Questions regarding the near-road monitoring pilot study

12. EPA and NACAA will select the locations for permanent sites that are part of the near-road pilot study based on which state or locals volunteer to participate and can process grant funds in a timely manner to deploy equipment. From this pool of volunteers, selection should be made on certain attributes that provide the best potential to fulfill pilot study objectives. In the attached draft white paper, EPA and NACAA have proposed some potential criteria for consideration in selecting where the fixed, permanent stations should be located. These considerations include choosing a large and a relatively small urban area based on population, an area with varied or complex terrain, an urban area with an operational NO_X analyzer representative of neighborhood or larger spatial scales for comparison to the near-road NO_X analyzer, and an urban area with a cooperative (or non-cooperative) Department of Transportation. Does the Subcommittee agree with these considerations? Further, are there other considerations that should be evaluated in selecting pilot cities to house permanent near-road monitoring stations as part of the pilot study?

Available funding constrains this NR pilot to only 2 or 3 sites unless EPA leverages existing sites and infrastructure that are NR-ish, possibly considering cities that are already conducting multi-pollutant assessment at multiple locations (Atlanta and New York City for example). Areas with existing "urban background" sites that have relevant NR pollutant measurements in place (that may include ozone for a measure of total urban oxidants) are desirable to assess the NR excess for key pollutants. The range of variables in this charge question can not be fully evaluated with only a few sites. In reality, giving the severe constraints of funding and timing for the pilot, the siting decision may be driven largely by which S/L agencies have the resources to support the pilot work and where they can find and deploy a reasonable site quickly. With only 2-3 sites, it may be appropriate to choose "generic" sites (avoiding extremes of topography etc.) that are most likely to represent a large fraction of the final network and are near the middle of the 0-50 meter distance from the road (e.g., ~ 20-30 meters) and have HDD as a significant fraction of traffic. Reliance on AADT or an MSA's population are useful inputs but often may not be good indicators of maximum 1-hour NO2.

The pilot fixed sites are not likely to inform how a wide range of siting characteristics would effect 1-hour NO2 concentrations. We might come closer to that goal by focusing the pilot on NO2 saturation studies with less emphasis (e.g. funding) on the fixed sites, but that is not a practical solution to the other goals of this pilot. There is some evidence suggesting that core urban zones not at large roadways may have the highest 1-hour NO2 values for some urban locations; saturation studies are ideal for assessing these sites. Cooperation of the local DOT may be useful for local traffic pattern characterizations. It may be worth encouraging academic or private sector groups to add in-kind supplemental measurements if that does not create multi-organization logistical issues. Finally, EPA,

ARB, and several research groups have mobile monitors that could be deployed to quickly assess potential locations of highest 1-hour NO2 concentrations.

13. **EPA and NACAA have proposed that at least two urban areas should have permanent near-road monitoring stations (that would fulfill NO_2 near-road monitoring requirements) implemented for the pilot study. Please comment on the *minimum* equipment/pollutant measurement complement that should be deployed at each site and also the *ideal* equipment complement that each site should or could have, respectively. Specifically, what pollutants (e.g., NO2, NOX, NO, CO, PM (Ultrafine, 2.5, and 10), black carbon, air toxics (such as benzene, toluene, xylene, formaldehyde, acrolein, or 1,3, butadiene) and ammonia) and other information should the pilot study measure or gather at the fixed, permanent monitoring stations, and by what methods? This list should be in priority order, as feasible, and can include any NAAQS or non-NAAQS pollutant by any method (FRM/FEM and/or non-reference or equivalent methods), any particular type of other equipment for gathering supporting data such as meteorology or traffic counts.**

The majority of Subcommittee members support the deployment of at least two pilot study sites with a minimum measurement suite of NO2/NO/NOx , black carbon, CO, meteorological parameters, and traffic counts; and ideally the pollutant measurements tabulated in the response to Charge Question #2. Measurements for vehicle class and speed distributions are also encouraged, especially if a screening tool will be developed because this information can be used in its evaluation. If an FEM-approved photolytic NO2 monitor is available, its deployment along with an FRM NO2 monitor at each site is strongly encouraged. Other Subcommittee members support the deployment of a single site with more extensive measurements to provide insights into key science questions about NO2. This would require a longer time commitment than currently programmed for the pilot study, but would ultimately better inform the regulatory process. Additional pilot study objectives could include the evaluation of passive sampling methods to be used in the saturation studies.

14. **EPA and NACAA have proposed four to five urban areas to have saturation monitoring, using either passive devices and/or continuous/semi-continuous saturation type multi-pollutant monitoring packages (i.e., several types of monitors in one mountable or deployable "package"). Please provide comment on:**

    a. **The pollutants that should be measured with the saturation devices at each saturation site.**

    b. **The number of saturation devices per pollutant, both passive and/or continuous/semi-continuous, that may be deployed in each pilot city.**

c. Whether placing saturation monitoring devices near certain road segments should include, at a minimum: 1) the highest AADT segment in an area, 2) the road segment with the highest number of heavy-duty truck/bus counts, 3) at a road segment with more unique roadway design, congestion pattern, or terrain in the area, and 4) if feasible, at a lower AADT segment with a similar fleet mix, roadway design, congestion, terrain, and meteorology as the top AADT road segment in the area.

The Subcommittee members expressed a wide range of views on the feasibility, ideal configuration(s) and potential usefulness of including a saturation monitoring component in the proposed pilot study. The pollutants sampled, number of sites per city, the number of cities and the kinds of sites for sampling need to be considered collectively, and in light of the limited budget and very short time frame available if the results are going to be of any use to the states in the establishment of permanent near-road sites. The kinds of sampling locations recommended by EPA and NACA are reasonable, but may be overly prescriptive, considering uncertainties in the kinds of sampling approaches that could actually be implemented.

The simplest possible approach might be limited exclusively to the use of passive samplers and focused on NO_2-only using Ogawa-type passive devices. Disadvantages of this approach include the single pollutant focus and longer-term cumulative nature of the resultant data. Assuming there are reasonable correlations between peak hourly concentrations and long term averages (as there have been at near-road sites in the UK), the sample aggregation of passive samplers may not be a major problem. Advantages of this simple approach include the very minimal siting constraints, the low (sampler, labor and analytical) cost per sample, which would allow deployment at a much larger array of locations, and the current availability of units with well characterized performance specifications.
The more complex approach suggested by EPA would attempt to develop a portable compact "package" of active, continuous samplers for multiple pollutants of interest, including NO_2, CO, $PM_{2.5}$. Advantages include the ability to characterize and compare short-term hourly peak concentrations for different pollutants at different kinds of sites. Disadvantages include anticipated high cost per unit (fewer cities and sites), more constraining siting requirements (power, security), unproven track records for data quality, and anticipated time delays for equipment procurement, testing and field deployment.

A third approach "intermediate" that the subcommittee recommends considering would be to combine passive samplers with timed, battery operated pumps which would draw a fixed volume of air during through a small chamber housing containing passive NO_2 samplers (and possibly other passive samplers for NO, NOx , BC, O_3) during specific time periods such as the morning rush hour(s) and afternoon hours of expected maximum secondary formation. The sample pump would improve the sensitivity and reduce the

sample variability compared to purely passive devices, and would retain the advantages of relatively low cost and flexible siting locations of the passive samplers.

One possible alternative to use of saturation samplers at fixed locations would be to employ mobile sampling platforms to explore spatial and temporal patterns for multiple pollutants. While the high costs of such units precludes their development with available pilot study funds, it is possible that some states may already have such mobile units available, and the committee recommends that their use be considered as an alternative to fixed site sampling in locations where such units may be available.