

NO₂ Primary NAAQS – Proposed Rulemaking

Briefing for CAAAC
October 6, 2009

Office of Air and Radiation
Office of Air Quality Planning and Standards

Overview of Briefing

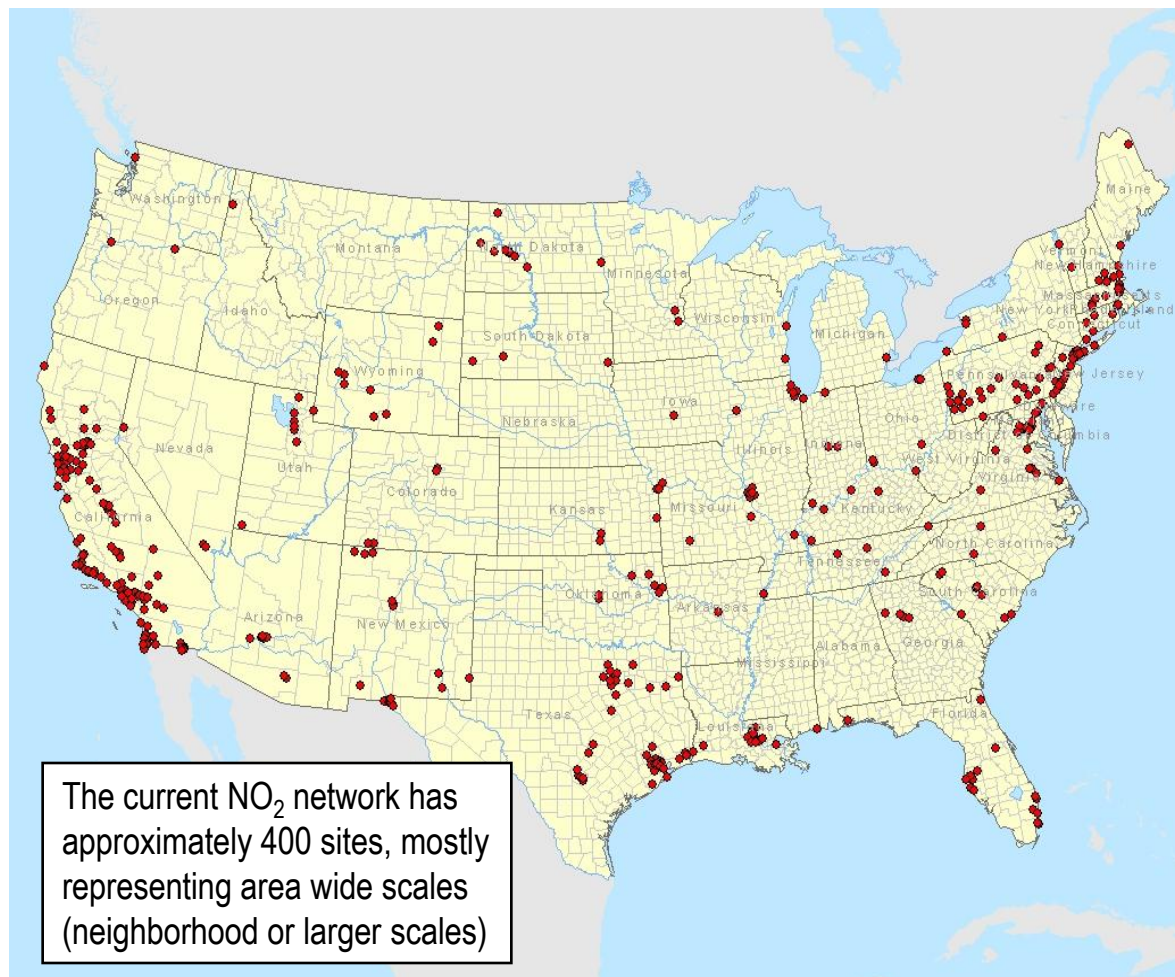
- Background
- Summary of the proposal
- Monitoring Network Design Specifics
- Public comments/perceptions on the proposal

Background

- Current NO₂ NAAQS is an **annual standard** with a level of **53 ppb** and all areas of U.S. are in attainment
- Existing NO₂ monitoring network was designed to measure NO₂ concentrations that occur **broadly across communities**, not the maximum concentrations that can occur anywhere in an area
- Mobile sources are important sources of NO₂, and individuals who spend time on or near major roadways (residence, schools, commuting) can experience **short-term NO₂ exposures considerably higher than measured by current network**
 - Of particular concern for susceptible individuals, including asthmatics, children, and the elderly
 - Concentrations can be 30 to 100% higher near roads than in same area away from road
- **Key U.S. epidemiologic studies** provide evidence for associations between 1-hour peak **area-wide NO₂ concentrations at or above 85 ppb** and increased respiratory-related emergency department visits, hospital admissions
- **Human clinical studies** provide evidence that **individual NO₂ exposures** at and above 100 ppb can increase airway responsiveness in most asthmatics
- REA concluded that risks associated with just meeting current annual standard are **large and can reasonably be judged important from a public health perspective**
 - Substantially lower risks were estimated for a 1-hour standard that limits area-wide NO₂ concentrations to 100 ppb or lower

Current NO₂ Monitoring Network

- The current network was implemented to support an annual standard
- The existing sites are satisfying multiple objectives including:
 - NAAQS compliance
 - assessment of ozone formation and transport
 - health study support
 - Prevention of Significant Deterioration (PSD)



Summary of the Proposal

- **Proposed approach**

- We proposed to retain the current annual standard and to increase public health protection against respiratory effects linked to short-term NO₂ exposure by setting a **new 1-hour standard** reflecting the **maximum allowable NO₂ concentration anywhere in an area**
 - Level: Proposed **80 to 100 ppb** and solicited comment from **65 to 150 ppb**
 - Form: proposed **99th percentile** and solicited comment on **98th percentile**
- In order to have monitors in locations where peak NO₂ concentrations are likely to occur, we also proposed to require a **2-tiered NO₂ monitoring network** that would include...
 - **Near road monitors:** Monitors placed within 50 meters of major roadways
 - **Area-wide monitors:** Monitors placed away from major roadways to measure NO₂ concentrations that occur more broadly across the community

- **Alternative approach**

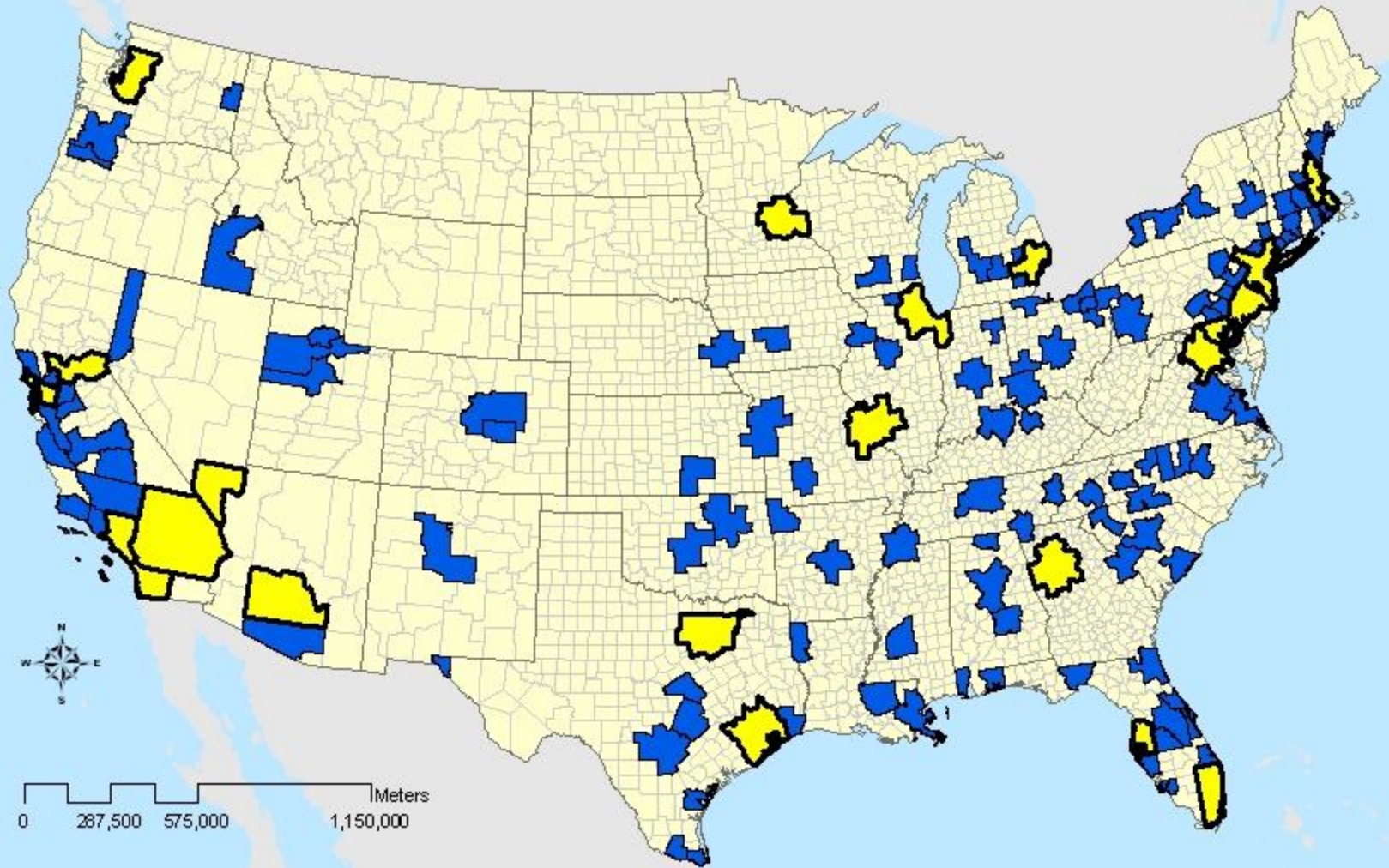
- We solicited comment on setting the 1-hour standard such that it would reflect the allowable **area-wide NO₂ concentrations**
- Under this alternative, we solicited comment on standard levels from **50 to 75 ppb**
- In order to have monitors that measure area-wide NO₂ concentrations, we solicited comment on requirements for monitor placement, including a requirement that monitors be located at some **minimum distance from major roadways**

Network Design Details

- The 1st tier of the network design focuses monitoring for locations of expected maximum hourly concentrations of NO₂ near roads
 - One monitor required in CBSAs with 350,000 people or more (~144 sites)
 - A second monitor is required in CBSAs with 2.5 million people or moreOR
 - Any CBSA that has one or more road segments exceeding 250,000 Annual Average Daily Traffic (AADT) (~23 additional sites)
 - These triggers will result in approximately 167 near-road sites, as proposed
- The 2nd tier of the network design requires “area-wide” monitoring, which is monitors sited to represent concentrations existing at a more broad spatial scale (from .5 to 4 km areas) a.k.a “neighborhood scale”
 - One area-wide monitor at a location of maximum concentration at the neighborhood spatial scale in any CBSA of 1 million or more people (~52 sites)

CBSAs with Required Near-road Sites

- CBSAs with >350,000 Population [1 Near-road Site]
- CBSAs >2,500,000 OR with 250k AADT Road Segments [2 Near-road Sites]

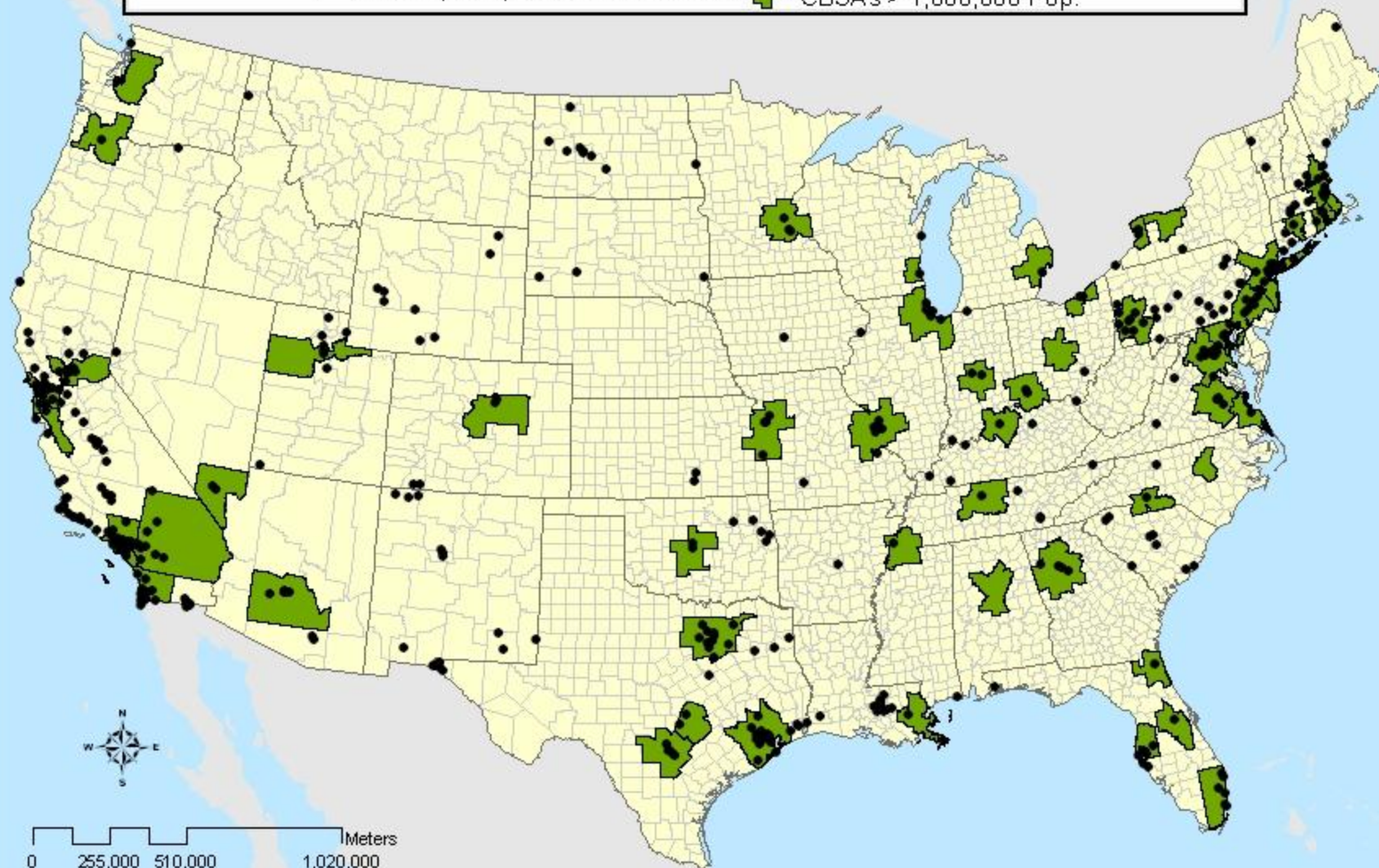


The proposed NO₂ network will be minimally required to have 165 near-road sites in 142 CBSAs.

* Note that Alaska would have 1 near-road site in Anchorage and Hawaii would have one near-road site in Honolulu. San Juan, Puerto Rico would have two near-road sites.

CBSAs with Required Area-wide Monitoring & The Current (2008) NO₂ Network Sites

- Current (2008) NO₂ Network Sites
- CBSAs > 1,000,000 Pop.



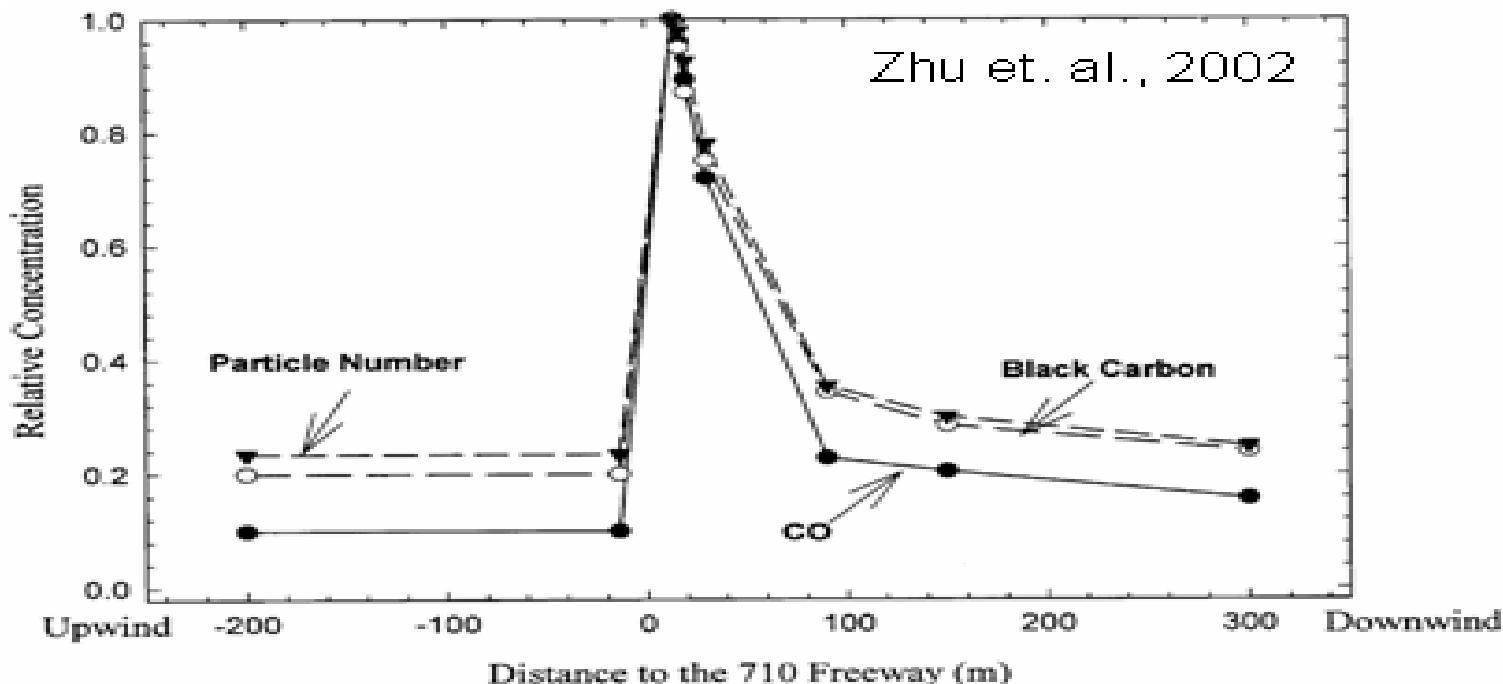
These CBSAs (green) with populations >1,000,000 are required to have one NO₂ monitoring site situated to assess the highest concentrations for the CBSA representing neighborhood or larger sized areas. Many sites in the current NO₂ network are likely to satisfy the proposed area-wide monitoring requirement; however, none are likely to satisfy the proposed near-road monitoring requirements. *San Juan, PR is not shown, but is proposed to have one area-wide monitoring site.

Near-road NO₂ Site Selection

- As proposed, near-road monitoring sites “shall be selected by ranking all road segments within a CBSA by AADT and then identifying a location or locations adjacent to those highest road segments where maximum hourly NO₂ concentrations are expected to be highest...”
- EPA notes in the preamble text that for site selection, agencies may utilize forms of quantitative analysis including modeling, data analysis, and/or saturation studies
- EPA provides examples of certain factors situations that might lead an agency to the appropriate locations: proximity to interchanges, fleet mix (diesel vs. light-duty), rapidly accelerating traffic, grade-climbing traffic, local terrain and meteorological effects
- If a pool of site candidates exist, EPA encourages selection of sites with relatively greater population exposure

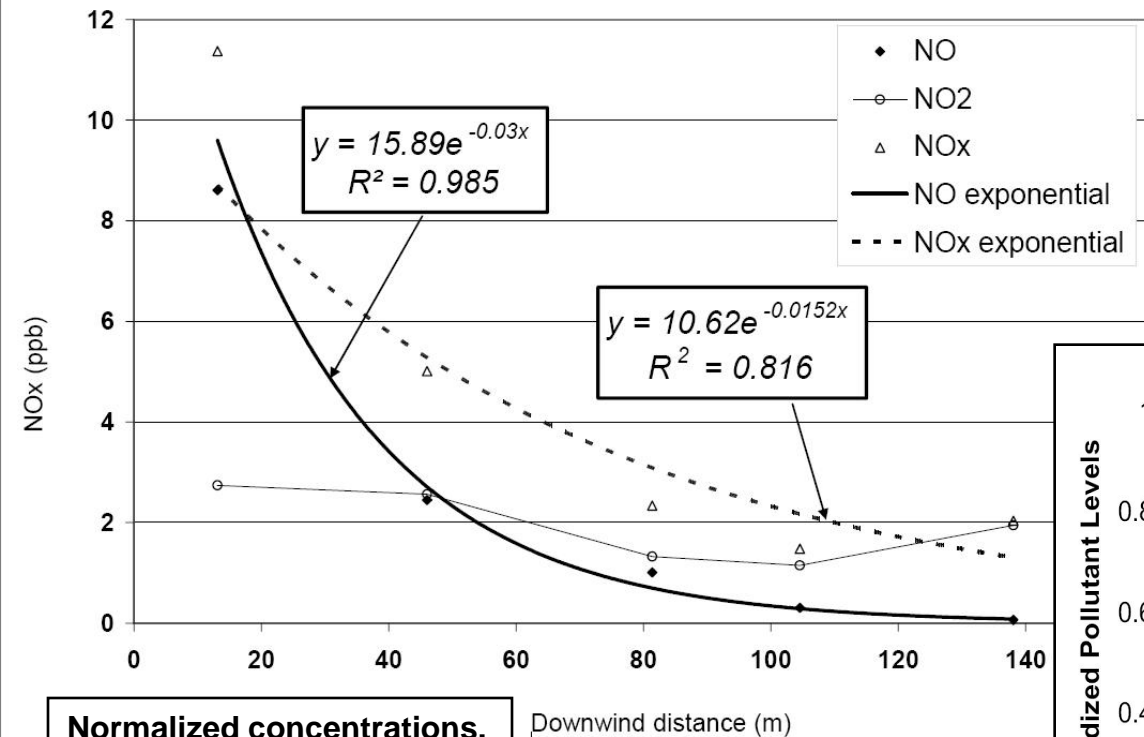
Monitor Siting: Defining What is “Near-road”

- Mobile source pollutants generally decay exponentially with distance from the road, although linear approximations may be valid within the first 100 meters (slide I added on the next page shows ~5-12% decrease)
- Literature suggests that primary emitted pollutants decay back to near-background levels within 100 to 300 meters from roads, depending on local conditions



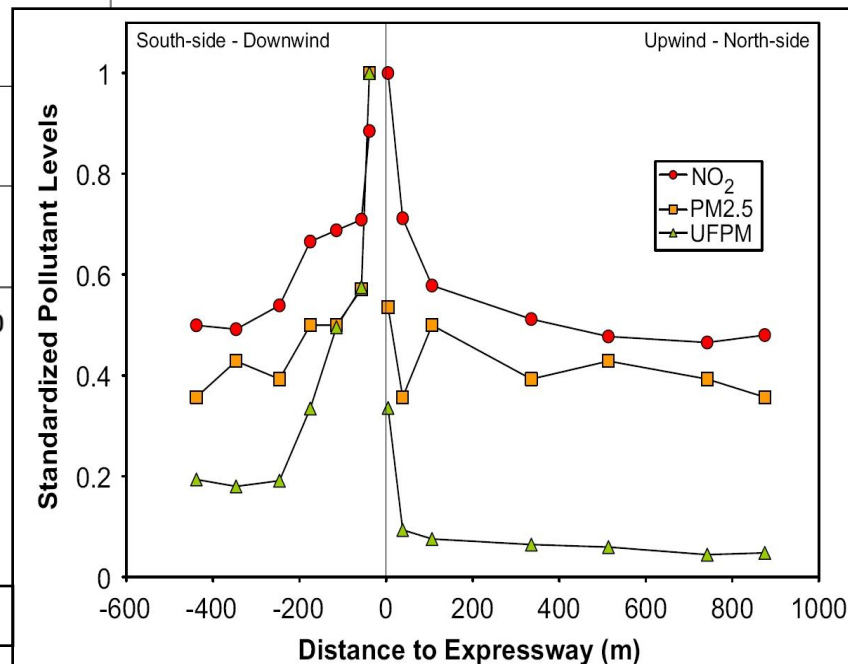
Note:
NO₂ isn't included here.

- Multiple articles have reviewed NO₂ behavior in the near road, suggesting general ranges of influence
- EPA used this information in determining how to propose siting requirements

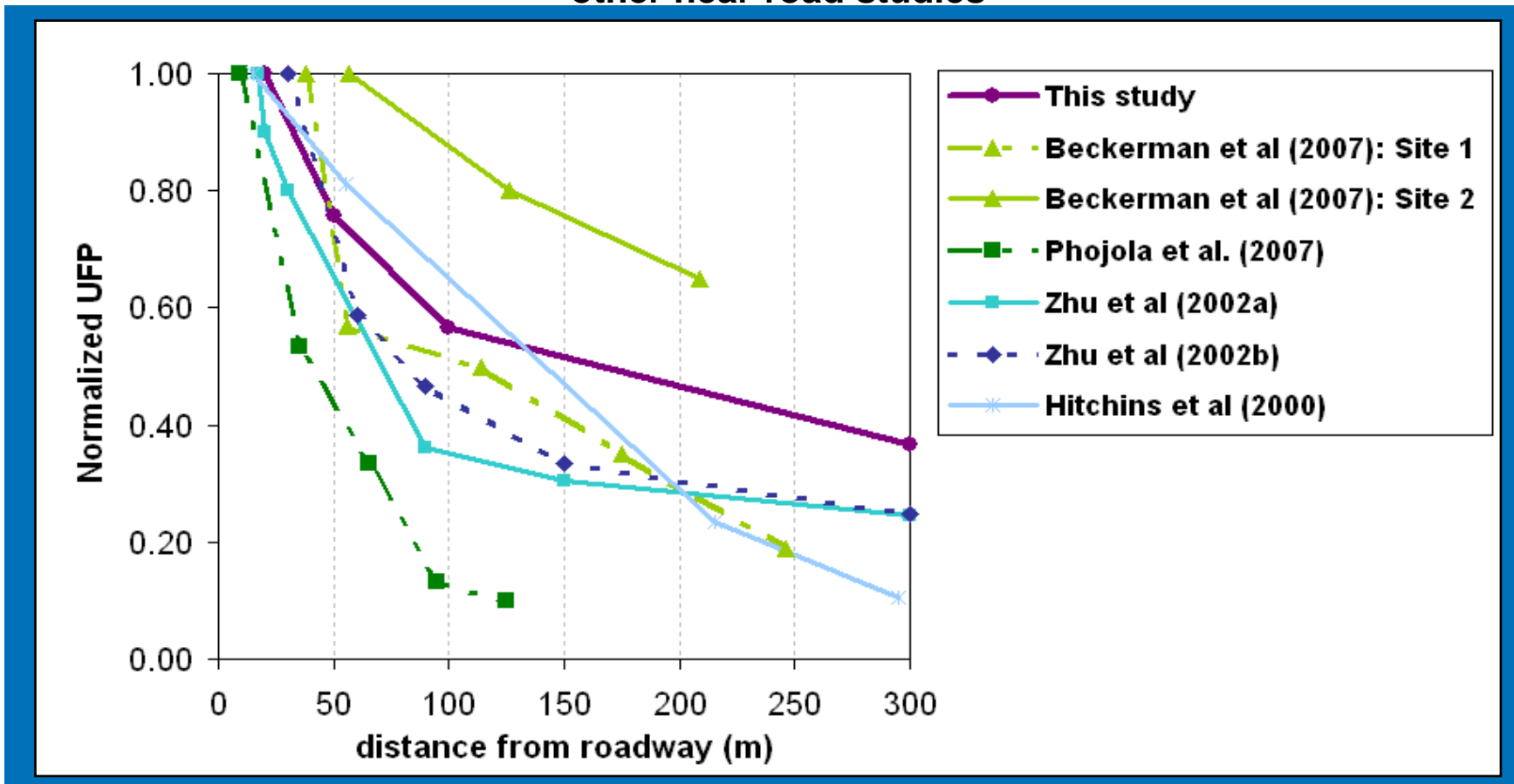


Normalized concentrations.
Clements, et.al, 2007

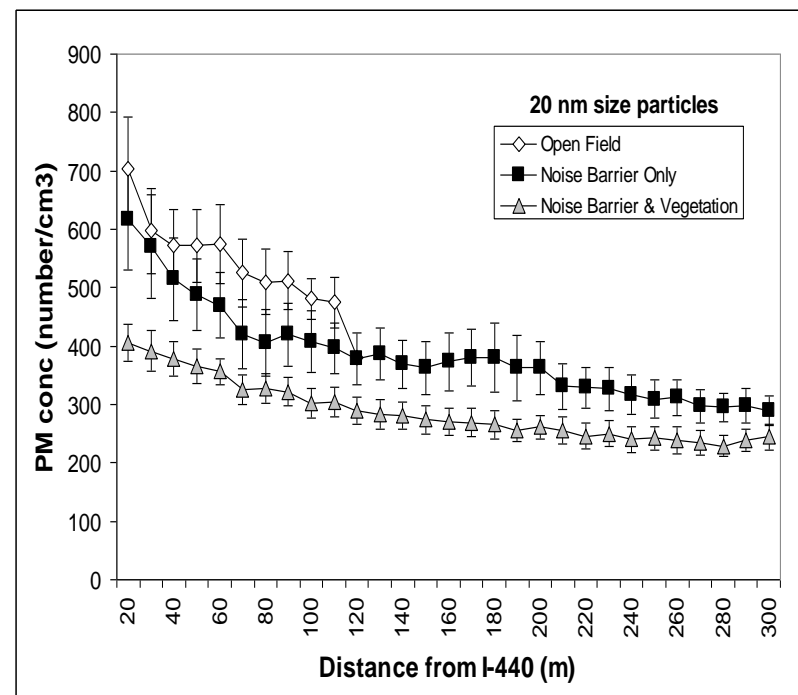
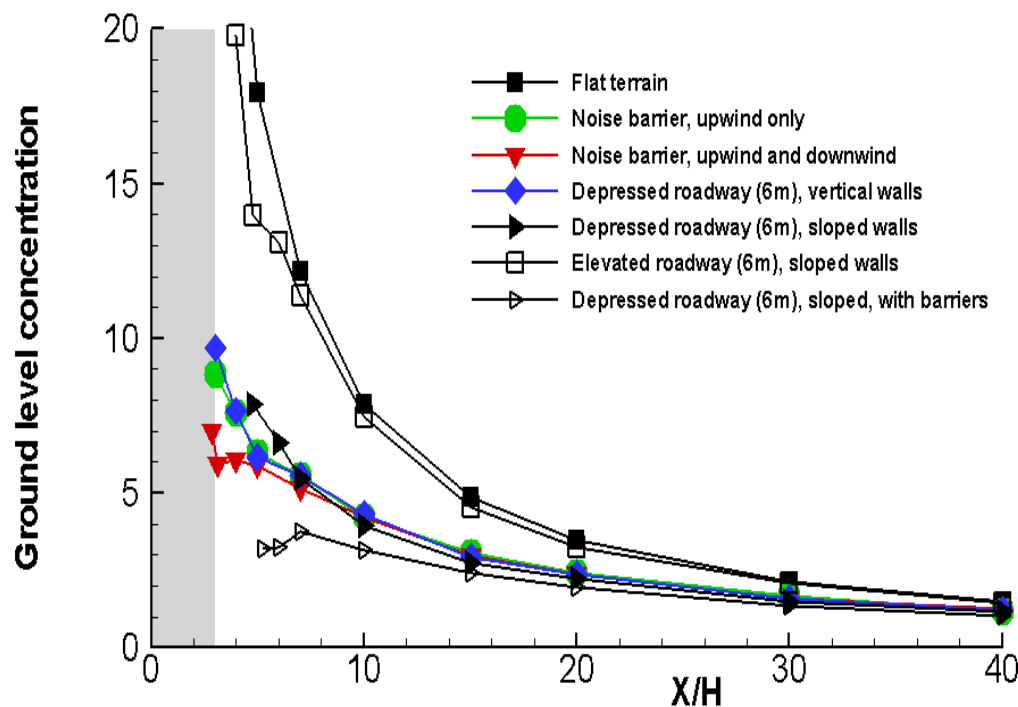
Beckerman et.al., 2008



Normalized UFP results from Hagler et al. (January 2009) and other near-road studies



- Near road obstacles (e.g. noise barriers, vegetation, and road cut sections) should be avoided, if possible
- These structures can channel pollutants in along-the-road wind conditions or affect air flow, hindering the identification of a max concentration location



Proposed Near-road Siting Criteria

- In conjunction with selecting the target road segment, monitoring agencies need specific probe siting criteria
- EPA proposed, based on evidence from literature and considering the logistics of real-world monitoring, that near-road NO₂ monitor probes “...is no greater than 50 meters away, horizontally, from the outside nearest edge of the traffic lanes of the target road segment..”
- EPA proposed that the monitor probe be located within 2 to 7 meters above the ground
- EPA also proposed to allow a probe to be placed on the interior side of any noise barriers, although we note this isn't ideal

Network Implementation

- NO₂ NAAQS to be signed (court ordered) on January 22, 2010

IF the EPA administrator were to promulgate the NO₂ proposal as is:

- State and local air agencies will have to submit their monitoring plans, which will address near-road monitors by July 1, 2011
- State and local air agencies would have to have the near-road network installed and operational by January 1, 2013
- EPA recognizes that it will need to issue guidance on the process of selecting locations for near-road sites and on meeting siting criteria
- EPA hopes to have a handful of State or local monitoring agencies step up early in the implementation process to provide examples on best approach and practices to implementing the near-road network

Near-road Monitoring Futures

- In developing the near-road monitoring concept for NO₂, EPA recognized the potential an appropriateness to consider future needs
- EPA believes that if a near-road monitoring network materializes from the NO₂ NAAQS review, the network can become a multi-pollutant in the future
- It is possible that other criteria pollutants could find a home in the near-road network, particularly CO, and possibly PM_{2.5}
- Non-criteria pollutant monitoring would also be feasible at these sites, including PM speciation, air toxics, ultrafine PM, black carbon, and even ammonia
- EPA believes that the ‘as proposed’ siting criteria are appropriate to meet the monitor siting needs these other pollutants in a near-road environment

Public Comments on the Proposal

Overview of Public Comments


- **Current Standard**
 - CASAC, environmental/public health groups, and most states agree with the proposed conclusion that **the current standard alone is not requisite to protect public health with an adequate margin of safety**
 - Some industry groups commented that **revision of the current standard is not justified** at this time based largely on uncertainties in the scientific evidence
- **Approach** to setting a new 1-hour standard and establishing a 2-tiered monitoring network
 - CASAC, environmental/public health groups, and most states **support the establishment of a new 1-hour standard and the need to obtain better information on NO₂ concentrations around roads**
 - Groups disagree regarding the most appropriate approach
 - Industry does not support the establishment of a new 1-hour standard or the proposed monitoring network based largely on uncertainties in the scientific evidence
- **Standard level and form**
 - CASAC and some States **support our proposed ranges of levels** and recommend a **98th percentile form** under the proposed approach
 - Environmental/public health groups **recommend a lower level with a more stringent form** (e.g., 99th percentile or no exceedance)
 - Industry groups **recommend a higher level** and generally recommend a **98th percentile form**

CASAC Comments on Approach

- CASAC **strongly supports the establishment of a new 1-hour standard** and the need to obtain **better information on NO₂ concentrations around roads**
- CASAC consensus was that we **need to monitor near roads**, but CASAC members were **split regarding the most appropriate approach**
 - Regardless of approach, they recommended that we consult the Ambient Air Monitoring Subcommittee to inform development of a near-road monitoring network
- The **majority of CASAC members favor the proposed approach** noting that this approach would be more effective than the alternative at limiting roadway-associated exposures
- A **minority of CASAC members favor the alternative approach**, combined with the establishment of a **research-oriented near-road network** noting...
 - That epidemiologic studies did not use near-roadway exposure data
 - The limited information available at this time to inform the design of a national roadside monitoring network

Other Public Comments

- Most environmental and public health organizations strongly support the proposed NAAQS and near-road monitoring
- Mixed response from State, Local, and tribal air monitoring groups and agencies.
 - These folks mostly support near-road monitoring, but are divided on:
 - 1) Specifics on monitor requirement triggers and siting, and
 - 2) Whether EPA should run a research network (non-regulatory) or an actual regulatory
- Industry generally didn't support the proposed NAAQS, nor the monitoring in many cases due to association



Questions?