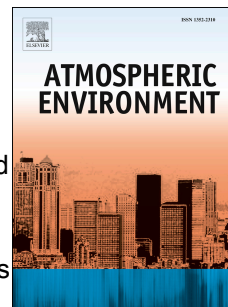


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# A National-Scale Review of Air Pollutant Concentrations Measured in the U.S. Near-Road Monitoring Network During 2014 and 2015

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## Abstract

In 2010, the U.S. Environmental Protection Agency (EPA) revised the National Ambient Air Quality Standards (NAAQS) for NO<sub>2</sub> to include a primary health-based standard for hourly NO<sub>2</sub>, and required air quality monitoring next to major roadways in urban areas in the U.S. Requirements for near-road measurements also include carbon monoxide (CO) and particulate matter smaller than 2.5 microns in diameter (PM<sub>2.5</sub>). We performed a national-scale assessment of air pollutants measured at 81 sites in the near-road environment during the first two years (2014 and 2015) of the new measurement program. We evaluated how concentrations at these locations compared to the NAAQS, to concentrations measured at other sites within the same urban areas, and when considering their site characteristics (distance of monitor to road, traffic volume, and meteorology). We also estimated the contribution of emissions from adjacent roadways at each near-road site to the PM<sub>2.5</sub> concentrations above the local urban background concentrations, i.e., the near-road “increment.” Hourly values of CO reached a maximum of 4.8 ppm across 31 sites in 2014 and 9.6 ppm across 47 sites in 2015, and were well below the NAAQS levels for both the 1-hr (35 ppm) and 8-hr (9 ppm) standards. Hourly concentrations of near-road NO<sub>2</sub> reached 258 ppb across 40 sites in 2014; however, there were only two occurrences of a daily 1-hr maximum NO<sub>2</sub> concentration above 100 ppb (the level of the hourly NO<sub>2</sub> standard). In 2015, hourly concentrations of near-road NO<sub>2</sub>, monitored at 61 sites in 55 urban areas, reached 154 ppb. Only 0.0015% (n = 5) of hourly NO<sub>2</sub> observations in 2015 exceeded 100 ppb. The highest annual NO<sub>2</sub> average recorded in 2015 (29.9 ppb) occurred at the Ontario site located along I-10 in the Los Angeles, California, area and was below the level of the NO<sub>2</sub> annual standard (53 ppb); in 2014, the highest annual mean NO<sub>2</sub> was also observed in Los Angeles at the Anaheim site (27.1 ppb). In 2014, sites in Cincinnati, Indianapolis, and Louisville recorded annual average PM<sub>2.5</sub> concentrations at or above 12 μg/m<sup>3</sup> (the level of the annual standard). There were 15 occurrences in 2014 of 24-hr PM<sub>2.5</sub> concentrations above the NAAQS level of 35 μg/m<sup>3</sup>. Annual average PM<sub>2.5</sub> exceeded 12 μg/m<sup>3</sup> at near-road sites in five urban areas in 2015, and there were 33 days across 12 near-road locations with 24-hr PM<sub>2.5</sub> concentrations above 35 μg/m<sup>3</sup>. Across the near-road monitoring network, annual average PM<sub>2.5</sub> concentrations did not have a significant relationship with traffic volume or distance between the monitor and the adjacent roadway; rather, variations in PM<sub>2.5</sub> were mostly driven by urban-scale PM<sub>2.5</sub>, with a typically small “increment” above urban-scale concentrations due to a site’s proximity to the roadway. We estimated this increment, i.e., the difference between near-road PM<sub>2.5</sub> concentrations and the concentrations at sites in the urban area of each near-road monitor, to be on average 1.2 μg/m<sup>3</sup> (σ = 0.3 μg/m<sup>3</sup>), with a range of -1.2 μg/m<sup>3</sup> to 3.1 μg/m<sup>3</sup> across the 26 sites (four of which had a negative increment). The near-road increment is on average 13% of the near-road PM<sub>2.5</sub>, and 15% of the near-road PM<sub>2.5</sub> for sites within 20 m of the roadway.

35 **Keywords**

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