Ozone National Ambient Air Quality Standard Health Exceedances on September 25, 2017

Exceedance Locations and Levels

On Monday, September 25, 2017, there were no exceedances in New Jersey of the 8-hour average ozone National Ambient Air Quality Standard (NAAQS) of 70 ppb that became effective in December 2015.

No New Jersey station exceeded the 75 ppb ozone NAAQS of 2008, and none exceeded the 84 ppb ozone NAAQS of 1997. The highest 1-hour average ozone concentration recorded on September 25, 2017, in New Jersey was 84 ppb at the Camden Spruce Street and Flemington stations, which is below the 1-hour ozone NAAQS of 120 ppb.

The number of days in 2017 on which exceedances of the 70 ppb ozone NAAQS of 2015 were recorded in New Jersey remains at fourteen (14). By the 25th of September in 2016, there were twenty-five (25) days on which ozone exceedances were measured in New Jersey (based on the 70 ppb NAAQS of 2015), and there were twenty (20) days by this same date in 2015 (based on the 75 ppb NAAQS of 2008) (See Table 1).

Table 1: Ozone NAAQS Exceedances at other Monitoring Stations in New Jersey's Ozone Nonattainment Areas on September 25, 2017

	# of Days NAAQS was Exceeded January 1 – Sept 25, 2017 NAAQS = 70 ppb	# of Days NAAQS was Exceeded January 1 – Sept 25, 2016 NAAQS = 70 ppb	# of Days NAAQS was Exceeded January 1 – Sept 25, 2015 NAAQS = 75 ppb
New Jersey	14	25	20

There is a group of monitoring stations in designated counties of 5 states, New York, Connecticut, Pennsylvania, Delaware and Maryland, that are included in New Jersey's ozone nonattainment areas. From this group of stations in the neighboring states, there were six (6) exceedances of the 70 ppb ozone NAAQS of 2015 recorded on Monday, September 25, 2017 (See Table 2):

Table 2: Number of Ozone Exceedances by State

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
DE	BCSP (New Castle Co.)	80
MD	Fair Hill	75
PA	BRIS (Bucks Co.)	73
PA	NEWG (Chester Co.)	79
PA	NORR (Montgomery Co.)	73
PA	NEA (Philadelphia Co.)	71

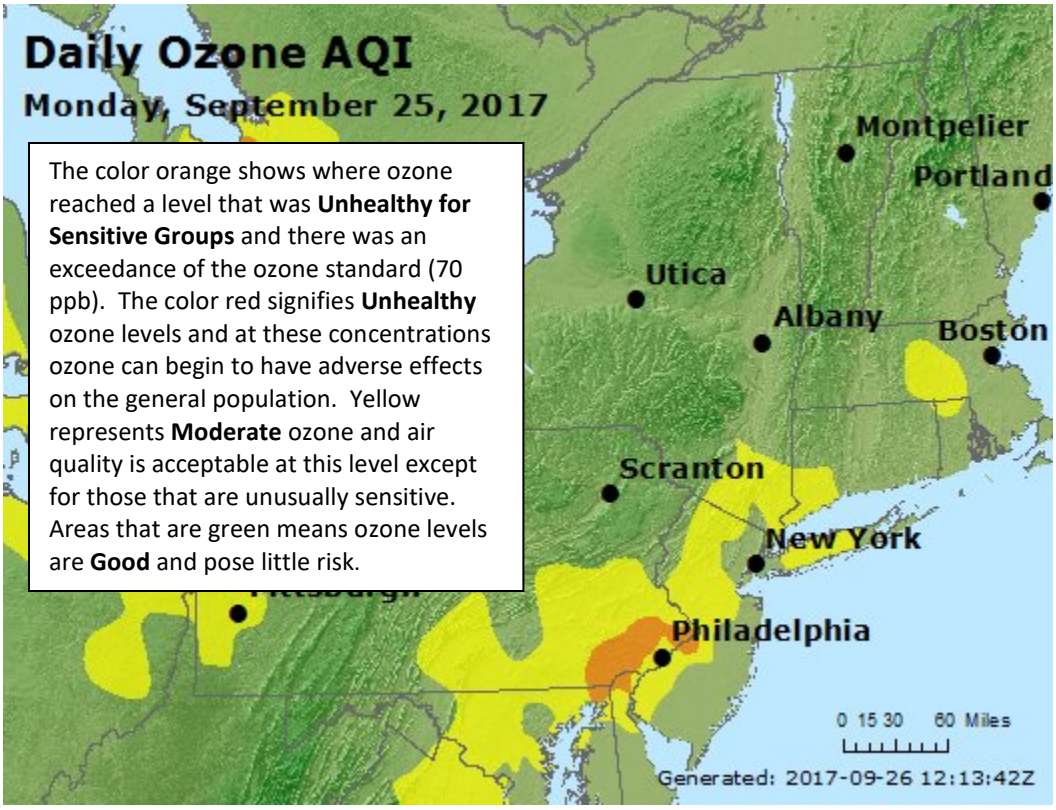
Two (2) stations exceeded the 75 ppb ozone NAAQS of 2008, but none exceeded the 84 ppb ozone NAAQS of 1997. The highest 1-hour average ozone concentration recorded was 114 ppb at the New Garden Township (NEWG) station in Pennsylvania, which is below the 1-hour ozone NAAQS of 120 ppb.

Monday marks the 13th day in 2017 on which exceedances of the 70 ppb ozone NAAQS of 2015 were recorded for Pennsylvania, the 8th day for Delaware, and the 8th day for Maryland. The number of days for Connecticut remains at twenty (20) with fourteen (14) for New York (See Table 3). Figure 1 shows graphically the region's ozone concentrations on September 25, 2017.

Table 3: Number of Ozone Exceedances by State

STATE	# of Days NAAQS was Exceeded January 1 – Sept 25, 2017 NAAQS = 70 ppb
Connecticut	20
Delaware	8
Maryland	8
New Jersey	14
New York	14
Pennsylvania	13

Figure 1. Ozone Air Quality Index for September 25, 2017



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

A strong area of high pressure continued to dominate the eastern half of the United States on Monday. The center of this high was noted over Pennsylvania allowing for sunny skies, warmer than average temperatures, and generally calm winds. Air was transported from the north into the region late Sunday as winds followed the curvature of this persistent high pressure system. During this time, the high pressure forced air to sink toward the surface allowing any pollution aloft to mix down. This enhanced locally generated emissions in the Philadelphia and Wilmington metropolitan areas on Monday which was already exacerbated by 90 degree temperatures and calm surface winds.

In addition, Hurricane Maria continued to slowly move along the U.S. East Coast on Monday. Sinking air ahead of the system influenced our area which provided yet another mechanism for transported pollution to descend over the region.

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 September 25, 2017. 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 Stations with 8-hr Ozone Exceedances that Were Selected to Run 48-hr Back Trajectories

STATE	STATION	Daily Maximum 8-Hr Average (ppb)
DE	BCSP	80
PA	BRIS	73
PA	NEA	71
PA	NEWG	79
PA	NORR	73
MD	Fair Hill	75

Low level wind trajectories (Figure 2) originated in central and southeast portions of New York State and traveled southward. Trajectories at the surface impacting Montgomery County and the Philadelphia area traveled along the surface through central New Jersey before stalling and making a slow arrival into Philadelphia. These trajectories remained at the surface for the duration of their path collecting emissions from cars, trucks, and industry along the way. Trajectories at the surface impacting Chester County, Maryland, and Delaware traveled southward through Pennsylvania. These trajectories also stalled slightly and briefly recirculated before reaching their ending locations. Unlike the trajectories impacting Philadelphia, these trajectories originated at a higher level of the atmosphere and were brought down to the surface via subsidence in the morning hours the day before this exceedance (shown bottom of Figure 2). This may have mixed polluted air aloft down to the surface. Mid-level trajectories (Figure 3) originated over a large extent throughout New England. In general, mid-level winds traveled south-southwest through New England, Connecticut, The Long Island Sound, and New Jersey. After their arrival in New Jersey, mid-level winds slowed down and experienced some slight recirculation before reaching their endpoints. Winds at the mid-level remained aloft for the duration of their path and therefor did not contribute to any exceedance at the surface. This recirculation is likely due to the interaction of the strong high-pressure system interfering with the exterior bands of Hurricane Maria. Upper level winds (Figure 4) originated in Canada and traveled southeastward through New England before curving to the left and traveling southwestward through Long Island and central New Jersey. Winds at the upper level descended slightly from 2000 to 1500m but remained aloft for the duration of their path.

Figure 5 below shows graphically the national ozone concentrations on September 24rd. This map illustrates that ozone levels were elevated over the mid-western United States, portions of Canada and reached the USG level in New Jersey the day prior to this event. Based on the trajectories and the overall weather pattern, it is likely that elevated ozone from the day before was transported into the region and then mixed with locally generated emissions leading to an exceedance.

Figure 2. 48-hour Back Trajectories for September 25, 2017 at 10 meters

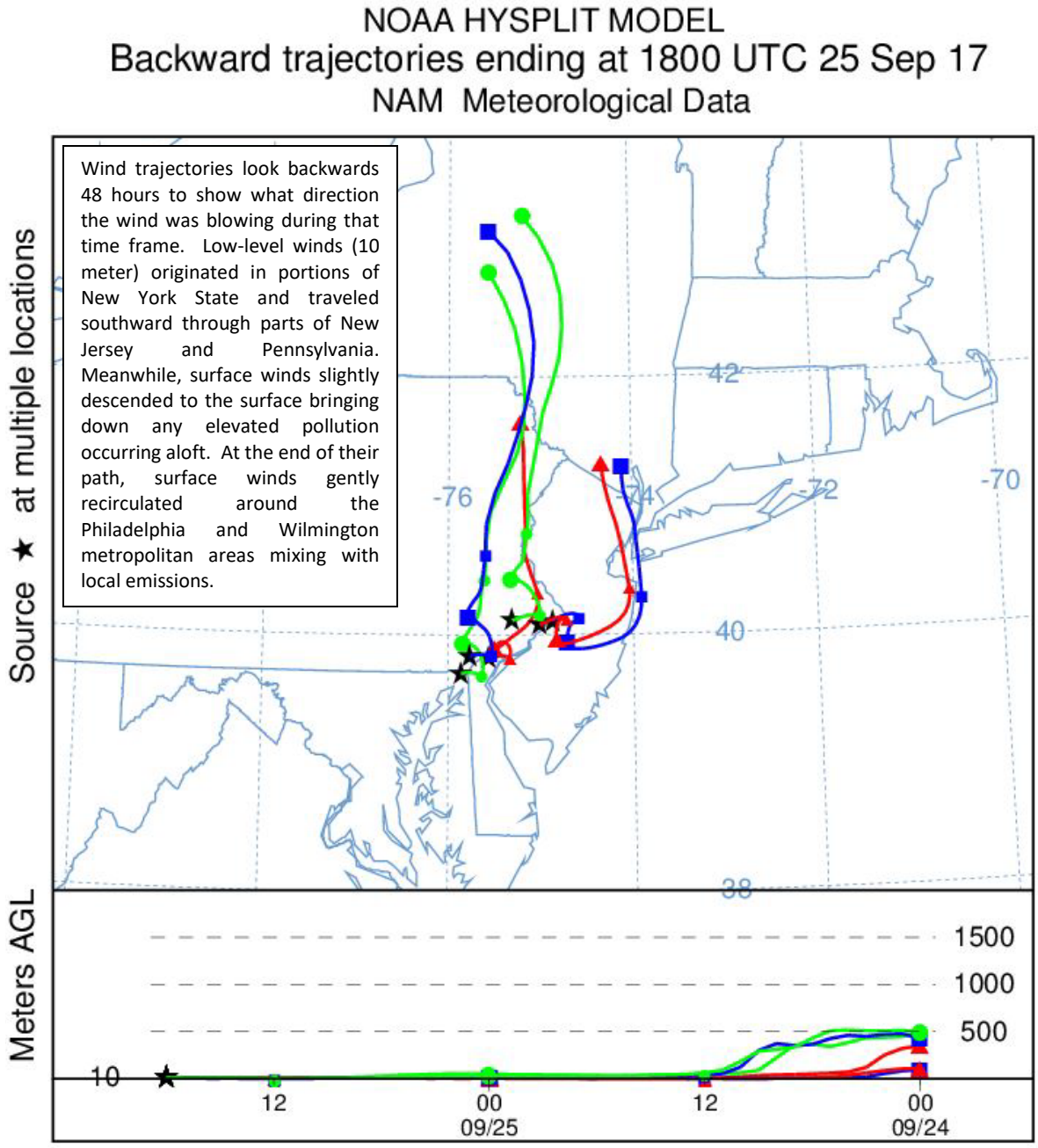


Figure 3. 48-hour Back Trajectories for September 25, 2017 at 500 meters

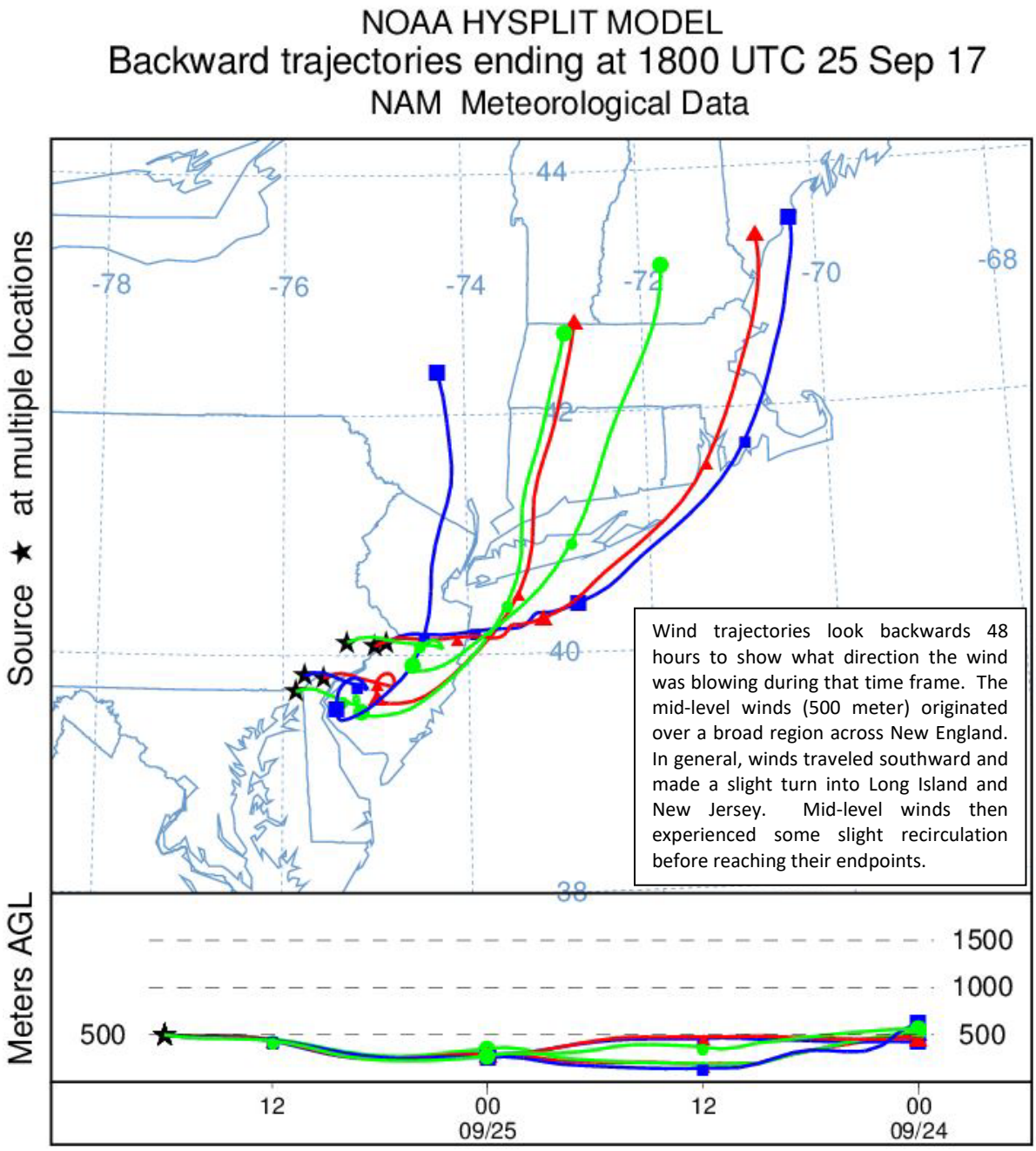


Figure 4. 48-hour Back Trajectories for September 25, 2017 at 1500 meters

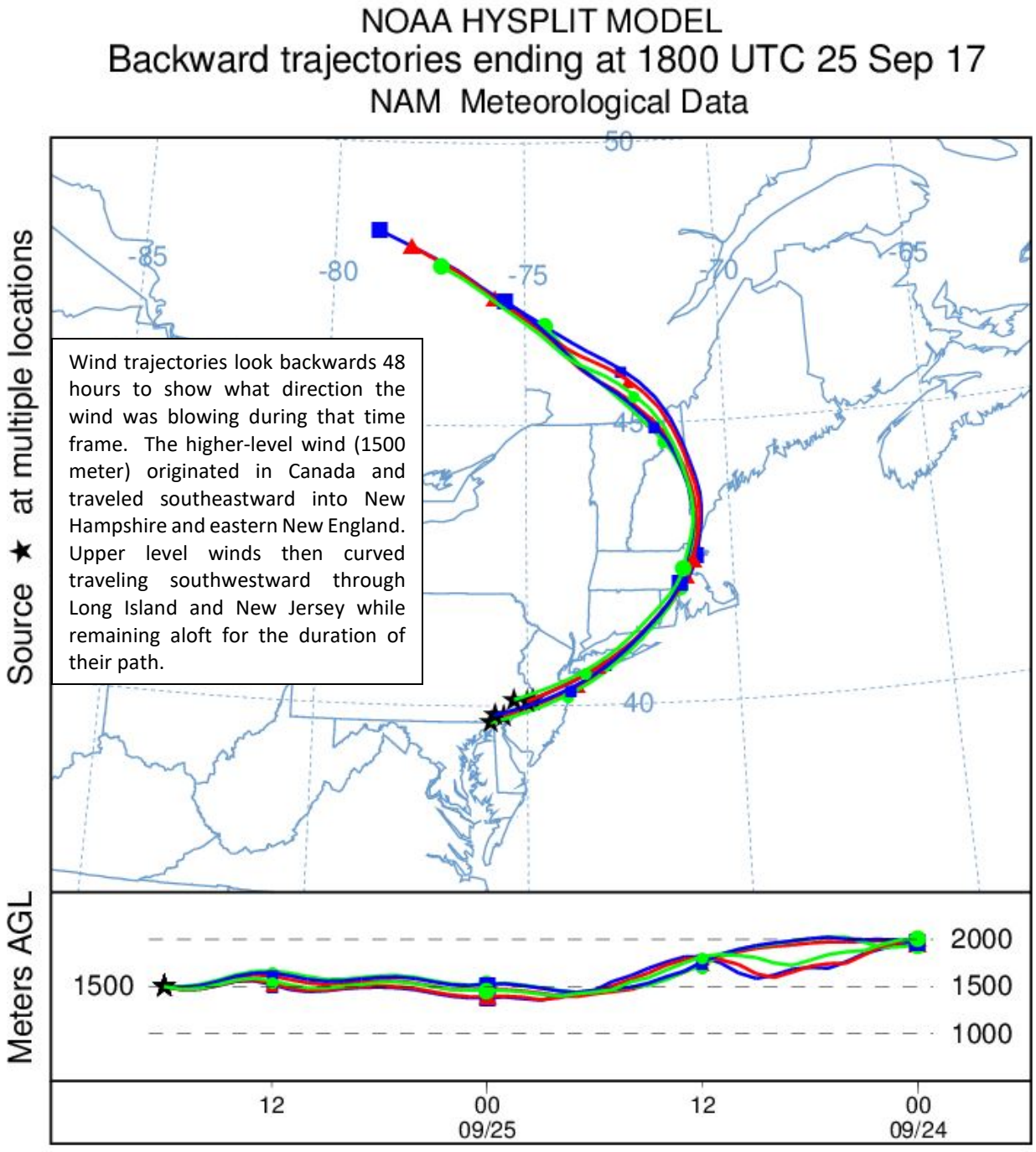
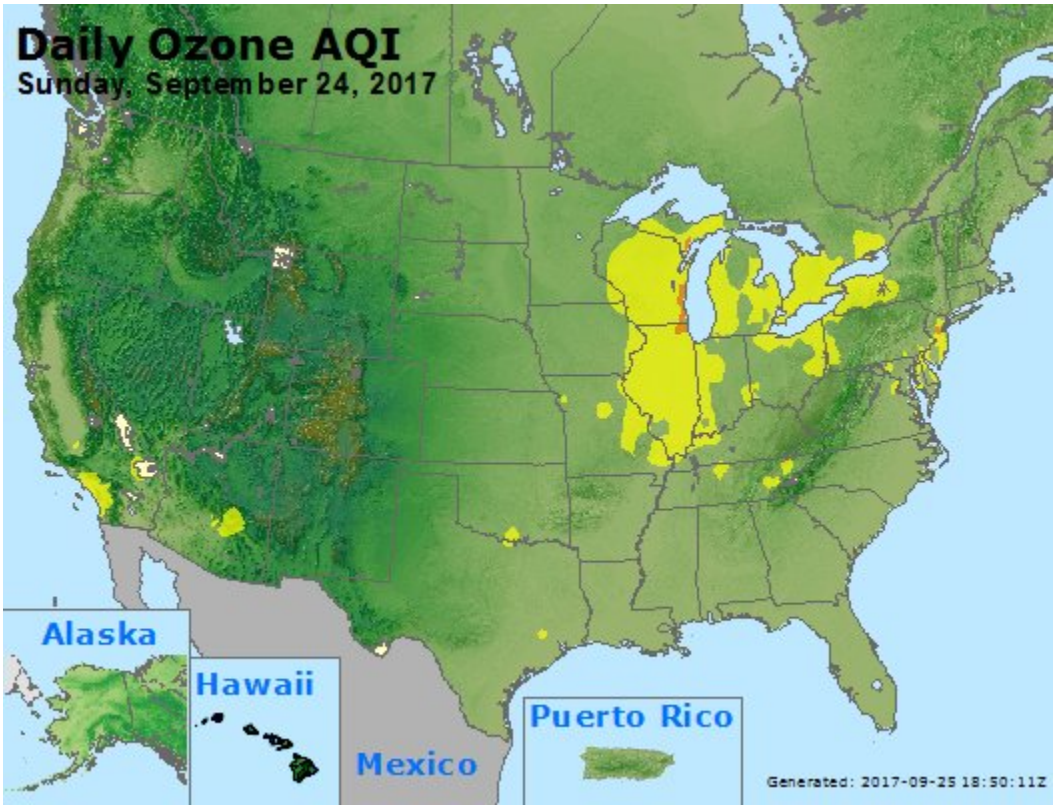


Figure 5. Ozone Air Quality Index for the United States on September 24, 2017



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.