

Overview of the NO₂ Pilot Study Results

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Acknowledgments

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- Members of the NO₂ near-road monitoring workgroup



Pilot Study Overview

- The pilot study:
 - Allowed state and local air monitoring agencies to evaluate, improve, and document (with EPA) the near-road monitor siting process outlined in the TAD, and
 - Provided first-hand experience in the full installation of a near-road monitoring station to share with the air monitoring community
 - 5 Pilot CBSAs conducted NO₂ saturation monitoring
 - Albuquerque, Baltimore, Boise, Miami, and Tampa
 - Boise and Miami installing permanent near-road stations
 - EPA conducting AERMOD/MOVES modeling of select road segments

Saturation Monitoring Study Design

- Passive sampling devices (PSDs) used for NO₂ measurements
 - up to 10 locations within each city
 - 1-week exposure periods (Mon.-Mon.)
 - 5 to 9 weeks of sampling
- Prioritized list of road segments selected using the TAD process
 - traffic volumes
 - fleet mix
 - congestion patterns
- Target road segments were then selected using additional factors outlined in the TAD
 - Roadway design
 - Terrain
 - Meteorology
 - Logistics (access, safety, etc.)



Saturation Monitoring Study Design

- Select road segments contained multiple PSDs
 - collocated sampling for QA
 - identify pollutant gradients from the road
 - assess vertical height influence



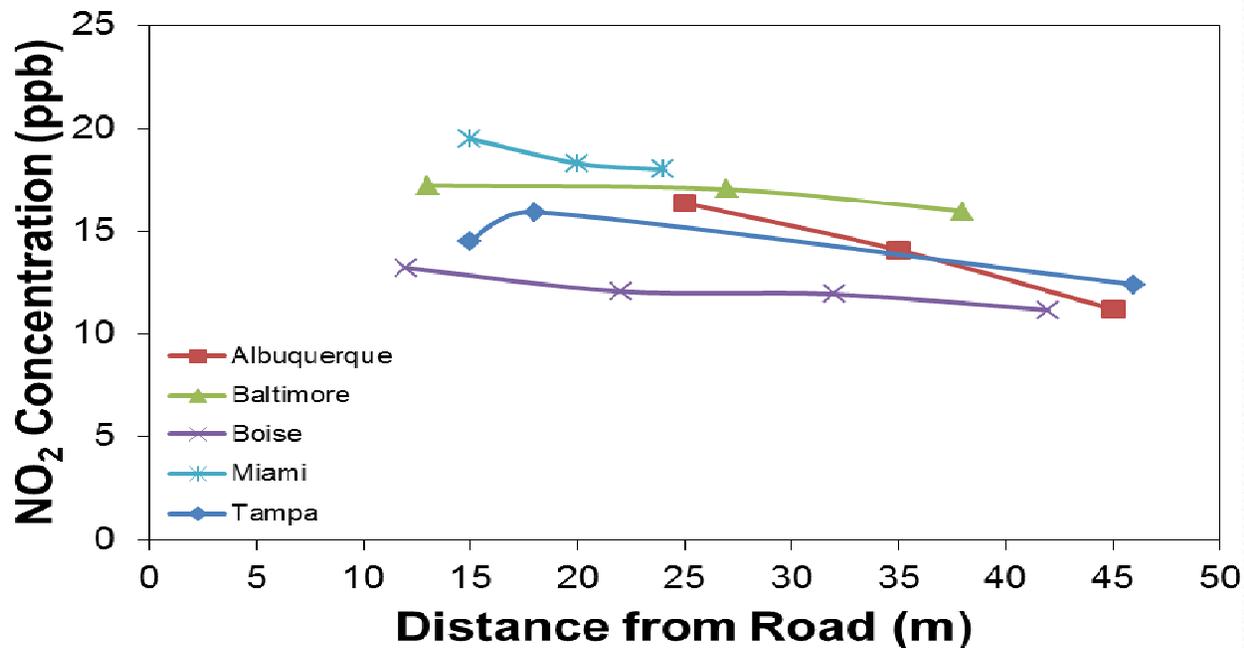
PSDs: Advantages and Disadvantages

- Passive samplers – advantages
 - Inexpensive, compact, portable
 - Useful for measuring pollutant concentrations over varying time frames (days to weeks)
 - Useful for assessing average spatial variations in pollutant concentrations
- Passive samplers – disadvantages
 - Do not provide information for trace levels of pollutants
 - Do not provide short time frame measurements
 - Available pollutant list relatively limited



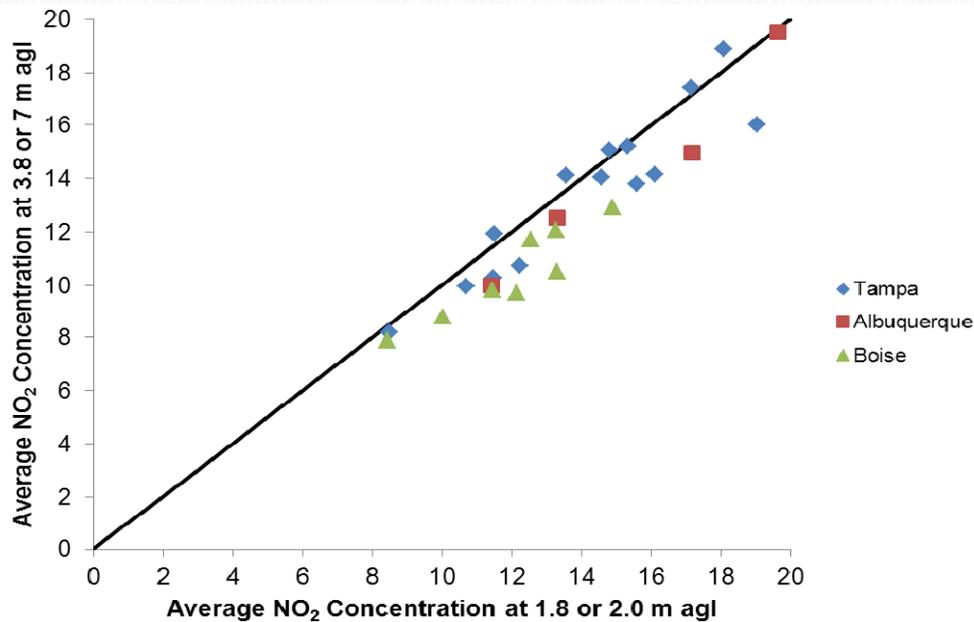
Key Findings: Distance to Roadway

- Concentrations highest closest to the roadway
- Concentrations declined with distance from the road.
- Tampa was the only exception (roadway design influence)



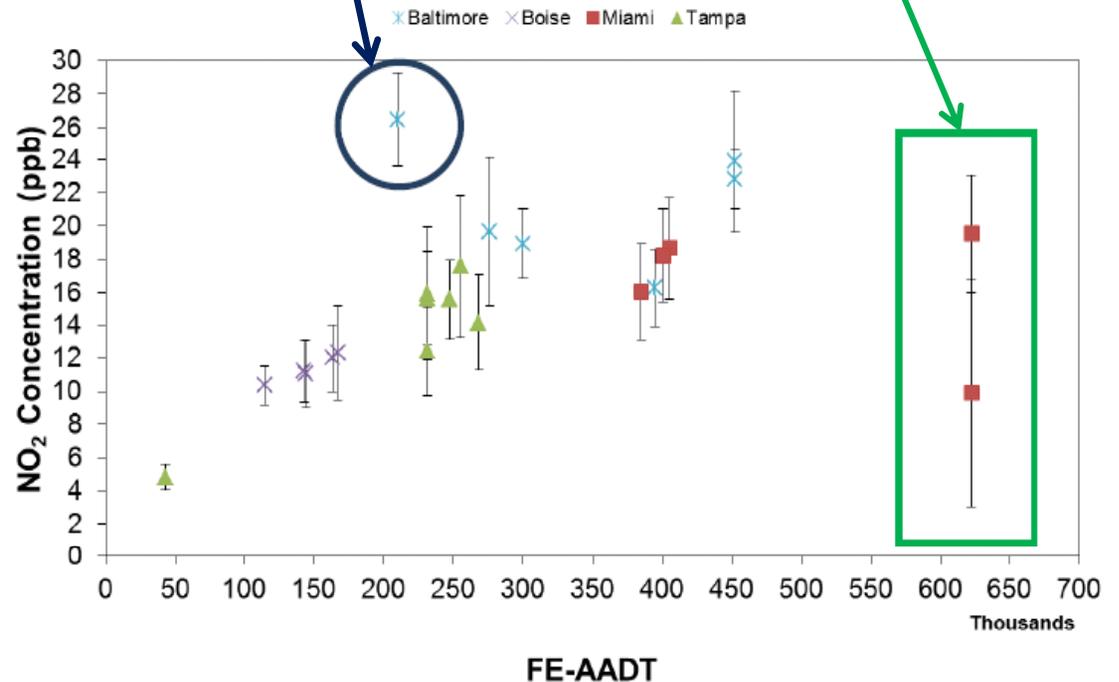
Key Findings: Vertical Height

- Concentrations highest closest to the road
 - For recommended siting criteria (e.g. at-grade, no obstructions), the concentrations are highest nearer to ground-level
 - For elevated road in Tampa, concentrations variable



Key Findings: Traffic Volume

- Higher NO₂ levels with higher FE-AADT
- Meteorology/other sources also influence results





Key Findings

- **Conceptual model.** In general, the near-road NO₂ concentrations measured during this pilot study met the expectations and assumptions outlined in the TAD.

NO₂ concentrations tended to be highest at locations nearest the roadway (both horizontally and vertically) and near the roads with the highest daily traffic (adjusted for heavy-duty traffic).

- **Distance to roadway.** NO₂ concentrations are highest at the sites closest to the roadway; concentration gradients existed but were relatively shallow.
- **Sampling height.** Measurements at different heights showed that concentrations were generally highest at whatever sampling height was closest to the roadway.

Key Findings

- **Traffic volumes and fleet mix.** NO₂ concentrations were typically highest near the road segments with the highest AADT and FE-AADT.
- **Roadway configuration.** NO₂ concentrations were affected by sampler placement relative to on-ramps (with accelerating traffic), truck-only lanes, and elevated roadways.
- **Meteorology.** Wind direction was an important factor in interpreting NO₂ concentrations in Broward County. Sites on the predominantly downwind side of the roadway exhibited higher average NO₂ concentrations

The cities experienced a range of siting issues—from relatively easy access to near-road sites to a lengthy permitting process—which helped inform the TAD.



Lessons Learned

- As recommended in the TAD, states should attempt to place their permanent monitoring site as “near as practicable” to the edge of highly trafficked roads.
- PSD sampling was relatively straightforward and low cost.
 - The pilot study seemed to help the monitoring agencies gain confidence in their site selection process and choices.
- While NO₂ concentrations varied from week to week at a given site, the spatial pattern of concentrations generally remained the same.
 - Additional sampling (nine weeks vs. five weeks) did not provide additional insight or change any conclusions.

The pilot study suggests that the site selection process documented in the TAD will lead to an appropriate monitoring location.