



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JAN 31 2005

OFFICE OF
AIR AND RADIATION

MEMORANDUM

SUBJECT: Response to the Draft Evaluation Report: EPA Needs to Direct More Attention, Efforts, and Funding to Enhance Its Speciation Monitoring Program for Measuring Fine Particulate Matter, Assignment No. 2003-1450

FROM: Jeffrey R. Holmstead
Assistant Administrator

A handwritten signature in black ink, appearing to read "Jeffrey R. Holmstead", written over the printed name and title.

TO: J. Rick Beusse
Director for Program Evaluation, Air Quality Issues

Thank you for providing us the opportunity to respond to the draft report from the Office of Inspector General (OIG) issued December 3, 2004. The purpose of this memorandum is to provide comments on the draft evaluation report, "EPA Needs to Direct More Attention, Efforts, and Funding to Enhance Its Speciation Monitoring Program for Measuring Fine Particulate Matter, Assignment No. 2003-1450." This response has been coordinated with EPA's Office of Research and Development (ORD).

The recommendations provided by the OIG generally align with our current improvement efforts. Our concerns with the OIG report pertain to: 1) characterization of the current state of affairs, and 2) the need to balance resources across all aspects of the air program. We disagree with negative statements in the report regarding the sufficiency of currently available speciation data to "fully" develop effective control strategies. Nevertheless, EPA recognizes that improvements are clearly needed in our current inventory, monitoring, and modeling programs to further improve the efficiency and credibility of control strategies.

OAR is experiencing a reduction in budget and expects to see limited funding in the coming years. With anticipation of static staff resources, the competing needs on our other monitoring networks, Biowatch, and the implementation of the National Ambient Air Monitoring Strategy (NAAMS), we will need to prioritize efforts put forth on these recommendations. Prioritization will allow OAR to focus on those recommendations deemed most critical. We will consider the OIG final recommendations along with expected recommendations from the Clean Air Act Advisory Committee Air Quality Management review, and related recommendations received on an ongoing basis from Clean Air Scientific Advisory Committee's subcommittee on ambient air monitoring and methods.

General comments are provided in the attached response, along with several specific comments that are more technical in nature. ORD will include their comments as a marked-up copy of the report that will be provided separately to OAR and the OIG via email.

If you have additional questions or require clarification, please contact Peter Tsirigotis of my staff at (919) 541-9411.

Attachment

cc: Pete Cosier, Office of Air and Radiation, Audit Follow-up Coordinator (6102A)
Dr. Dan Costa, National Human and Environmental Effects Laboratory (B143-02)
Thomas C. Curran, Deputy Director, Office of Air Quality Planning and Standards (C404-04)
Dr. Gary J. Foley, Director, National Exposure Research Laboratory (MD-75)
Lek G. Kadeli, Acting Deputy Assistant Administrator for Management (8101R)
Ardra Morgan-Kelly, Audit Liaison, National Exposure Research Laboratory (D343-01)
William Lamason, Associate Director, Emissions, Monitoring and Analysis Division (C304-02)
Phil Lorang, Leader, Ambient Air Monitoring Group (D243-02)
Stephen D. Page, Director, Office of Air Quality Planning and Standards (C404-04)
Joann Rice, Ambient Air Monitoring Group (D243-02)
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Dr. Linda Sheldon, Director, Human Exposure and Atmospheric Sciences Division (E205-01)
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Laurie Trinca, Audit Liaison, Office of Air Quality Planning and Standards (C404-2)
Peter Tsirigotis, Director, Emissions, Monitoring and Analysis Division (C304-02)
James Vickery, National Exposure Research Laboratory (D305-1)
Timothy Watkins, Deputy Director, Human Exposure and Atmospheric Sciences Division (E205-01)

We have the following general comments on the draft conclusions and recommendations:

General Comments

(1) *We object to the statement in the draft report that “EPA and States are not yet equipped with the necessary information to fully develop effective control strategies.”*

The following statement is made or implied throughout the draft report (e.g., on pages 5, 13, and 17, and in the “At a Glance” section):

“Although some speciation data is available to begin work on developing control strategies, EPA and the States are not yet equipped with the necessary information to fully develop effective control strategies.”

This position is not supported by the findings of others in the air quality science and policy communities. For example, the NARSTO community, which includes all major U.S. Federal, State and private sponsors of air quality research, in its 2003 report, *“Particle Matter Science for Policy Makers - a NARSTO Assessment,”* points out that “Policy makers are currently benefiting from research initiated five to ten years ago, or longer. This research provides a basic understanding on PM formation, transport, and its major contributing sources. It characterizes the areas of North America where PM concentrations, visibility reduction, and potential population exposure are the greatest. Despite considerable uncertainties, sufficient scientific confidence exists to devise management actions likely to improve air quality (emphasis added).” Corresponding comments have been received from the Clean Air Scientific Advisory Committee (CASAC) Ambient Air Monitoring and Methods Subcommittee in their review of the National Monitoring Strategy and have been among Clean Air Act Advisory Committee’s (CAAAC) recommendations on improving air quality management.

The OIG report correctly points out (p. 13) that “EPA and States primarily use three tools for managing its PM_{2.5} programs: ambient monitoring data, emissions inventory data, and atmospheric modeling.” However, EPA does not use these tools independently. The report’s conclusion and affirmation it attributes to NARSTO that “unless improvement of monitoring data is a high priority to EPA, it will be limited in its ability to help effectively control PM_{2.5}” are seriously overstated and in error. As the NARSTO assessment points out (Synthesis, p. 24), “Source specific options to reduce PM concentrations are best approached through corroborative analysis using emissions inventories, ambient concentration measurements and air quality modeling. Given the strengths and limitations of any one of these science tools, it is recommended that they be used in an integrated manner...” No one of these three tools is more important than another. As an example, EPA integrated emissions inventories, modeling and speciation monitoring data when it evaluated the impact of regional SO₂ and NO_x as part of the Clean Air Interstate Rule (CAIR) [www.epa.gov/air/interstateairquality]. OAR and ORD are working together to address these issues through a variety of research efforts supported by PM Supersites, STAR Grants and other extramural activities, some of which are outlined in the OIG report on pages 44-45.

The OIG report makes the case that determining the chemical make up of PM is largely accomplished through data generated by EPA's ambient air speciation program, and the draft lists EPA's two principle networks, the STN and IMPROVE, with total investments of \$16.5M yearly. Only brief mention is made of the 5-year \$26.5 M Supersites program instituted to apply state-of-the-art monitoring and speciation methods to particle characterization. The report omits the fact that the Supersites program is an in-depth characterization of PM in those regions of the U.S. with the highest PM concentrations. EPA has established the program to address the very thing that the OIG has recommended. In fact, the Supersites program is the subject of a specialty conference by the American Association for Aerosol Research next month. This conference and the subsequent policy-relevant recommendations, through ORD's 2006 Annual Performance Measure (APM), will be very helpful to the Agency in making potential improvements to the monitoring program. Further, the OIG report should recognize the equally large measurement studies sponsored by States and private industry in California (CRAPACS) and the Southeast U.S. (SEARCH), and by other Federal agencies such as NOAA, DOE, and NASA in the Northeast U.S. (NEAQS). These studies collectively have produced a wealth of PM speciation information that will well equip States with the necessary information they need to develop effective control strategies.

(2) The draft report inadequately describes the role of speciation monitoring for developing "effective" control strategies and the work being done at EPA.

The roles of the Speciation program are to provide data for:

- assessing the effectiveness of emission reductions strategies through the characterization of air quality trends;
- supporting the development of predictive modeling tools and the application of source apportionment modeling for control strategy development;
- supporting programs aimed at improving environmental welfare, such as the Regional Haze program; and
- supporting health effects and exposure research studies.

This information is valuable in crafting control strategies to address the principal sources of PM problems, as well as to assist in better understanding the components of PM that are of greatest significance to human health effects.

The statement in item (1) also refers to developing "effective" control strategies. However, it is very difficult to say what is, and what is not, an "effective" control strategy. The real question is

what pollutants do we need to reduce to minimize risk from PM? From that information, we need to develop effective control strategies. EPA has, in fact, implemented controls and reduced PM levels considerably. Lead from gasoline has been eliminated. Sulfate in the East has dropped due to SO₂ controls and nitrate also will likely drop due to the NO_x SIP call, as well as the Acid Rain Program. Further reductions may come from the proposed CAIR. We can identify the major sources (power plants, cars, etc) and address a big part of the PM problem, but once again the question is, are they the right sources to reduce the risk from PM? This leads to the need for speciation data to improve our understanding of the relative toxicity (and resulting

risks) from various PM sources. In our response to the OIG position papers, we suggested adding a section/paragraph entitled “Speciation Data Needed to Improve Understanding of PM Exposure and Health Effects,” which has been incorporated on page 16 of the draft report. The point of this suggested paragraph was to highlight the fact that to develop more “effective” control strategies, we need to understand what characteristic of PM drives the observed health impacts. In others words, is it particle size, composition, species or some combination that leads to health impacts? Speciated data are needed to support exposure and health research to answer these questions in addition to developing control strategies for PM_{2.5}, which is the emphasis of the report. The bottom line is that the most effective control strategy will consider the sources of PM that are responsible for the greatest health risk in addition to reducing PM_{2.5} mass to meet the PM National Ambient Air Quality Standards (NAAQS).

(3) The report does not address the need to balance research priorities within the air research program and across other media.

The principal recommendation of the OIG report is that EPA needs to direct more resources to speciation monitoring. As pointed out in item (1) above, speciation monitoring is only one of three tools needed for PM NAAQS implementation; the other two are emissions characterization and air quality process understanding and modeling. EPA has carefully balanced its investment across all three tools to address the key remaining uncertainties. The need to fully integrate and balance these three tools is a point made in the National Resource Council’s (NRCs) concluding report on PM research priorities (Report IV). Revisiting of this balance through our annual allocation process may be warranted, but a major shift that would come at the expense of the other two areas of research would be inappropriate and would not serve the interests of enhanced air quality management. It is also important to note that EPA must balance research investments supporting these three areas (monitoring, emissions characterization, and air quality modeling) with research needs in the areas of exposure, health effects, and control technology development.

As part of the Agency's annual planning and budgeting process, ORD works with EPA's other program and regional offices to allocate funds across various research programs. This process ensures that media-specific recommendations are fully considered and that the areas of greatest need are given the highest priority. Using this process, the OAR has an opportunity to elevate

the relative priority of research supporting PM speciation monitoring. It is important to note, however, that ORD is already making significant investments in this area of research with results and research products anticipated in the near future. Finally, ORD must balance EPA's needs for research not only within the air research program, but also across all environmental activities.

Responses to the Recommendations

3-1 *Increase from 5 to 10 percent the OAQPS funding allocated for performing analytical assessments, adopting new methods, and conducting research on technologies that can more fully identify the chemical make-up of PM_{2.5}, account for the atmospheric impacts on PM_{2.5}, and assay the resultant changes that occur to the composition of the particle, with particular emphasis on:*

OAR supports the general intent of the recommendations. However, we are not endorsing the specific recommendation regarding the funding increase, which does not account for competing priorities in the air program. It is important to note that ORD also allocates funding to conduct research to address these issues.

a) Increasing and improving the speciated data for the six major components of PM_{2.5} (sulfate, nitrate, ammonia, organic carbon, elemental carbon, and crustal material).

To the extent that the recommendation implies equal attention to improvements for all six components across the nation, we disagree. This recommendation lacks specific detail regarding what is meant by “increasing and improving” the speciation data. Please clarify what is meant by “increasing and improving the speciated data.” For example, does this refer to the number of sites (i.e., collect more spatial data) or their geographic distribution; does it refer to higher time resolution (i.e., implementation of continuous methods); or does it refer to measuring a larger number of species (i.e., focus on the organic species and methods of analysis with better limits of detection for the inorganic species)? It would be an inefficient and unproductive use of scarce resources, for instance, to increase speciation sampling for pollutants in parts of the nation where reliable emissions information indicates there are few or no significant sources. Also, we can measure all the species specified within a certain set of uncertainties, so is the report asking for improved methods that will reduce the uncertainties in the measurement methods? We recognize that there is room for improvement in some of the speciation methods currently used, especially for carbon measurements. ORD currently has several efforts underway to address these issues.

b) Enabling EPA and State, local, and tribal agencies to perform more sophisticated analyses, through source-receptor modeling, to better identify the source of the PM_{2.5} and fill the gaps in the data generated from the STN and IMPROVE networks.

We believe that the tools (emissions, modeling, and measurements) currently available to identify the sources of PM_{2.5} are sufficient for developing effective control strategies for attainment of the NAAQS. Given the measurements that are available today, the current receptor modeling tools are capable of providing a broad characterization of the sources contributing to ambient PM_{2.5} levels which can be used for developing effective control strategies. One potential complication is the level of expertise available, particularly in the State, local, and tribal agencies, to apply these tools. As a result, any additional near term investments may better be directed at developing and delivering guidance for applying source apportionment techniques, particularly receptor modeling approaches.

While we believe that current receptor modeling tools are capable of supporting control strategy development; improvements in our measurements and modeling tools will certainly improve our ability to more specifically identify sources of PM. For example, to be able to separate and identify additional specific sources, detailed measurements (e.g., hourly measurements conducted on a daily basis as opposed to 24-hour integrated averages conducted on a 1-in-3 day basis) and improved modeling tools to take advantage of these measurements, would be needed. However, these enhancements would require substantial additional investments, well beyond the 5 to 10 percent suggested in this recommendation. EPA is committed to advancing the science

in this area and has a program to develop improved source-receptor tools, but as stated previously, investments in this area must be balanced with investments in other priority research areas.

As noted in the OIG report (pp. 15-16), EPA is investing in improvements to emission source profiles by updating of the speciation source profile database (SPECIATE), planned for completion in 2005. SPECIATE will be an important resource in source apportionment studies.

3-2 Identify the uncertainties associated with the comparability of similar speciation monitoring methods, such as the IMPROVE and STN methods, and develop short- and long-term plans to address these uncertainties and increase the usability of the data generated from the various speciation networks. Specifically:

a) Complete the six-site comparability study and incorporate the results of the study into Agency decision making.

Besides the initial 6-site study, there have been an additional nine STN/IMPROVE sites added to assess comparability and informing network decisions. This information will also be used to develop a plan for future collocated sites to help understand the differences between the data generated. ORD plans to present data analysis results at the upcoming American Association for Aerosol Research meeting in Atlanta, Georgia, in February 2005. OAR is beginning the task of compiling the results from the first 6-site study and laying out questions specifically directed at informing the decision making and program improvements.

b) Expedite Agency efforts to determine whether the STN and IMPROVE monitors can produce adequately comparable data, and if not, determine which method should be further deployed to increase data consistency.

See comment above. In addition, ORD has research underway that is targeted at identifying the “optimal” thermal-optical analysis method as noted in Appendices F and G of the OIG’s report. Results from that research can aid in the identification of the method best suited for future deployment.

3-3 Increase Agency efforts to develop the data needed to conduct the more advanced analyses necessary to understand the behavior, characteristics, and chemical composition of PM_{2.5}, including:

a) Increasing analytical work related to source profiling and tracer species, such as fingerprinting carbon to its original source.

Please clarify whether this recommendation addresses emissions-related monitoring, ambient-related monitoring, or both. An emissions-related recommendation would address “source profiling,” while an ambient monitoring recommendation would address the measurement of “tracer species” in air, as opposed to the source. Since both source profiling and tracer species are mentioned, it could be assumed that the recommendation addresses both emissions and ambient monitoring. However, it is important to understand what (or how) source profiles are used and the relationship between source profiles and tracer species. Tracer species are unique

markers for a source which are identified by measuring source profiles. A source profile is the chemical make-up (not the amount, but the fraction of the total) of the emissions coming from a source; the activity is how those vary over time.

One possible way to clarify this recommendation would be to change the wording as follows, “Increase efforts to develop methods to collect and measure source profiles at emissions sources, and the respective tracers in ambient air that uniquely identify those sources.” Such a recommendation should focus on two areas: 1) organic speciation; and 2) methods with lower limits of detection for important trace elements.

b) Identifying and minimizing the uncertainties associated with measuring the organic fraction of PM_{2.5}.

It is important to note that EPA has several significant ongoing efforts that address this topic and cover both improvements in the methods (sampling and analysis) and development of calibration and reference standards. EPA’s efforts are noted in the OIG’s draft report on pages 26 and 27, where discussions of the Supersites program and ORD’s research efforts to improve Speciation

are included. EPA is also developing methods to characterize PM_{2.5} mass associated with the organic carbon as measured in the speciation program.

c) Re-evaluating the methods used in the measurement of ambient ammonia by developing the proper filter needed to measure PM_{2.5} constituents that increase in mass from absorbing moisture, or, in other instances, the constituents [that] decrease in mass as a result of volatilization.

We ask that the OIG clarify the statement: “by developing the proper filter needed to measure PM_{2.5} constituents that increase in mass from absorbing moisture or, in other instances, the constituents [that] decrease in mass as a result of volatilization.”

- In the body of the draft report, there is reference to water absorption by ammonium sulfate. However, if the concern is ammonium sulfate, then a filter will not make a difference because we use a Teflon filter for mass and it does not absorb water.

- If the draft report is referring to water associated with ammonium sulfate that possibly affects the measurement of sulfate, the filter is not an issue as we measure sulfate or sulfur mass directly and water does not impact the method. However, the water associated with hygroscopic ammonium sulfate is part of the measured PM_{2.5} mass as collected by the Federal Reference Method (FRM) sampler on Teflon filter media. EPA recognizes that this must be considered when developing control strategies, as it did for the proposed CAIR.

- If the report is referring to the measurement of ammonium nitrate, nitrate and ammonium are measured directly, although there is evidence that ammonium is lost from nylon filters (4-City Study report). It is also unclear if this is a question about ammonia or ammonium since the two have been confused in the document. Measurements of

ammonia and nitric acid have not been included in the speciation network. The current STN collects ions (including ammonium) on a nylon filter and includes a denuder to remove acid gases (including nitric acid) from the sample stream. Ammonia is not currently collected using the particle filter, but can be measured using other proven methods. These gas-phase measurements require different sample collection and analysis methods. Ammonia and nitric acid gas-phase measurements are being recommended as part of the EPA National Air Monitoring Strategy NCore level 2 network. EPA recognizes that ammonium nitrate is semi-volatile, and the amount of particle nitrate that is part of PM_{2.5} mass as measured by the FRM is different than the nitrate measured by the speciation samplers. Methods are available to adjust for this difference for PM implementation and control strategy development.

- If the report is referring to the measurement of the precursor ammonia, these measurements are not done in either the STN or IMPROVE. Methods for ammonia are well documented in the literature and have been used in monitoring networks for 20+ years. So the question is: does the report refer to the need to measure ammonia properly in the networks?

- Reference is also made to the loss of volatile species and a decrease in mass. This does affect the mass of the “ambient” PM as measured on the Teflon filter, but this is noted in the FRM Regulations and is accounted for in the PM_{2.5} standards as the health effects were measured against mass produced by similar fine particle samplers also using Teflon filters.

d) Developing and deploying continuous speciation monitors that help provide the real-time data needed to more accurately depict what is occurring in the atmosphere on a real-time basis and better pinpoint the sources of PM_{2.5}.

EPA is taking action to address this concern. OAR has deployed a small network of continuous speciation study sites to aid in the development and implementation of continuous monitors at routine monitoring sites. This 5-site network has served the needs well in evaluating the operation and feasibility of the currently available continuous sulfate, nitrate and carbon monitors in a routine monitoring setting. The State participants in the study, along with EPA and the vendors, have used this study to help identify issues with the new monitoring technologies and improve them. OAR plans to expand this study to about 12 sites over the next 2 years, and include newly available continuous speciation monitors. As the new technologies are demonstrated for use in a routine setting, these sites will serve as the platform for the long-term continuous monitoring network.

3-4 Establish a stakeholders workgroup to address the challenges described in Recommendations 3-1, 3-2, and 3-3, comprised of officials from OAQPS, ORD, and selected EPA Regions; State, local, and tribal agencies; State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials; RPOs; affected industries; academia; and monitor manufacturers.

In light of the many coordination and advisory processes already in place, we do not support the recommendation for a new workgroup. We acknowledge and value participation, feedback and input from our stakeholders, scientific experts, and air monitoring experts. Our current and upcoming mechanisms for soliciting input provides for better decision making and program improvement and development. OAR has access to the newly formed CASAC Ambient Air Monitoring and Methods Subcommittee. This subcommittee has representatives from State and local government agencies and academia. OAR is also in the process of forming an ambient air monitoring steering committee composed of EPA's ORD and OAR, EPA Regional offices,

State, local and tribal agencies, and other Federal agencies. The CASAC subcommittee has recently reviewed the National Air Monitoring Strategy. The CASAC meetings are open to the public and have involved industry and the manufacturers. The combination of these two groups can be used to effectively vet ambient air monitoring issues and get sufficient and informed feedback on our plans to address challenges.

3-5 Through the workgroup discussed in Recommendation 3-4, increase partnering efforts with monitor manufacturers to maximize the availability and use of current continuous speciation monitors and expedite the development of the next generation of speciation monitors to address the challenges described above. Given the health and economic consequences if controls are not implemented expeditiously and at the right sources, EPA should consider a joint EPA-private sector pre-competitive technological research program similar to the groundbreaking Partnership for a New Generation of Vehicles (PNGV) program that helped to develop a new generation of low emitting vehicles.

EPA agrees with the intent of this recommendation. Improvements in communication with the vendor community add value to the development and implementation of current and future generations of continuous monitors. OAR has continually communicated with the vendors about monitoring needs and future directions. For example, we have a continuous monitoring study that requires us to keep in communication with the vendors to present issues, work with them on resolutions, and implement the latest version of their monitoring technologies. We have been open about the number of monitoring sites we anticipate and clear that we cannot recommend a specific vendor type.

In contrast to the PNGV, the market for monitoring equipment is quite limited, so we respectfully disagree that PNGV is a suitable conceptual model for OAR's efforts on monitoring technology.

It is very important to recognize that EPA must be careful in establishing partnering relationships with monitoring vendors. Generally, the vendors are looking for some type of commitment from EPA, either to provide resources or to deploy methods in national monitoring networks. EPA must be extremely cautious about making such commitments, and in some cases, will not be able to do so, particularly with respect to recommending a specific vendor's instrument. ORD's Small Business Innovative Research (SBIR) program is another program that could be potentially be utilized and, in fact, has been utilized to address continuous PM mass technologies.

Suggested Changes to the Text of the Report

In the section, *At a Glance*, under *What We Found*: Please revise the 2nd through 4th sentences related to insufficiency of the speciation data to effectively develop control strategies. As written, they are incorrect. Suggest revising the text as follows:

“Although the speciation network provides information on understanding the make-up and origin of PM_{2.5}, the Agency’s ambient monitoring network does not by itself provide the data needed for EPA or States to identify or quantify the chemical make-up of PM_{2.5} particles, reliably trace particles back to their source, or account for chemical changes that occur after particles are released into the atmosphere. The development of control strategies is best approached through collaborative processes that use emissions inventories, ambient monitoring data, and air quality modeling. Speciation data is available to begin work on developing control strategies. EPA and the States are in the process of using the available monitoring data from the Speciation, Supersites, and other state and private monitoring networks to begin development of control strategies; however, increased efforts are needed.”

In the section, *At a Glance*, under *What We Recommend*: Please consider revising the 2nd sentence of the 1st paragraph to read: “This would include promoting greater attention to providing opportunities for cooperation with the private sector to develop improved continuous speciation monitors.”

Page 1, 2nd paragraph: “...how the particle can be traced to its source of origin, also known as fingerprinting;...” Suggest change the wording “also known as fingerprinting” to “through the use of source apportionment modeling”

Page 11, 3rd bullet: Change the reference to “ammonia” instead of “ammonium”. The Speciation program provides a measure of particulate ammonium but not gas-phase ammonia.

Page 16, 2nd paragraph: “The current state of scientific understanding on the formation of secondary organic aerosols is insufficient, and as a result PM modeling predictions at the present time have substantial uncertainties. Improved speciation data would help decrease these limitations.” Suggest clarifying the data needs to support PM modeling predictions. If this is continuous or semi-continuous speciation data, then this should be clarified in the text.

Page 17: “Key Agency officials agreed that continuous speciation monitors would be the most likely approach to providing the robust data set needed.” Insert the words “or semi-continuous” after continuous. Also include this text, “semi-continuous monitors for speciation are available for carbon, nitrate and sulfate. These monitors have the ability to provide more time resolved data.”

Page 18, 2nd paragraph, 1st sentence: change “ammonia” to “ammonium”

Page 21, 2nd paragraph: There are issues with this and the next 2 paragraphs regarding the discussion of ammonia versus ammonium. The statement: "...ammonia is more complicated because the nylon filter does not bond with ammonia..."; ammonia is the gaseous, not the particle species. This discussion is confusing and needs clarification regarding the appropriateness of particle ammonium measurements in the speciation network and the need for supplemental gas-phase measurements of ammonia. Please contact Joann Rice in OAQPS, at 919-541-3372 for assistance in clarification.

Page 21, last paragraph, last sentence: "According to an ORD official, measurements of ammonia and nitric acid, while desired, have not been included in the network due to operational resources and cost." Please either delete the sentence or include the following statements for clarification: "These are gaseous, not particle species, and therefore cannot be obtained from particle filter measurements made by the Speciation network and require different sample collection and analysis methods. However, the NAAMS NCore Level 2 sites include plans to include ammonia and nitric acid measurements as part of the multi-pollutant strategy."

Page 22, 2nd paragraph: "...there are concerns that without improved speciation monitoring data on carbon, ammonia, ..." change "ammonia" to ammonium. For clarification, a sentence could be added that expresses the need for gas-phase measurements of ammonia. Similar issues exist with the use of the word "ammonia" on page 24, 1st paragraph and in recommendations 3-1b) and 3-3c) starting on page 30. Please change these to "ammonium".