meters

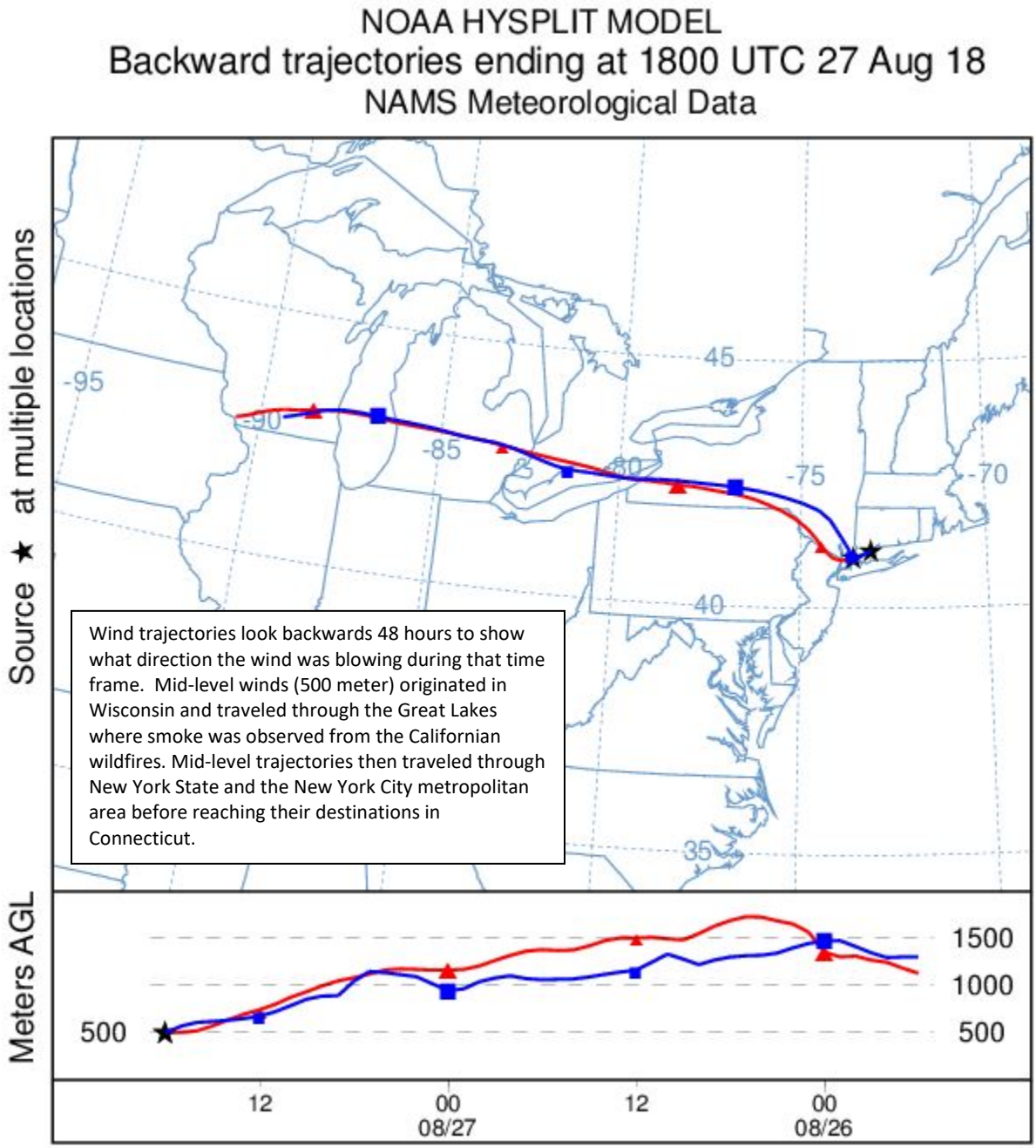


Figure 4. 48-hour Back Trajectories for August 27, 2018 at 1500 meters

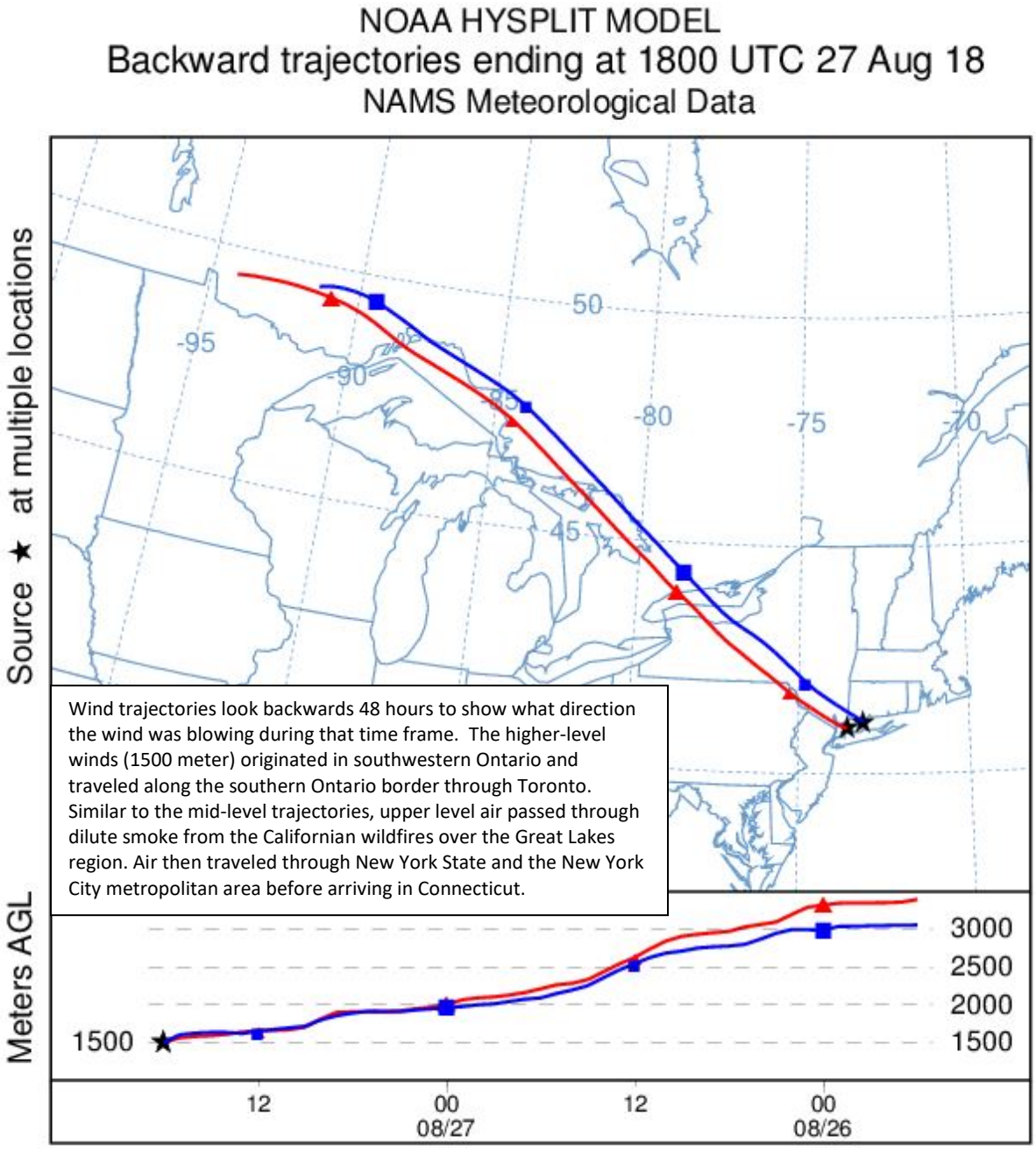
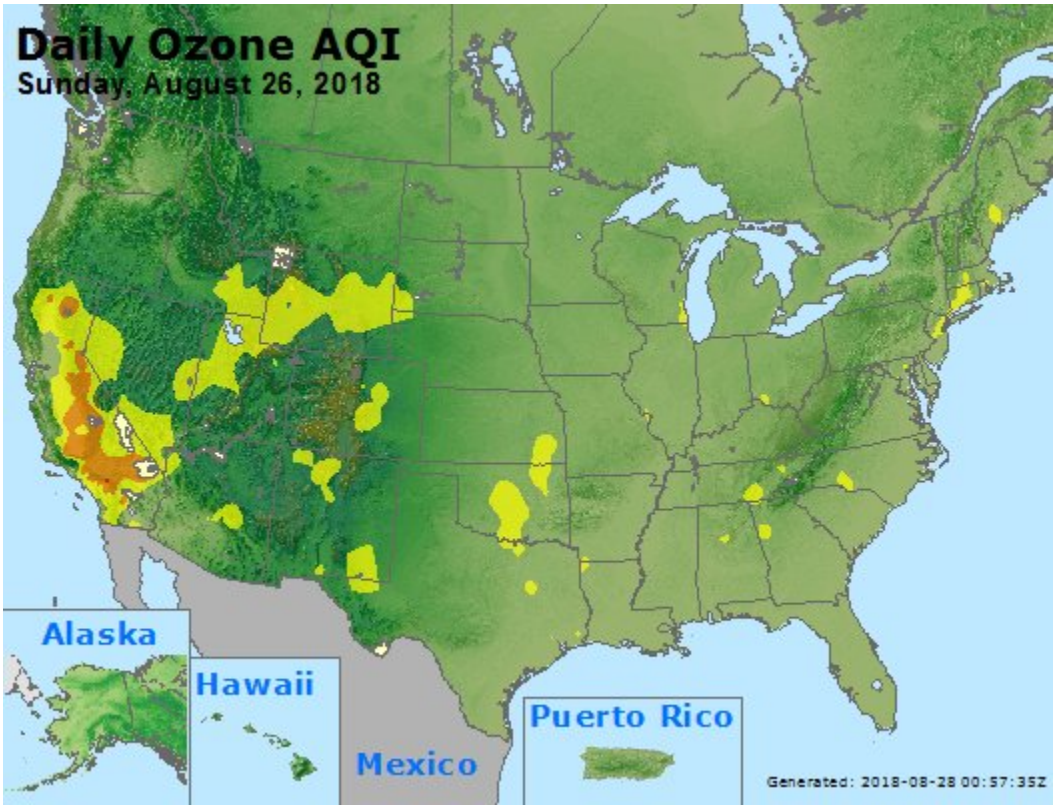


Figure 5. Ozone Air Quality Index for the United States on August 26, 2018



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.