Ozone National Ambient Air Quality Standard Health Exceedances on May 25, 2018

Exceedance Locations and Levels

On Friday, May 25, 2018, there were two (2) 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. Maximum 8-Hour Average Ozone Concentrations in New Jersey on May 25, 2018

<table>
<thead>
<tr>
<th>STATION</th>
<th>Daily Maximum 8-Hr Average (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancora State Hospital</td>
<td>54</td>
</tr>
<tr>
<td>Bayonne</td>
<td>65</td>
</tr>
<tr>
<td>Brigantine</td>
<td>43</td>
</tr>
<tr>
<td>Camden Spruce St</td>
<td>62</td>
</tr>
<tr>
<td>Chester</td>
<td>68</td>
</tr>
<tr>
<td>Clarksboro</td>
<td>61</td>
</tr>
<tr>
<td>Colliers Mills</td>
<td>62</td>
</tr>
<tr>
<td>Columbia</td>
<td>61</td>
</tr>
<tr>
<td>Flemington</td>
<td>65</td>
</tr>
<tr>
<td>Leonia</td>
<td>65</td>
</tr>
<tr>
<td>Millville</td>
<td>53</td>
</tr>
<tr>
<td>Monmouth University</td>
<td>59</td>
</tr>
<tr>
<td>Newark Firehouse</td>
<td>63</td>
</tr>
<tr>
<td>Ramapo</td>
<td>64</td>
</tr>
<tr>
<td>Rider University</td>
<td>72</td>
</tr>
<tr>
<td>Rutgers University</td>
<td>71</td>
</tr>
<tr>
<td>Washington Crossing*</td>
<td>No Data</td>
</tr>
</tbody>
</table>

*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: Ozone Concentrations at Out-of-State Monitoring Stations in New Jersey’s Ozone Non-Attainment Areas on May 25, 2018

<table>
<thead>
<tr>
<th>STATE</th>
<th>STATION</th>
<th>Daily Maximum 8-Hr Average (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>Danbury</td>
<td>72</td>
</tr>
<tr>
<td>CT</td>
<td>Greenwich</td>
<td>67</td>
</tr>
<tr>
<td>CT</td>
<td>Madison-Beach Road</td>
<td>71</td>
</tr>
<tr>
<td>CT</td>
<td>Middletown</td>
<td>77</td>
</tr>
</tbody>
</table>
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 region’s ozone concentrations on May 25, 2018.

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

<table>
<thead>
<tr>
<th>STATE</th>
<th># of Days NAAQS was Exceeded January 1 – May 25, 2018 NAAQS = 70 ppb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecticut</td>
<td>3</td>
</tr>
<tr>
<td>Delaware</td>
<td>2</td>
</tr>
<tr>
<td>Maryland</td>
<td>2</td>
</tr>
<tr>
<td>New Jersey</td>
<td>3</td>
</tr>
</tbody>
</table>
Weather

A high pressure system over the Great Lakes region on May 24th moved east-southeast toward the Mid-Atlantic early on the May 25th and merged with a secondary high pressure off the U.S. east coast. This newly established high pressure system remained anchored off shore for the remainder of the day allowing for abundant sunshine, light winds becoming southwesterly, and temperatures reaching the mid-upper 80s throughout the non-attainment area. Meanwhile, a surface trough was noted throughout the day and extended from southern New England through the Hudson Valley, northwestern New Jersey, and Pennsylvania.

In the day preceding this event, moderate and scattered USG ozone levels were noted throughout the Mid-Atlantic, Great Lakes, and Mid-West regions of the United States. As the abovementioned high pressure traveled east and stalled off-shore, already polluted air was transported into our region, both...
at the surface and aloft. At the surface, southwest winds ushered air from the Mid-Atlantic region and Chesapeake Bay along the I-95 corridor. As this already polluted air traveled northeast, it was enhanced by locally generated emissions from cars, trucks, and industry along the way. In addition, the upper level pattern allowed for a westerly transport of polluted air from the Great Lakes and Mid-West into our region.

Finally, vertical smoke was noted over our region on May 25th which appears to have been transported from wildfires in the Canadian Prairies. As smoke is known to contain pollutant precursors for ozone formation, it is possible that, in addition to the above, this smoke enhanced ozone levels across our non-attainment 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 exceedance on May 25, 2018. The figures illustrate where the winds came from during the 48 hours preceding the high ozone event. Seven (7) monitoring stations with an 8-hr ozone exceedance were used to run back trajectories. The selected sites and the maximum 8-hr ozone level recorded are listed in Table 4 below:

<table>
<thead>
<tr>
<th>STATE</th>
<th>STATION</th>
<th>Daily Maximum 8-Hr Average (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>Danbury</td>
<td>72</td>
</tr>
<tr>
<td>CT</td>
<td>Madison Beach Road</td>
<td>71</td>
</tr>
<tr>
<td>CT</td>
<td>Westport</td>
<td>75</td>
</tr>
<tr>
<td>NJ</td>
<td>Rider University</td>
<td>72</td>
</tr>
<tr>
<td>NJ</td>
<td>Rutgers University</td>
<td>71</td>
</tr>
<tr>
<td>NY</td>
<td>Queens</td>
<td>73</td>
</tr>
<tr>
<td>PA</td>
<td>BRIS (Bucks Co.)</td>
<td>71</td>
</tr>
</tbody>
</table>

Surface level back trajectories (Figure 2) originated in portions of southeastern Pennsylvania, Maryland and Delaware and recirculated around this region the day prior to the exceedances (May 24th). This recirculation is due to the strong sea-breeze that developed on the 24th causing the polluted air to be blown back onshore and pick up additional emissions along the remainder of its path. The trajectory affecting western Connecticut was likely influenced by weak low pressure that developed over Connecticut and formed a surface trough. Back trajectories at the mid-level (Figure 3) originated in central Pennsylvania and southern Ontario. Mid-level trajectories traveled southward where they met a stationary front causing the air to stall in Virginia before being looped back into the circulation of high pressure. Some mid-level trajectories descended from aloft while others remained at 500m for the duration of their path. Unlike the low and mid-level back trajectories, the upper level trajectories (Figure 4) did not show a recirculation pattern. However, upper level trajectories originated in Ontario and traveled southeastward towards Pennsylvania where they made a sharp change in direction traveling eastward to their destinations in central New Jersey, New York, and Connecticut. Upper level
trajectories passed through portions of Pennsylvania that saw widespread moderate levels of ozone on the 24th before reaching their endpoints.

Figure 2. 48-hour Back Trajectories for May 25, 2018 at 10 meters

Wind trajectories look backwards 48 hours to show what direction the wind was blowing during that time frame. Low-level winds (10 meter) originated in southeastern Pennsylvania, Maryland and Delaware and recirculated around this region due to a strong sea breeze that developed. After recirculating, trajectories traveled northeastward generally along the I-95 corridor before reaching their endpoint.
Wind trajectories look backwards 48 hours to show what direction the wind was blowing during that time frame. The mid-level winds (500 meter) originated in portions of central Pennsylvania and Ontario. Mid-level winds recirculated around portions of Virginia due to a stationary front and multiple high pressure centers over the Mid-Atlantic causing the air to stall and loop back into the circulation of high pressure.
Figure 4. 48-hour Back Trajectories for May 25, 2018 at 1500 meters

NOAA HYSPLIT MODEL
Backward trajectories ending at 1800 UTC 25 May 18
NAMS Meteorological Data

Wind trajectories look backwards 48 hours to show what direction the wind was blowing during that time frame. The higher-level wind (1500 meter) originated in Ontario and traveled southeastward through western New York and Pennsylvania before making a sharp turn eastward through central and eastern Pennsylvania. Trajectories affecting northern monitors traveled through the NYC metropolitan area while southern trajectories traveled through Philadelphia.
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/](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.