

DRAFT – 8/24/10
Near-road Monitoring Pilot Study Objectives & Approach

In January of 2010, the EPA promulgated monitoring requirements (see attached pdf of the Federal Register for the Primary National Ambient Air Quality Standards for Nitrogen Dioxide; Final Rule, with revised monitoring language beginning on page 6435 of the notice) in support of the revision to the primary NO_x National Ambient Air Quality Standards (NAAQS). As part of the rulemaking, certain state and local air agencies are required to operate near-road NO₂ monitors, which are defined in 40 CFR Part 58, Appendices D and E. As part of this rulemaking, in response to public comment, EPA committed to creating near-road monitoring guidance materials which would be supplemented by a near-road monitoring pilot study to assist state and local air monitoring agencies in the implementation of required near-road monitoring stations. This document is intended to present and elaborate upon the primary objectives for the near-road monitoring pilot study. EPA intends for this pilot study to provide real-world experience in near-road monitoring implementation and also inform the forthcoming near-road monitoring guidance documentation.

Pilot Objectives

The primary objective of the near-road monitoring pilot is to allow EPA, state, and local air monitoring stakeholders to evaluate, improve, and document the near-road monitor siting process. This objective encompasses the main process that state and local air agencies will have to execute when selecting and installing every required near-road monitor. As a result, pilot participants are gathering experience that can then be translated and communicated to all state and locals who will be going through this process in the near future. The pilot study process may provide clarity or answer the following:

1. State and local agencies must consider fleet mix, roadway design, congestion patterns, terrain, and meteorology in the site selection process. Is there a relative priority amongst these factors? Should (could) the near-road monitoring pilot inform whether there are mechanisms by which to prioritize or ‘weight’ these factors in the site selection process?
 - a. For example, how may a state or local agency utilize fleet mix information (which quantifies passenger car and heavy-duty truck volumes on individual road segments that will likely affect pollutant emissions differently) in their site selection process?
 - b. What other different types of data might be available to states (e.g., Annual Average Weekday Traffic, Level of Service, etc.), how current is such data, and what do they mean, or, how are they useful?
2. What approach should be used to balance between strictly satisfying minimum monitoring requirements (such as those for near-road NO₂ monitors) and serving multi-pollutant monitoring objectives? A prime example includes evaluating how near-road monitors might be sited in a way to accommodate monitoring in a location of greatest interest/need for NO₂, CO, and PM_{2.5}.

3. Can the pilot be supportive or informative to modeling needs, and/or can the pilot be supplemented by existing modeling capabilities?
4. How effectively do the factors and available data described above support the identification of the maximum concentration location(s) available within a CBSA?
 - a. What is the likely variation between maximum concentrations expected at the candidate locations identified using the above factors? How can a state or local agency utilize modeling and/or saturation monitoring techniques to further characterize candidate near-road locations?
5. How will states mitigate issues on worker/traffic safety in near-road site selection, installation, and on-going operations?
 - a. E.g., will air agencies need to ensure that monitoring stations are placed behind guardrails, or that they will need to work to have guardrails installed as appropriate near their near-road monitoring stations?
 - b. E.g., what are any given state's existing set-back rules? Are there issues with driver sight lines because of a monitoring station?
6. What other government agencies will state and local air agencies need to communicate or collaborate with to achieve success in the selection and installation of near-road monitoring stations?
7. Can the pilot suggest an approach by which state and local agencies, and EPA, can verify that the most logical and appropriate sites are being selected for the permanent near-road monitoring stations where AADT, fleet mix, roadway design, congestion patterns, terrain, and meteorology have been considered?

Pilot Study Approach

The pilot study objectives can likely be met with a two-pronged approach. The first prong could be considered as a quasi-saturation monitor based evaluation, specifically to look at how a city could evaluate the effects of fleet mix, roadway design, congestion patterns, terrain, and meteorology on pollutant concentrations within their particular CBSA. The second prong could focus on the selection and installation of permanent near-road monitoring stations in at least two urban areas, using information gained as part of the first prong. Between these two prongs, EPA believes that all of the questions above, as part of the pilot objectives, and questions relating to guidance document preparation will be addressed to some degree. The data collected in the permanent pilot sites and the saturation monitoring studies should be analyzed to meet the pilot study objectives.

The first prong, which may inform the second prong, could focus on deploying 4 or more saturation type monitoring "packages" (where a "package" would be mountable, mobile, or otherwise easy to deploy multi-pollutant measurement devices) along different road segments in an area to more directly ascertain how one or more of fleet mix, roadway design, congestion patterns, terrain, and meteorology may affect pollutant concentrations. Subsequently, the

information extracted from this pilot may have more useful information 1) where permanent stations part of the prong 2 of the pilot study may be placed, and 2) to provide more information to states on exactly how they can account for all of the above mentioned considerations in their site selection process. This prong of the pilot may be accomplished with non-FRM/FEM methods that are pole-mountable or allow for mobile monitoring. There are passive devices and semi-continuous analyzers available that may be appropriate to use in this prong of the pilot. The near continuous methods would be most desirable since the revised NAAQS is a 1-hour standard and intended to protect against 1-hour peak exposures. However, on a cost basis, passive methods could allow for the number of segments that could be evaluated at one time to be significantly increased. Under the guise of using four or more near continuous monitoring method packages, one specific way to place the individual monitoring packages to address pilot objectives could be to purposefully place monitor packages at roads with specific characteristics including:

- At the highest AADT segment in an area.
- At the road segment with the highest number of heavy-duty truck/bus counts.
- At a road segment with more unique roadway design, congestion pattern, or terrain.
- If feasible, at a lower AADT segment with a similar fleet mix, roadway design, congestion, terrain, and meteorology as the top AADT road segment. This package, compared to the first road segment, could potentially isolate the impact of AADT on concentrations between two road segments.

The second prong of the pilot would focus on establishing long-term near-road monitoring stations that satisfy minimum monitoring requirements resulting from the recent NO_x NAAQS revision. This would include the overall process of identifying a pool of candidate near-road sites and subsequently selecting a site and installing the monitoring station. There are options on what the selection criteria should be for the cities installing a permanent near-road monitoring station. Therefore, this prong may want to try to use information gained from prong 1 of the pilot study, or, if possible, focus on urban areas that have no roads with outstanding heterogeneity with respect to fleet mix, roadway design, congestion patterns, terrain, and meteorology in selecting where permanent type sites may go. Of such urban areas, other metrics for consideration include:

- Large versus small urban areas – Smaller urban areas (≤ 2.5 million) are only required to have one near-road site. Do they have tougher decisions to make than a larger urban area with regard to how to treat variances in fleet mix or any of the other ‘considerations’ that must be made? Should the pilot include a city that is relatively small, but represents the only urban area in a state that will have a near-road monitor? Should this proposed first prong include one large and one smaller urban area?
- Terrain and meteorology – Urban areas with more varied and complex terrain or meteorology may provide an informative experience to share with other states versus urban areas with rather flat or unremarkable terrain or meteorology.
- Urban areas where the state or local air agency may or may not have local/state support, such as a DOT amenable to cooperate in aiding site installations.
- An urban area with an operational NO_x analyzer that is considered representative of the broader urban background. This would provide information on how much higher near-road concentrations are when compared to relative background concentrations in order to identify the road’s contribution.

- An urban area with a DOT or Metropolitan Planning Organization (MPO) with detailed traffic information and project modeling results.

Near-Road Site Implementation and Documentation

The pilot study will also provide information and documentation that will assist states in the implementation of their near-road monitoring sites. These include:

- Data Collection – Where can traffic and other pertinent data be found, which data sources were and were not useful, and what obstacles were encountered?
- Candidate Site Selection and Data Analysis – How was the data evaluated and interpreted in order to select the candidate sites, and how could this process be refined and improved?
- Near-Road Site(s) Selection – When evaluating candidate sites, what unforeseen obstacles were encountered, how accurate were the data collected, and what difficulties were encountered in establishing the site?
- Approvals and Installation – After selecting the site location(s), what approvals were needed and how cooperative were state and local agencies and organizations? Were any obstacles encountered when installing the site, such as safety or electricity access?
- Operation and Maintenance – During the time of operation, were any issues or difficulties encountered such as safety, inconsistent operation, access limitations, etc.?