## Ozone National Ambient Air Quality Standard Health Exceedances on September 24, 2017

### Exceedance Locations and Levels

On Sunday, September 24, 2017, there was one (1) exceedance in New Jersey of the 8-hour average ozone National Ambient Air Quality Standard (NAAQS) of 70 ppb that became effective in December 2015 (See Table 1):

**Table 1. Ozone NAAQS Exceedances in New Jersey on September 24, 2017**

| STATION | Daily Maximum 8-Hr Average (ppb) |
|---|---|
| Rutgers University | 78 |

One (1) New Jersey station 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 on September 24, 2017, in New Jersey was 90 ppb at the Rutgers University, which is below the 1-hour ozone NAAQS of 120 ppb.

Sunday marks the 14th day in 2017 on which exceedances of the 70 ppb ozone NAAQS of 2015 were recorded in New Jersey. By the 24th 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 former 75 ppb NAAQS of 2008) (See Table 2).

**Table 2: New Jersey Exceedance Count**

| | # of Days NAAQS was Exceeded January 1 – Sept 24, 2017 NAAQS = 70 ppb | # of Days NAAQS was Exceeded January 1 – Sept 24, 2016 NAAQS = 70 ppb | # of Days NAAQS was Exceeded January 1 – Sept 24, 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 no exceedances of the 70 ppb ozone NAAQS of 2015 recorded on Sunday, September 24, 2017.

No 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 was 82 ppb at the Bristol station in Pennsylvania, which is below the 1-hour ozone NAAQS of 120 ppb.

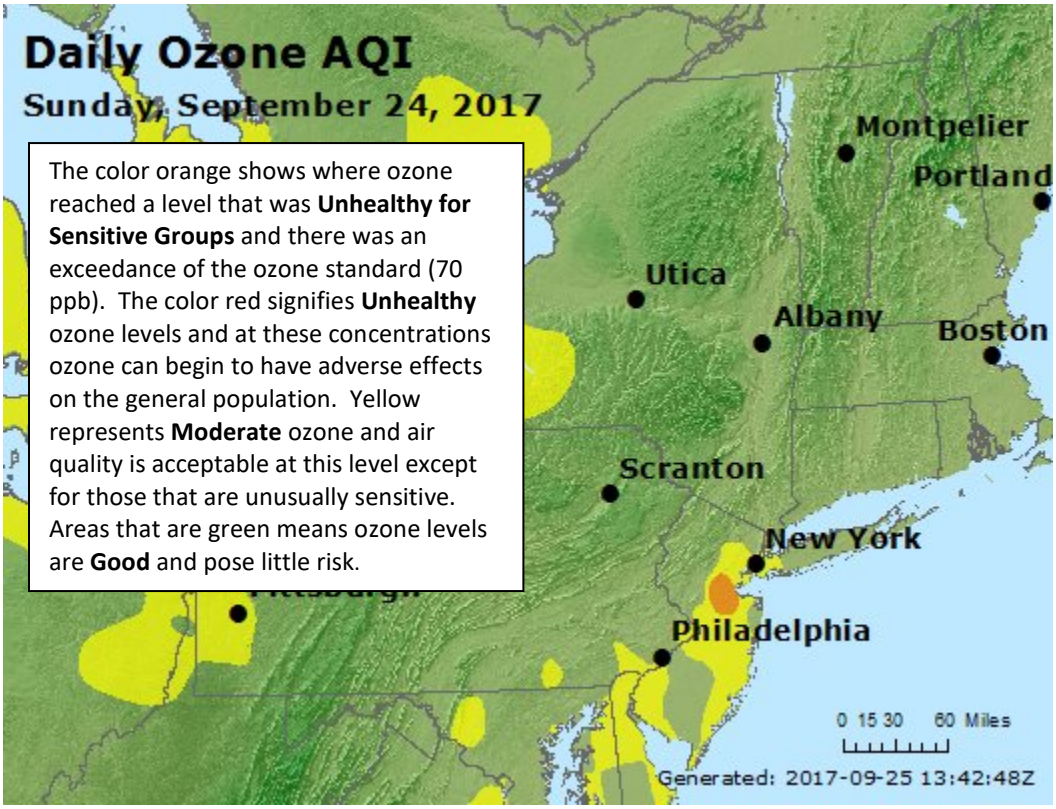
The number of days in 2017 on which exceedances of the 70 ppb ozone NAAQS of 2015 were recorded for Connecticut remains at twenty (20) with fourteen (14) for New York, twelve (12) for Pennsylvania,

and seven (7) days each for Maryland and Delaware. (See Table 3). Figure 1 shows graphically the region's ozone concentrations on September 24, 2017.

**Table 3: Number of Ozone Exceedances by State**

| STATE | # of Days NAAQS was Exceeded<br>January 1 – Sept 24, 2017<br>NAAQS = 70 ppb |
|---|---|
| Connecticut | 20 |
| Delaware | 7 |
| Maryland | 7 |
| New Jersey | 14 |
| New York | 14 |
| Pennsylvania | 12 |

**Figure 1. Ozone Air Quality Index for September 24, 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**

An area of strong high pressure remained in control over the Northeast and Mid-Atlantic regions in the days preceding the high ozone event. The high was centered over Pennsylvania on the 23rd where it remained through 24th producing light and variable surface winds to New Jersey.

Strong mid-level ridging moved eastward on Sunday producing warmer than normal temperatures across the region at the surface and aloft. As a result, meteorological data from across the region shows temperatures reached the low 90s with strong subsidence and clear skies. Subsidence (a gentle sinking of air over a broad region) from the strong high in addition to subsidence occurring in the exterior bands of Hurricane Maria created favorable conditions for polluted air aloft to migrate down to the surface (shown bottom of Figures 2, 3, and 4). In addition, unusually warm temperatures aloft for this time of year created additional advantageous conditions for ozone production aloft.

The persistent high-pressure system locked over the Northeast and Mid-Atlantic in combination with warm temperatures and sunny skies are all features commonly seen with an ozone exceedance. In this instance, ozone was most likely created aloft in addition to locally produced at the surface. Light and variable winds out of the north were also likely a factor in transporting pollution from the New York City metropolitan area downwind into New Jersey. This exceedance being exclusive to the Rutgers University monitor is likely linked to its convenient proximity to New York City and the lag time associated with pollutant interaction to form ozone.

**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 exceedance September 24, 2017. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. One (1) monitoring station with an 8-hr ozone exceedance was used to run back trajectories. The selected site and the maximum 8-hr ozone level recorded is 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) |
|---|---|---|
| NJ | Rutgers University | 78 |

Surface level back trajectories (Figure 2) show that air parcels affecting the New Brunswick area originated over southeastern Ontario in the mid-levels of that atmosphere. This air traveled southeast and south, following the curvature of the above mentioned high pressure system, through central New York State and just west of the NYC and Northern New Jersey Metropolitan Area to the affected monitor. Given the strong influence of this high pressure system, air gradually descended down to the surface level during its travels and had the opportunity to quickly pick up locally generated emissions along the way. Similarly, mid-level and upper-level back trajectories (Figure 3 & 4) originated in Canada, near the Ontario/Quebec boarder, in higher levels of the atmosphere. Air slowly descended as it

traveled southeast and south through the extreme western portions of New England and the NYC and Northern New Jersey Metropolitan Area to its destination.

Figure 5 below shows graphically the national ozone concentrations on September 23rd. This map illustrates that ozone levels were elevated over the mid-western United States and southern portions of Ontario, Canada the day prior to this event. Based on the trajectories and the overall weather pattern, it is likely that this elevated ozone from the day before was transported into the region and then mixed with locally generated emissions leading to an exceedance in the New Brunswick vicinity.

**Figure 2. 48-hour Back Trajectories for September 24, 2017 at 10 meters**

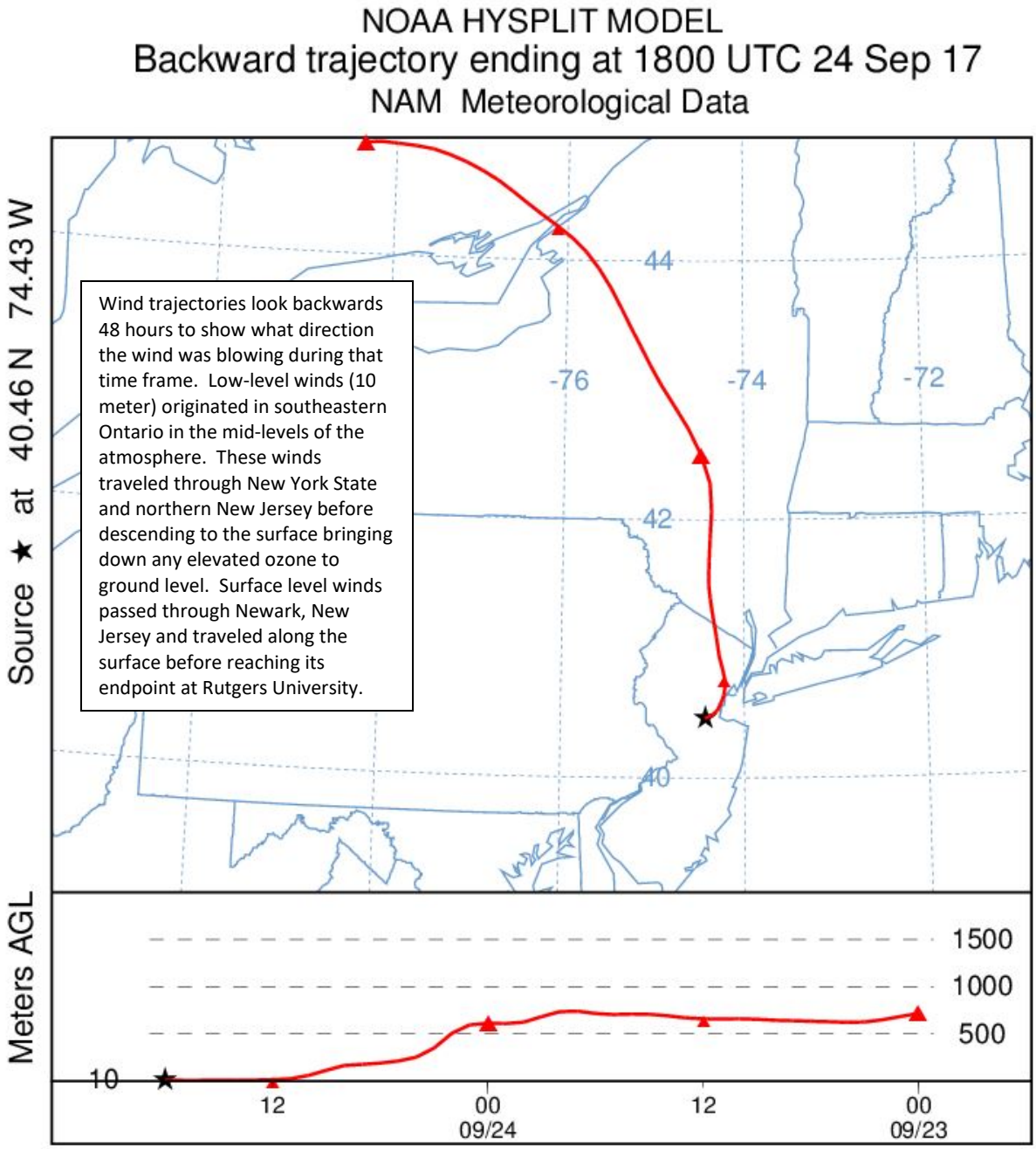


**Figure 3. 48-hour Back Trajectories for September 24, 2017 at 500 meters**

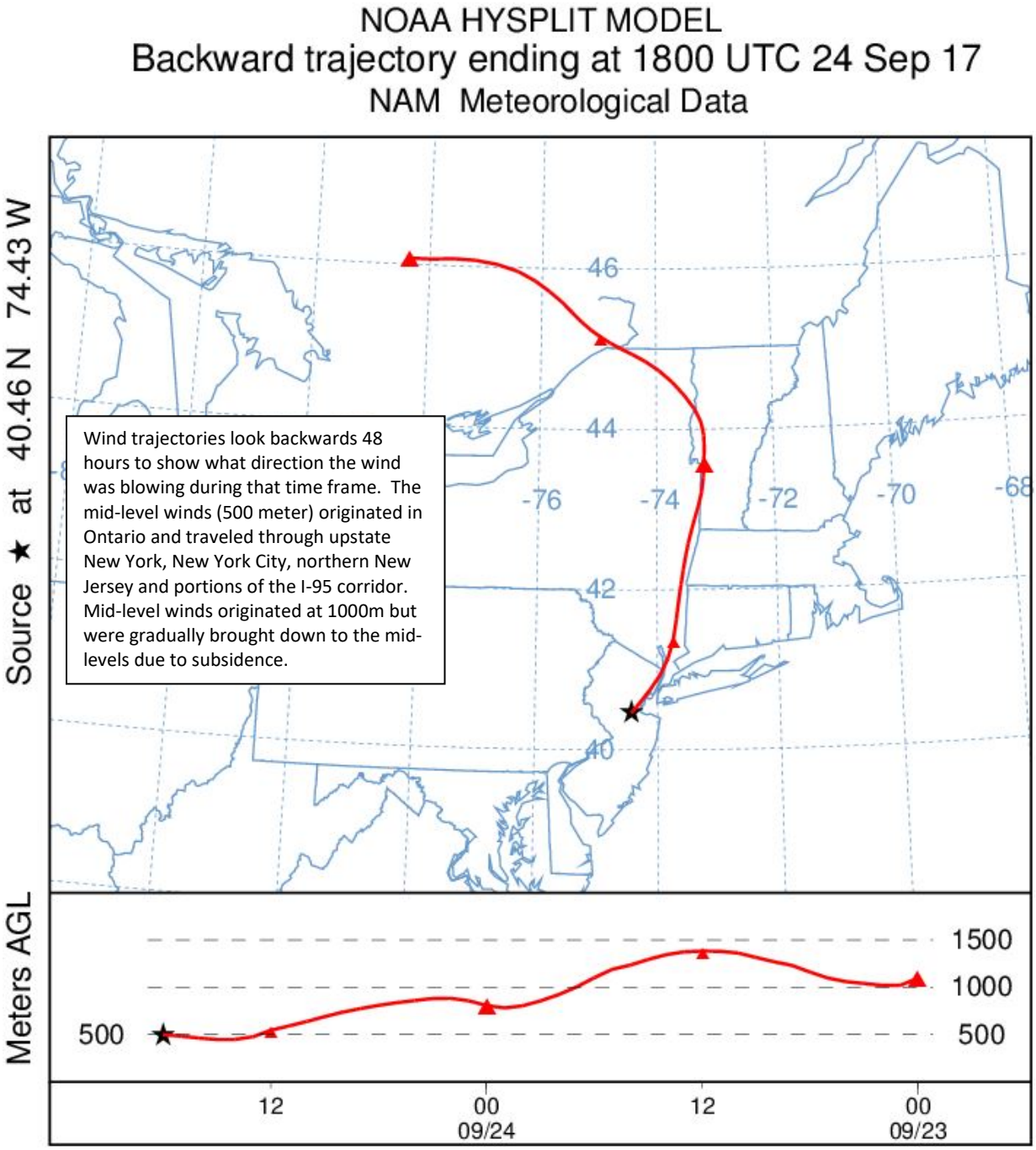


**Figure 4. 48-hour Back Trajectories for September 24, 2017 at 1500 meters**

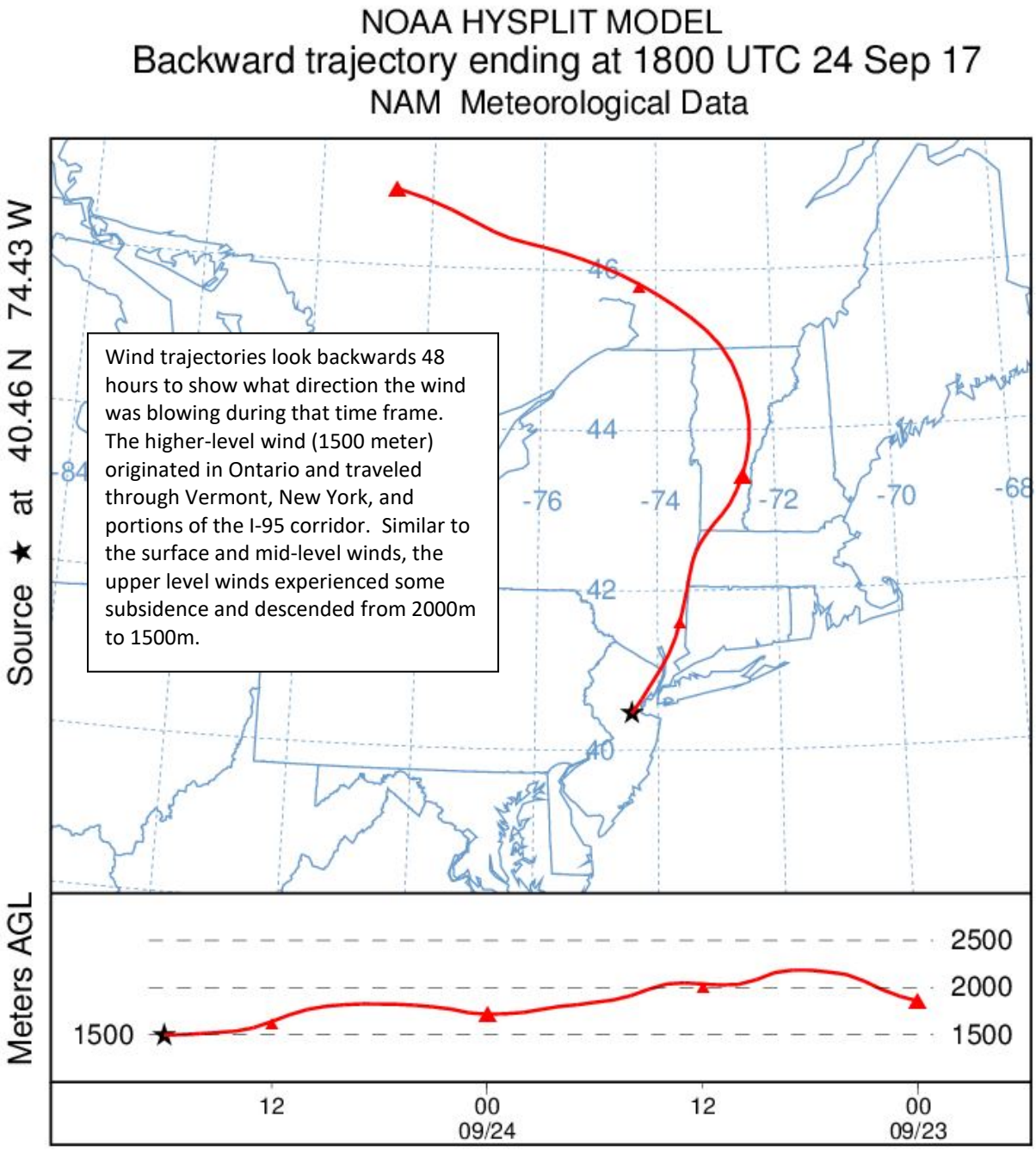



**Figure 5. Ozone Air Quality Index for the United States on September 23, 2017**


**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.