9 February 2009 Preliminary Review Comments from CASAC AAMMS on the Ozone Monitoring Issues related to the Revised NAAQS

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Urban Network Design Requirements

1. *Considering the ozone minimum monitoring requirements that are already promulgated through 40 CFR Part 58, is the considered change to these requirements sufficient to ensure a minimally adequate network in urban areas?*

Figure 1 of Attachment 2 shows that there are many populated but unmonitored areas. Many of these areas have experienced substantial population and traffic growth, especially in the western and southeastern U.S. There is ample evidence that O_3 is transported over long-distances, as well as being locally generated, and that elevated concentrations can be found nearly everywhere (Bertschi and Jaffe, 2005; Choi et al., 2008; Dabdub et al., 1999; Goldstein et al., 2004; Guttorp et al., 1994; Hudman et al., 2004; Rao et al., 2003; Rosenthal et al., 2003; Spicer et al., 1979; Wolff et al., 1977). Elevated O_3 can also be generated by non-urban sources such as plantlife (Marr et al., 2002; Pun et al., 2002; Tao et al., 2003), fires (Bertschi and Jaffe, 2005; Preisler et al., 2005), and livestock (Howard et al., 2008). It is entirely appropriate to lower the population threshold for monitoring to protect urban public health.

2. *We are considering a timeline that would require newly required ozone monitors to be operational no later than January 1, 2011, based on the expectation that final rulemaking will be completed in 2009. Is this schedule appropriate or should EPA consider providing an additional year for new monitors to be deployed (or relocated)? What would be the advantages or disadvantages of a staggered deployment schedule?*

Maximum flexibility should be allowed for the addition of monitoring locations. It is better to: 1) thoroughly evaluate the potential measurement locations, 2) procure and install the best equipment, 3) train operators in its use, and 4) have an adequate shakedown period than to rush the process. It often takes a year or more to obtain the funding, permits, and infrastructure when a new air quality site is installed.

Non-Urban Network Design Requirements

1. *We are considering a new requirement that each State operate a minimum of three non-urban ozone monitors to meet certain objectives (described above). Considering the stated objectives of the non-urban ozone monitoring requirements, is three required monitors per state sufficient?*

It is not clear whether or not this would require three monitors in addition to those identified in Figure 2 of Attachment 2 or would include those monitors. Perhaps columns could be added to Table 2 of Attachment 2 that would include the number of current monitors in each state that are: 1) federal lands with sensitive ecosystems; 2) small towns (micropolises?); and 3) non-urban locations with expected high concentrations. Would this also include existing monitors from non-compliance networks (e.g., the National Park Service's 2B O_3 monitors http://www.nature.nps.gov/air/Studies/portO3.cfm)? Looking at the large differences in areas of different states, the complex terrain in some states as opposed to others, and the existing densities of monitors in Figures 1 and 2 of Attachment 2, it would seem that a more refined allocation of monitoring locations based on a conceptual model of O_3 precursor locations, formation potential, and transport corridors might be more useful than an allocation of three monitors per state. area.

2. *What factors should be considered in the siting of ozone monitors to assess impacts on ozone sensitive vegetation in national parks, wilderness areas, and other ecosystems?*

Factors for measurement location should include: 1) presence of species susceptible to damage (Legge et al., 1995; Miller and McBride, 1999; Musselman et al., 2006; Paoletti, 2006; Prinz, 1985); 2) potential for high O_3 levels (transport, upslope/downslope flows, local generation) (Lee et al., 2007; Wager and Baker, 2006); and 3) logistics and cost-effectiveness. It might be more logical and cost-effective to extend the NPS network to additional IMPROVE (http://vista.cira.colostate.edu/views) sites where some infrastructure already exists. It would also be useful to think "beyond compliance" (Chow and Watson, 2008) and not require a full-scale compliance monitoring site at some of the remote locations.

3. *In addition to the objectives that have been described for non-urban ozone monitors, what other objectives should be considered in the final network design? How would the consideration of additional objectives, if any, effect the minimum number of non-urban required monitors?*

Additional objectives should include: 1) tracking trends in O_3 and precursors to evaluate accountability and relationships to other pollutants for O_3 SIPs (Cohan et al., 2007; Foley et al., 2003); 2) increasing.

4. *Current ozone monitoring regulations (described in Appendix E of 40 CFR part 58) include requirements for station and probe siting (e.g., vertical distance of inlets, set-back distances from roadways). Are these requirements (that have been developed for urban monitors) appropriate for non-urban ozone monitors? What changes, if any, should be considered?*

Even in rural areas, there could be significant NO sources and one would want to site well away from such sources. We still want glass and Teflon inlets, etc.

5. *We believe that States should have the option of designating that existing non-urban ozone monitors that are potentially operated by another agency (e.g., CASTNET monitors operated by the National Park Service) be utilized for meeting certain non-urban minimum monitoring requirements. What factors should States use to determine if such monitors are appropriate to include in their networks?*

Clearly the monitoring locations have to meet the needs identified under question 2 above.of additional monitors.

<u>Ozone Monitoring Season</u>

1. *We are considering changes to the required ozone monitoring seasons based on analyses of the patterns of ozone exceedances and occurrences of the Moderate level of the Air Quality Index, during periods outside of the currently required seasons. What other factors should be considered, if any, in the determination of the length of the required monitoring season for each State?*

Some of the remote sites may not be easily accessible during winter owing to snow, and this should be considered. Elevated O3 can occur in winter, however, owing to reflection of sunlight from snowcover and concentration of precursors during the day within a shallow layer over the snow. O3 is also correlated with HNO3 (Aneja et al., 1994; Bottenheim and Sirois, 1996) that is a precursor to wintertime PM2.5 nitrate levels and can be useful as part of a multi-pollutant control strategy

development where PM2.5 concentrations are also excessive.

2. *We believe that ozone monitors that are located at NCore stations should be operated on a year-round monitoring schedule. Under what circumstances might it be appropriate to require year-round monitoring at other stations beside NCore?*

O3 monitors should be operated year round wherever practical to evaluate multi-pollutant approaches and to determine the extent of elevated levels during winter. This is the case already at most multi-pollutant monitoring sites. There may be instances at remote locations where access is denied due to weather, and it is probably not cost-effective to take extreme measures for such locations. At a minimum they should be operated year-round in areas that experience excessive PM2.5 and O3 concentrations.

3. *We are considering that changes to the required ozone monitoring season be applicable to existing monitors beginning in 2010, one year ahead of the deployment schedule for newly required ozone monitors. Is this schedule reasonable for existing monitors?*

The same argument applies as above. It is better to phase in the changes in a logical manner than to set a mandate that will compromise quality and the utility of the data. It is probably less of a burden to extend the monitoring period than it is to locate new sites, but additional staff, training, and possibly instrumentation may be needed that will require some lead time.

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Dr. Delbert J. Eatough

Urban Network Design Requirements

1. *Considering the ozone minimum monitoring requirements that are already promulgated through 40 CFR Part 58, is the considered change to these requirements sufficient to ensure a minimally adequate network in urban areas?*

The proposed changes seem reasonable and adequate. The existence of Class 1 monitors covers many non-urban areas already and the NCORE site activation will give a reasonable year round data set.

2. *We are considering a timeline that would require newly required ozone monitors to be operational no later than January 1, 2011, based on the expectation that final rulemaking will be completed in 2009. Is this schedule appropriate or should EPA consider providing an additional year for new monitors to be deployed (or relocated)? What would be the advantages or disadvantages of a staggered deployment schedule?*

If the final rulemaking is completed this year, increasing the deployment on a staggered basis, depending on the available data, to either two or three years (i.e., a one year extension for some, identified lower probability sites) seems reasonable.

Non-Urban Network Design Requirements

1. *We are considering a new requirement that each State operate a minimum of three non-urban ozone monitors to meet certain objectives (described above). Considering the stated objectives of the non-urban ozone monitoring requirements, is three required monitors per state sufficient?*

The criteria for the three sites seems reasonable. The inclusion of a wilderness site as one might be relaxed if such sites already exist in the state. What happens if a state has no unmonitored MSA with a expected to exceed the 85% value?

Do you have any idea why WY is an outlier?

Ozone Monitoring Season

1. *We are considering changes to the required ozone monitoring seasons based on analyses of the patterns of ozone exceedances and occurrences of the Moderate level of the Air Quality Index, during periods outside of the currently required seasons. What other factors should be considered, if any, in the determination of the length of the required monitoring season for each State?*

There is evidence that even at low Ozone concentrations, there is photo oxidation of material during the winter which leads to high PM levels during inversions. Identifying these regions for year round ozone monitoring would be useful.

2. *We believe that ozone monitors that are located at NCore stations should be operated on a year-round monitoring schedule. Under what circumstances might it be appropriate to require year-round monitoring at other stations beside NCore?*

See response to 1.

3. *We are considering that changes to the required ozone monitoring season be applicable to existing monitors beginning in 2010, one year ahead of the deployment schedule for newly required ozone monitors. Is this schedule reasonable for existing monitors?*

Yes.

Dr. Philip K. Hopke

Urban Network Design Requirements

1. *Considering the ozone minimum monitoring requirements that are already promulgated through 40 CFR Part 58, is the considered change to these requirements sufficient to ensure a minimally adequate network in urban areas?*

At least one monitor in each MSA with more than 50,000 is certainly warranted. I suggest a key consideration here has to be that the concentration of ozone is also critically important in control of PM given the role of oxidants in the formation of secondary particles. It is time we looked at the problem from a multiple pollutant perspective both in terms of the health effects and in terms of the control strategies. To do and fully protect public health requires that we have adequate measurements of all of the key pollutants in any area of reasonable population.

2. *We are considering a timeline that would require newly required ozone monitors to be operational no later than January 1, 2011, based on the expectation that final rulemaking will be completed in 2009. Is this schedule appropriate or should EPA consider providing an additional year for new monitors to be deployed (or relocated)? What would be the advantages or disadvantages of a staggered deployment schedule?*

At this point, state and local agencies are hard pressed for funding. Thus, one would suggest that from a public health protection standpoint, it would be important to deploy the monitors as quickly as possible. However, there should be resources made available to the state, local, and tribal agencies to defray the costs of the redeployment or the acquisition of additional monitors.

Non-Urban Network Design Requirements

1. *We are considering a new requirement that each State operate a minimum of three non-urban ozone monitors to meet certain objectives (described above). Considering the stated objectives of the non-urban ozone monitoring requirements, is three required monitors per state sufficient?*

We consider Montana and Rhode Island equivalent is the need of monitors per unit area? This is clearly a very strange idea. We can certainly apply appropriate models and look at the real needs to monitor and where they will need to be placed in order to meet the underlying objectives. Given the disparity in the size of states, the distribution of population centers and where transported ozone represents a significant regional control problem, this requirement appears arbitrary. There are a number of small eastern states where this would not appear very sensible and other states where it will clearly be inadequate. Who is to decide whether or not to exceed the minimum number? There needs to be a clearer definition of the criteria for siting the monitors and that would define the minimum number per area.

2. *What factors should be considered in the siting of ozone monitors to assess impacts on ozone sensitive vegetation in national parks, wilderness areas, and other ecosystems?*

We need to look at cumulative indices of exposure for the plants. We can estimate these exposures from appropriate modeling efforts and given the nature of the ecosystem, estimate the likely damage. If we are really interested in protecting the vegetation, then it is worth the effort to customize the plans for each major area of the country having significantly different types of vegetation.

3. *In addition to the objectives that have been described for non-urban ozone monitors, what other objectives should be considered in the final network design? How would the consideration of additional objectives, if any, effect the minimum number of non-urban required monitors?*

Clearly, a major concern for monitoring in rural areas is to provide critical data for model testing and validation.

4. *Current ozone monitoring regulations (described in Appendix E of 40 CFR part 58) include requirements for station and probe siting (e.g., vertical distance of inlets, set-back distances from roadways). Are these requirements (that have been developed for urban monitors) appropriate for non-urban ozone monitors? What changes, if any, should be considered?*

Even in rural areas, there could be significant NO sources and one would want to site well away from such sources. We still want glass and Teflon inlets, etc.

5. *We believe that States should have the option of designating that existing non-urban ozone monitors that are potentially operated by another agency (e.g., CASTNET monitors operated by the National Park Service) be utilized for meeting certain non-urban minimum monitoring requirements. What factors should States use to determine if such monitors are appropriate to include in their networks?*

Clearly the monitoring locations have to meet the needs identified under question 2 above.

<u>Ozone Monitoring Season</u>

1. *We are considering changes to the required ozone monitoring seasons based on analyses of the patterns of ozone exceedances and occurrences of the Moderate level of the Air Quality Index, during periods outside of the currently required seasons. What other factors should be considered, if any, in the determination of the length of the required monitoring season for each State?*

Again, we need to think in multiple pollutant terms. Secondary aerosol is still formed in the winter. Exposures to ozone and other pollutants occur. We will never sort out the requirements to protect health from the exposure mixture that the atmosphere produces without making year round measurements.

2. *We believe that ozone monitors that are located at NCore stations should be operated on a year-round monitoring schedule. Under what circumstances might it be appropriate to require year-round monitoring at other stations beside NCore?*

Again, one needs to look at the needs for understanding the behavior of the suite of pollutants and whether ozone data would provide critical information needed to make the management judgments needed to adequately protect public health.

3. *We are considering that changes to the required ozone monitoring season be applicable to existing monitors beginning in 2010, one year ahead of the deployment schedule for newly required ozone monitors. Is this schedule reasonable for existing monitors?*

It is not clear that it would be useful to do this uniformly across the country. It might make more sense to phase these into those areas that are most sensitive and where the data would prove most useful.

Dr. Jay R. Turner

Urban Network Design Requirements

1. *Considering the ozone minimum monitoring requirements that are already promulgated through 40 CFR Part 58, is the considered change to these requirements sufficient to ensure a minimally adequate network in urban areas?*

Monitoring should be conducted in all MSAs below 350,000 population to at least establish ozone air quality conditions. This is important given the role of ozone monitoring not only for NAAQS compliance determinations but also for AQI reporting. There should be flexibility in the timeline to deploy new monitors in such areas and the requirements to maintain monitoring in these smaller MSAs depending on the observed ozone levels.

2. *We are considering a timeline that would require newly required ozone monitors to be operational no later than January 1, 2011, based on the expectation that final rulemaking will be completed in 2009. Is this schedule appropriate or should EPA consider providing an additional year for new monitors to be deployed (or relocated)? What would be the advantages or disadvantages of a staggered deployment schedule?*

What three-year period will be used for the first round of designations under the May 2008 NAAQS revisions? If the new data are expected to inform the decision-making on nonattainment area boundaries, then every effort should be made to get these monitors operating on a schedule consistent with the designation process. This might be particularly important for monitors being sited near the fringe areas of existing nonattainment areas or monitors being sited in smaller MSAs in counties near, but currently outside, existing nonattainment areas. MSAs smaller than 350,000 population and currently without ozone monitoring could have staggered implementation to provide the monitoring agencies with flexibility in allocation of resources (it would be shame to buy ozone monitors for each of smaller MSAs only to find that sustained monitoring in many such areas would not be a priority) and mindful of the additional burden on personnel to establish and operate these new sites.

Non-Urban Network Design Requirements

1. *We are considering a new requirement that each State operate a minimum of three nonurban ozone monitors to meet certain objectives (described above). Considering the stated objectives of the non-urban ozone monitoring requirements, is three required monitors per state sufficient?*

With the pattern towards ratcheting down the ozone standard, I am concerned about the low density of non-urban monitoring downwind of (generally large) urban ozone nonattainment areas, especially in the Midwestern United States. It is not clear to me that we are capturing the spatial extent of the ozone impact in such cases. For example, a largely rural county at the downwind edge of a nonattainment area (but perhaps still within the MSA) might have the highest ozone design value; in this case, it should be determined whether the plume is causing NAAQS violations further downwind. While these areas might have relatively low population, people living in these areas are impacted. (I respect the philosophical issues this might create with respect to a given urban area's impact on air quality in the immediate downwind counties in light of larger scale, regional transport and the complexities in attributing observed burdens to emission source regions, but the urban plume patterns should be a consideration at least in areas with geographically isolated nonattainment areas.) Given this need, together with the need for

monitoring with respect to objectives relevant to the secondary standard, three non-urban monitors per state might be sufficient in some but not all cases.

2. *What factors should be considered in the siting of ozone monitors to assess impacts on ozone sensitive vegetation in national parks, wilderness areas, and other ecosystems?*

Existing estimates of ozone concentration fields should be used to prioritize areas. States should be allowed to capitalize on existing monitoring conducted by other networks (e.g. CASTNET) to fulfill this monitoring objective.

3. *In addition to the objectives that have been described for non-urban ozone monitors, what other objectives should be considered in the final network design? How would the consideration of additional objectives, if any, effect the minimum number of non-urban required monitors?*

See #1 above, which encourages placing additional emphasis on non-urban areas downwind of large urban ozone nonattainment areas.

4. *Current ozone monitoring regulations (described in Appendix E of 40 CFR part 58) include requirements for station and probe siting (e.g., vertical distance of inlets, set-back distances from roadways). Are these requirements (that have been developed for urban monitors) appropriate for non-urban ozone monitors? What changes, if any, should be considered?*

No comments at this time.

5. *We believe that States should have the option of designating that existing non-urban ozone monitors that are potentially operated by another agency (e.g., CASTNET monitors operated by the National Park Service) be utilized for meeting certain non-urban minimum monitoring requirements. What factors should States use to determine if such monitors are appropriate to include in their networks?*

See #2 above; States should determine whether existing non-urban ozone monitors that are potentially operated by another agency are in locations consistent with their prioritized list of sites based on estimated ozone levels. The daily maximum 8-hour average might not be best ozone metric for prioritizing such areas and other metrics should be considered (e.g. reflecting upon analyses and considerations for the secondary standard that were part of the mostrecent ozone NAAQS review process).

<u>Ozone Monitoring Season</u>

1. *We are considering changes to the required ozone monitoring seasons based on analyses of the patterns of ozone exceedances and occurrences of the Moderate level of the Air Quality Index, during periods outside of the currently required seasons. What other factors should be considered, if any, in the determination of the length of the required monitoring season for each State?*

The analysis used to support adjustments to the state-specific ozone seasons seems reasonable.

2. *We believe that ozone monitors that are located at NCore stations should be operated on a year-round monitoring schedule. Under what circumstances might it be appropriate to require year-round monitoring at other stations beside NCore?*

Ozone monitors at NCore sites should be operated year-round. Many data analyses, including but not limited to health effects studies (including studies which might not be focused on ozone but include it as a possible confounder), would benefit from year-round data. Also, ozone data can be useful when validating performance of certain portions of chemical transport models that might be run for purposes other than ozone (e.g. fine PM).

3. *We are considering that changes to the required ozone monitoring season be applicable to existing monitors beginning in 2010, one year ahead of the deployment schedule for newly required ozone monitors. Is this schedule reasonable for existing monitors?*

What three-year period will be used for the first round of designations under the May 2008 NAAQS revisions? This information is important when considering the timelines for phasing in changes to the monitoring season.

Dr. Thomas Lumley

Urban Network Design Requirements

1. *Considering the ozone minimum monitoring requirements that are already promulgated through 40 CFR Part 58, is the considered change to these requirements sufficient to ensure a minimally adequate network in urban areas?*

The addition of monitors in lower-population areas is an important step in ensuring that the NAAQS protect the US population. I believe the current density of monitors in larger urban areas is sufficient if they are appropriately located in places where higher ozone concentrations are expected. A useful way to confirm this would be to summarize how many excedances of the proposed threshold in large urban areas were detected by only a single monitor

2. *We are considering a timeline that would require newly required ozone monitors to be operational no later than January 1, 2011, based on the expectation that final rulemaking will be completed in 2009. Is this schedule appropriate or should EPA consider providing an additional year for new monitors to be deployed (or relocated)? What would be the advantages or disadvantages of a staggered deployment schedule?*

I have no relevant expertise on the feasibility of deploying monitors by 1/2011. If this schedule is feasible then postponing the deployment will significantly reduce the amount of data available in smaller urban areas by the next revision of the standards. My non-expert reading of economic forecasts suggests that state budgets are likely to still be strained by the current recession in 2010, so later deployment may be helpful for cost reasons.

Non-Urban Network Design Requirements

1. *We are considering a new requirement that each State operate a minimum of three non-urban ozone monitors to meet certain objectives (described above). Considering the stated objectives of the non-urban ozone monitoring requirements, is three required monitors per state sufficient?*

It is not clear to me that the number of monitors in each state should be the same. States may differ greatly both in the amount of publically significant ozone-sensitive vegetation and in the likelihood of high ozone levels. It seems more appropriate to customize the requirements to the actual risks.

2. *What factors should be considered in the siting of ozone monitors to assess impacts on ozone sensitive vegetation in national parks, wilderness areas, and other ecosystems?*

The likelihood of adversely high ozone concentrations; the sensitivity of the vegetation; the importance of the vegetation ecologically, as a public attraction, and as part of a more-or-less pristine wilderness area. In particular, since vegetation (unlikely human health) can safely be assumed to be unaffected by natural background levels of ozone, monitoring should focus on areas where anthropogenic ozone impacts are likely to cause vegetation damage.

3. *In addition to the objectives that have been described for non-urban ozone monitors, what other objectives should be considered in the final network design? How would the consideration of additional objectives, if any, affect the minimum number of non-urban required monitors?*

I have no suggestions on this issue.

4. *Current ozone monitoring regulations (described in Appendix E of 40 CFR part 58) include requirements for station and probe siting (e.g., vertical distance of inlets, set-back distances from roadways). Are these requirements (that have been developed for urban monitors) appropriate for non-urban ozone monitors? What changes, if any, should be considered?*

Increasing required distances from roads may be appropriate. In an urban setting there are constraints on required distance from roads that are not present in non-urban areas. In addition, important ozone-sensitive vegetation is likely to live further from main roads than the typical member of the urban population.

5. *We believe that States should have the option of designating that existing non-urban ozone monitors that are potentially operated by another agency (e.g., CASTNET monitors operated by the National Park Service) be utilized for meeting certain non-urban minimum monitoring requirements. What factors should States use to determine if such monitors are appropriate to include in their networks?*

This seems appropriate. The monitors should be operated on the same schedule and have accuracy comparable to the urban monitors, and they should be sited so as to capture the potential ozone impacts that the standards protect against.

<u>Ozone Monitoring Season</u>

1. *We are considering changes to the required ozone monitoring seasons based on analyses of the patterns of ozone exceedances and occurrences of the Moderate level of the Air Quality Index, during periods outside of the currently required seasons. What other factors should be considered, if any, in the determination of the length of the required monitoring season for each State?*

I can't think of any.

2. *We believe that ozone monitors that are located at NCore stations should be operated on a year-round monitoring schedule. Under what circumstances might it be appropriate to require year-round monitoring at other stations beside NCore?*

Year-round monitoring at NCore stations plus extension of the monitoring season to capture `Moderate' ozone levels at other stations seems sufficient.

3. *We are considering that changes to the required ozone monitoring season be applicable to existing monitors beginning in 2010, one year ahead of the deployment schedule for newly required ozone monitors. Is this schedule reasonable.*

I have no relevant expertise on this issue.

Dr. Warren H. White

General Comments

An indication of the incremental cost of extending an existing seasonal site to year-round operation is missing from the materials provided for discussion. The AAMMS does not need to know the actual dollars involved, but does need an approximate "exchange rate" between 12-month operation and, say, 8-month operation. What is the marginal cost as a fraction of fixed costs? I assume that we couldn't just 'buy' three 8-month sites with two 12-month sites. Cost is the unmentioned elephant in the room; for what other reason would anyone limit the operating season?

I appreciate that a lot of experience and history has gone into the map of ozone monitoring seasons, but does it really have to be so complex and spatially resolved? Wyoming, for example, scheduled to start monitoring year-round, is entirely surrounded by states still scheduled to hibernate every winter. Is there any scientific rationale for creating this island defined by political rather than climatological or topographical boundaries? Note that Schnell et al. (2009) "suggest that similar ozone production [to that observed in Wyoming] during wintertime is probably occurring around the world under comparable industrial and meteorological conditions." I would prefer a uniform monitoring season everywhere, if only on aesthetic grounds, and would prefer it to be as long as we can afford, year-round if possible.

I don't feel strongly about extending the monitoring season, because I don't know how to interpret cold-weather ozone as an indicator of other photochemical products and their aggregate effect on health and welfare. The NAAQS is set for ozone as "the indicator for a mix of O_3 and other photochemical oxidants" (Arnold et al., 2007), and the composition of the winter mix may differ from that of the summer mix on which most current evidence for ozone-related health effects is based.

References:

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Dr. Yousheng Zeng

Urban Network Design Requirements

In my opinion, it is appropriate to require at least one monitor in a small MSA where no design value exists. However, after a period of monitoring and the results are far below the ozone NAAQS, state agencies should be allowed to discontinue monitoring in the area. I would propose the following monitoring requirements in a sliding scale. In a MSA with population between 50,000 and 350,000, a minimum of one ozone monitoring station is required to collect at least one ozone season of valid monitoring data. If the maximum concentration during this season is below 50% of NAAQS (or another percentage), agencies may discontinue the monitoring until the MSA is bumped up to the next MSA category (i.e., 350,000-4,000,000) based on decennial MSA redefinition. If the maximum is equal to or above 50% of NAAQS, the monitoring must be continued for at least 3 years (3 seasons) to establish a design value for the MSA. If the design value is below 85% of NAAQS, the monitoring may be discontinued as EPA currently proposed. If the design value is equal to or above 85% of NAAQS, the monitoring must be continued until the design value drops below 85% of NAAQS for additional 3 consecutive years.

In regard to deployment schedule, I would propose the beginning of ozone season in 2011 instead of Jan. 1, 2011. This will give some agencies more time to install the monitoring stations without losing usable data. I also strongly support the idea of staggered deployment schedule. Agencies should be required to deploy at least one newly required monitoring station in the first required season (and one in each subsequent seasons if there are more than one newly required stations) within their jurisdiction. In combination with above proposed sliding scale, if an agency deploys the first station and the result for the first season is below 50% of NAAQS, the agency can relocate the station to the next newly required station. With this requirement and deployment approach, transportable monitoring trailers can be used to maximize resources and minimize cost.

Non-Urban Network Design Requirements

I generally support the proposed requirements for non-urban area. I would also add the concept of sliding scale and staggered deployment schedule outlined above. To cover large non-urban areas, EPA should consider requirements that would incentivize state agencies to use transportable (or even mobile) monitoring platforms. With combination of the above proposed sliding scale and staggered deployment schedule, state agencies can assess large areas in a very cost effective manner.
I support the option of using existing monitoring stations (e.g., CASTNET monitors) to fulfill part of the new requirement. However, it only makes sense to use this option for the first objective of these requirements, i.e., characterizing ozone impact to vegetation and ecosystems, and not for the other two objectives.

Ozone Monitoring Season

I support the proposed increase in length of monitoring period. The monitoring period should be long enough so that there should not be ozone exceedances outside of the monitoring period. My only question is how confident EPA is in making this proposed requirement when only 45% of year-round monitoring data was analyzed. I assume that there was some statistic analysis done to support representativeness of the 45% monitors to the remaining 55% of monitoring sites. This kind of supporting analysis is not provided for this consultation review.

I strongly agree that ozone monitors at NCore stations should be operated year-round. I don't know if PAMS stations are required to be operated year-round. There is some value to operate PAMS monitors year-round. This is not limited to ozone monitors at PAMS sites. It also applies to other pollutants at PAMS sites. For example, if speciated VOC, along with ozone, are monitored year-round, it may provide some insight in ozone study, which is a major objective of PAMS network. In non-ozone season, stationary industrial sources of VOC typically emit at the level comparable to that of ozone season. These VOC may have a longer lifetime in the atmospheric during non-ozone season than during ozone season. Without strong atmospheric photochemical processes, the monitoring data during non-ozone season may preserve sources' influence better.

Making the change to monitoring period effective in 2010 for *existing monitors* seems feasible to me. However, more weight should be given to several AAMMS members who are more involved in SLAMS operations and may know some practical challenges.

Dr. Barbara Zielinska

Non-Urban Network Design Requirements

1. *We are considering a new requirement that each State operate a minimum of three non-urban ozone monitors to meet certain objectives (described above). Considering the stated objectives of the non-urban ozone monitoring requirements, is three required monitors per state sufficient?*

This depends on the specific State - one size does not fit all. Considering differences in a State geographic locations, presence or absence of protected areas downwind of major urban populations, sensitive vegetation, etc, , three non-urban ozone monitors may be sufficient for some States, but for some – may not. I suggest more detailed analysis; similar to that EPA has done for changes to required ozone monitoring season (Table 2 of the ozone review document). Variable patters of ozone temporal distribution in complex mountain terrain point to a need for higher number of monitoring sites in such areas than in other areas (Van Ooy and Carroll, 1995).

2. *What factors should be considered in the sitting of ozone monitors to assess impacts on ozone sensitive vegetation in national parks, wilderness areas, and other ecosystems?*

One of the most important factors is to consider the presence of the most ozone sensitive species in these areas. For example, Ponderosa pine, which is the main tree species in Sierra Nevada Mountains, is very sensitive to ozone exposure (Bytnerowicz et al., 2003). Thus, it is important to situate the monitors in proximity of these species during their physiological activity and active uptake of gases.

3. *In addition to the objectives that have been described for non-urban ozone monitors, what other objectives should be considered in the final network design? How would the consideration of additional objectives, if any, effect the minimum number of non-urban required monitors?*

I'm not aware of any additional objectives.

4. *Current ozone monitoring regulations (described in Appendix E of 40 CFR part 58) include requirements for station and probe siting (e.g., vertical distance of inlets, set-back distances from roadways). Are these requirements (that have been developed for urban monitors) appropriate for non-urban ozone monitors? What changes, if any, should be considered?*

The additional requirements for non-urban ozone monitors may include appropriate distance from high trees and local roadways, placement of the monitors in open terrain and in proximity of sensitive vegetations.

5. *We believe that States should have the option of designating that existing non-urban ozone monitors that are potentially operated by another agency (e.g., CASTNET monitors operated by the National Park Service) be utilized for meeting certain non-urban minimum monitoring requirements. What factors should States use to determine if such monitors are appropriate to include in their networks?*

These monitors should meet the required technical quality and be able for continuous ozone monitoring. Integrated methods (such as passive ozone monitors), are convenient is some situations and may help in selection of "hot spots" where real time monitors should be placed (Arbaugh and Bytnerowicz, 2003).

Diurnal variations in ozone concentrations are important in assessment of the ozone impact on sensitive vegetations. Real-time monitors which can be placed in remote locations (light, reliable, battery-operated; not requiring AC), such as 2B Technologies, Boulder CO, should be considered.

Additional comment: Efforts leading to a development of more biologically relevant ozone secondary standard, such as those taking currently place in Europe should be considered (Matyssek et al., 2007).

References

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