Ozone National Ambient Air Quality Standard Health Exceedances on June 4, 2022

Exceedance Locations and Levels

On Saturday, June 4, 2022, 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 Ozone Concentrations on 6/4/2022

<table>
<thead>
<tr>
<th>STATION</th>
<th>Daily Maximum 8-Hr Average (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancora State Hospital</td>
<td>63</td>
</tr>
<tr>
<td>Bayonne</td>
<td>52</td>
</tr>
<tr>
<td>Brigantine</td>
<td>45</td>
</tr>
<tr>
<td>Camden Spruce St</td>
<td>63</td>
</tr>
<tr>
<td>Chester</td>
<td>57</td>
</tr>
<tr>
<td>Clarksboro</td>
<td>71</td>
</tr>
<tr>
<td>Colliers Mills</td>
<td>64</td>
</tr>
<tr>
<td>Columbia</td>
<td>53</td>
</tr>
<tr>
<td>Flemington</td>
<td>59</td>
</tr>
<tr>
<td>Leonia</td>
<td>56</td>
</tr>
<tr>
<td>Millville</td>
<td>60</td>
</tr>
<tr>
<td>Monmouth University</td>
<td>52</td>
</tr>
<tr>
<td>Newark Firehouse</td>
<td>55</td>
</tr>
<tr>
<td>Ramapo</td>
<td>50</td>
</tr>
<tr>
<td>Rider University</td>
<td>60</td>
</tr>
<tr>
<td>Rutgers University</td>
<td>58</td>
</tr>
<tr>
<td>Washington Crossing*</td>
<td>60</td>
</tr>
<tr>
<td>TOTAL EXCEEDANCES</td>
<td>1</td>
</tr>
</tbody>
</table>

*The Washington Crossing station is operated and maintained by EPA as part of the nationwide Clean Air Status and Trends Network (CASTNET).

From the out-of-state stations within New Jersey’s ozone non-attainment areas, there were no 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 6/4/2022

<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>55</td>
</tr>
<tr>
<td>CT</td>
<td>Greenwich</td>
<td>58</td>
</tr>
<tr>
<td>CT</td>
<td>Madison-Beach Road</td>
<td>42</td>
</tr>
<tr>
<td>CT</td>
<td>Middletown-CVH-Shed</td>
<td>48</td>
</tr>
<tr>
<td>CT</td>
<td>New Haven</td>
<td>43</td>
</tr>
<tr>
<td>CT</td>
<td>Stratford</td>
<td>49</td>
</tr>
<tr>
<td>CT</td>
<td>Westport</td>
<td>55</td>
</tr>
<tr>
<td>DE</td>
<td>BCSP (New Castle Co.)</td>
<td>67</td>
</tr>
<tr>
<td>DE</td>
<td>BELLFNT2 (New Castle Co.)</td>
<td>67</td>
</tr>
<tr>
<td>DE</td>
<td>KILLENS (Kent Co.)</td>
<td>64</td>
</tr>
<tr>
<td>DE</td>
<td>LEWES (Sussex Co.)</td>
<td>54</td>
</tr>
<tr>
<td>DE</td>
<td>LUMS 2 (New Castle Co.)</td>
<td>64</td>
</tr>
<tr>
<td>DE</td>
<td>MLK (New Castle Co.)</td>
<td>66</td>
</tr>
<tr>
<td>DE</td>
<td>SEAFORD (Sussex Co.)</td>
<td>66</td>
</tr>
<tr>
<td>MD</td>
<td>Fair Hill</td>
<td>67</td>
</tr>
<tr>
<td>NY</td>
<td>Babylon</td>
<td>47</td>
</tr>
<tr>
<td>NY</td>
<td>Bronx - IS52</td>
<td>54</td>
</tr>
<tr>
<td>NY</td>
<td>CCNY</td>
<td>55</td>
</tr>
<tr>
<td>NY</td>
<td>Flax Pond</td>
<td>50</td>
</tr>
<tr>
<td>NY</td>
<td>Fresh Kills</td>
<td>56</td>
</tr>
<tr>
<td>NY</td>
<td>Holtsville</td>
<td>45</td>
</tr>
<tr>
<td>NY</td>
<td>Pfizer Lab</td>
<td>57</td>
</tr>
<tr>
<td>NY</td>
<td>Queens</td>
<td>50</td>
</tr>
<tr>
<td>NY</td>
<td>Riverhead</td>
<td>41</td>
</tr>
<tr>
<td>NY</td>
<td>Rockland Cty</td>
<td>54</td>
</tr>
<tr>
<td>NY</td>
<td>White Plains</td>
<td>55</td>
</tr>
<tr>
<td>PA</td>
<td>BRIS (Bucks Co.)</td>
<td>63</td>
</tr>
<tr>
<td>PA</td>
<td>CHES (Delaware Co.)</td>
<td>65</td>
</tr>
<tr>
<td>PA</td>
<td>NEWG (Chester Co.)</td>
<td>64</td>
</tr>
<tr>
<td>PA</td>
<td>NORR (Montgomery Co.)</td>
<td>67</td>
</tr>
<tr>
<td>PA</td>
<td>LAB (Philadelphia Co.)</td>
<td>63</td>
</tr>
<tr>
<td>PA</td>
<td>NEA (Philadelphia Co.)</td>
<td>66</td>
</tr>
<tr>
<td>PA</td>
<td>NEW (Philadelphia Co.)</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>TOTAL EXCEEDANCES</td>
<td>0</td>
</tr>
</tbody>
</table>
The number of days in 2022 on which exceedances of the ozone NAAQS were recorded for all the states within New Jersey’s ozone non-attainment areas is summarized in Table 3.

Table 3. Number of Days Ozone NAAQS was Exceeded in NJ’s Non-Attainment Areas in 2022

<table>
<thead>
<tr>
<th>STATE</th>
<th># of Days NAAQS was Exceeded January 1 – June 4, 2022 NAAQS = 70 ppb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecticut</td>
<td>1</td>
</tr>
<tr>
<td>Delaware</td>
<td>0</td>
</tr>
<tr>
<td>Maryland</td>
<td>0</td>
</tr>
<tr>
<td>New Jersey</td>
<td>1</td>
</tr>
<tr>
<td>New York</td>
<td>0</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure 1. Ozone Air Quality Index for June 4, 2022

An exceedance of the ozone standard (70ppb) is represented by the color orange. The color orange shows where ozone concentrations (71 – 85ppb) reached levels that are Unhealthy for Sensitive Groups, such as asthmatics and the elderly. Yellow represents Moderate ozone (55 – 70ppb) and air quality is acceptable at this level except for those that are unusually sensitive. Green represents Good ozone levels (0 – 55ppb) and pose little risk.

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 weak area of high-pressure building eastward was the main weather story providing seasonable and pleasant weather conditions on Saturday, June 4, 2022 as a cold front approached the nonattainment area from the northwest. Mostly sunny skies, temperatures reaching the mid-80s, and light northwesterly winds provided generally clean conditions for much of the region however, a surface trough draped across the nonattainment area likely resulted in polluted air aloft to be mixed down toward the surface. These weather features, in combination with localized transport from the Philadelphia Metropolitan Area and regional transport of previously polluted air/emissions from the Great Lakes, allowed for ozone levels to rise slightly leading to an isolated exceedance at the Clarksboro monitor.

Where Did the Air Pollution that Caused Ozone Come From?

Figures 2, 3, and 4 show the back trajectories of different wind heights for the monitored exceedance(s) on this day. The figures illustrate where the air came from during the 48 hours preceding the 8-hour ozone standard exceedances. A transport analysis is provided with each figure shown below along with a map of the National Air Quality Index for the previous day (Figure 5). The monitoring station(s) that were chosen to model back trajectories are listed in Table 4.

<table>
<thead>
<tr>
<th>STATE</th>
<th>STATION</th>
<th>Daily Maximum 8-Hr Average (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NJ</td>
<td>Clarksboro</td>
<td>71</td>
</tr>
</tbody>
</table>
The surface level back trajectory shows that air at the surface originated over the Great Lakes region, a region that saw widespread moderate air quality the day prior to this event. This air then quickly traveled southeast over western New York before making a turn southward over eastern Pennsylvania early on June 4th. As air continued south throughout the day, it began to reduce speed over the Philadelphia Metropolitan Area before turning east toward its destination. With air traveling slowly in the last 12 hours of transit, it’s likely that this already polluted air became further enhanced by emission from cars, trucks, and local industry.
The mid-level back trajectory, very similar to the surface level, shows that air originated over the Great Lakes region and transported previously polluted air southeast across western New York and eastern Pennsylvania. Air then significantly reduced speed over the Philadelphia Metropolitan Area, becoming increasingly polluted into arrival. Under the influence of a surface trough, atmospheric mixing likely occurred over the region, allowing an enhancement of surface level ozone concentrations.
Figure 4. 48-hour Back Trajectories for June 4, 2022 at 1500 meters

NOAA HYSPLIT MODEL
Backward trajectory ending at 1800 UTC 04 Jun 22
NAMS Meteorological Data

The upper-level back trajectory originated over Michigan and traveled generally southeastward over northeastern Ohio and Pennsylvania into arrival. As with the other atmospheric levels, air was able to quickly transport previously polluted air from the Great Lakes region east, further supporting elevated ozone levels over southwestern New Jersey.
How is Ozone Created?
Ground-level ozone is an air pollutant known to cause several 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
Learn more about your local ozone air quality forecast by visiting the “What’s Your Air Quality Today?” page at https://www.nj.gov/dep/baqp/aqitoday.html.