Comments and Response to PM Charge Questions CASAC AAMMS - 11 February 2009 Consultation
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Comments and responses are provided in bold print.

$PM_{10-2.5}$ Speciation Measurement

1. Table 1 provides a list of proposed $PM_{10-2.5}$ species and analysis methods. Are there additional $PM_{10-2.5}$ target species or methods that can be used to help identify the source of unidentified mass in order to obtain better mass closure?

See items 2 and 3 below.

2. Various sampling devices, including dichotomous samplers, MetOne SASS speciation monitors, PM_{10} and $PM_{2.5}$ FRMs are potential sampling devices (with the appropriate filter types) for $PM_{10-2.5}$ speciation. Among these sampler types, which should be included or excluded from the pilot network design? Are there other sampling devices not listed here that should be considered?

Run two (2) EC – OC semi-continuous (hourly average) measurements outfitted with PM_{10} and $PM_{2.5}$ inlets respectively. Although this measurement is not totally free of artifacts, volatilization losses of OC should be significantly less than those resulting from 24-hr average sampling.

3. What are the $PM_{10-2.5}$ speciation sampling artifacts that may be encountered using the samplers mentioned above and how should they be addressed? Is speciation by the difference method problematic for $PM_{10-2.5}$ speciation and if so what specific issues make it problematic?

Evaluate OC artifacts by comparing the 24-hr OC filter based measurements with the integrated semi-continuous measurements recommended in (2.) above.

4. The current and most widely used $PM_{2.5}$ speciation sampler is the MetOne SASS and it has a flow rate of 6.7 Liters per minute (Lpm) which is significantly lower than either the FRM for $PM_{10-2.5}$ mass or the dichotomous sampler (16.7 Lpm). If this sampler was configured for $PM_{10-2.5}$ by difference, would the 6.7 Lpm flow rate be problematic, especially with the need to compare reconstructed mass to the mass collected by the $PM_{10-2.5}$ FRM?

The lower flow will likely impact the precision and accuracy of the MetOne SASS as compared to PM_{10-25}, but why speculate, perform the field test experiments!

5. Is the amount of particle mass collected on the dichotomous filters (especially the minor flow) sufficient for speciation chemical analysis?

Survey the concentration ranges from existing CSN measurement networks and calculate the expected reductions resulting from flow differences in the dichotomous sampler. If the range in chemical speciation concentrations estimated for these adjusted flows remain within the detection limits of the analytical methods, case closed. If not, you will need to consider other options.

$PM_{10-2.5}$ Species or Components

1. Table 1 provides a list of proposed $PM_{10-2.5}$ species and analysis methods. Among these species, which are most important? Are there important $PM_{10-2.5}$ species or components missing from this list? Are there important analysis methods missing from this list?

The compiled list is a reasonable for the majority of contributing sources to $PM_{10-2.5}$. There is

always the possibility of a unique PM course source whose chemical composition is not on this list and would require the application of species specific analytical technique.

2. In the consideration of potential ion measurements for $PM_{10-2.5}$ species, what ions should be on the target list? Are nitrate or ammonium ions important? If so, is an acid gas denuder and nylon filter required for the proper collection of these species in $PM_{10-2.5}$?

The measurement of nitrate and ammonium ions is important and the measurement technique requires the application of appropriate denuders.

3. The 2004 CD included a list of important $PM_{10-2.5}$ components which included biological materials and fly ashes. If these species are important to characterize, what specific types of biological materials and fly ashes should be included? Is scanning electron microscopy (SEM) on Teflon filters sufficient to quantify and identify these species? Is the proposed total protein assay technique important to obtain a quantitative indicator of the total biological material present?

SEM analyses are very labor intensive and not very quantitative. I would suggest a plot study should be carried out to demonstrate its potential utility in this application.

4. Can the complication of particle size and absorption effects in XRF be resolved using absorption correction factors? If not, what other method(s) should be considered?

Absorption correction factors are likely to be variable and only reproducible in controlled environments. Consider the application of ICP/MS analytical technique.

5. Are metal oxides a significant source of interference in thermal-optical analysis (TOA) of $PM_{10-2.5}$ for OC and EC given the large expected soil component? If so, how should this interference be addressed?

This is an interesting research question that requires an investment of resources to study the phenomena in the laboratory and the field.

<u>Network Design</u>

1. Are sites with high PM_{10} and low $PM_{2.5}$ good candidate sites for $PM_{10-2.5}$ speciation? Given that there will be some urban and rural NCore monitoring sites with $PM_{10-2.5}$ speciation, what other factors should be considered in selecting the pilot monitoring and long-term sites or locations?

The majority (if not all) of urban NCore monitoring sites are not deployed in locations to adequately sample $PM_{10-2.5}$ exposures. The likely source regions impacting $PM_{10-2.5}$ exposures in urban areas are traffic related and associated with populations situate within 500m of major highways.

2. If there is an opportunity to modify the NCore $PM_{10-2.5}$ speciation monitoring requirements during a future rulemaking, should changes to the network design be considered? For example, changing the total number of required monitors and/or the required locations?

The design criteria for locating urban NCore level 2 monitoring sites must consider measurements in neighborhoods in proximity (e.g. within 500m) of significant traffic sources (major highways). Estimates of population with 500m of major roadways within metropolitan areas is one metric for determining the distribution of traffic impacted vs. central urban monitors to be deployed. One in

three urban monitors deployed to characterize exposures within traffic impacted neighborhoods would be a reasonable starting point.