

**Summary Minutes of the
U.S. Environmental Protection Agency
Clean Air Scientific Advisory Committee (CASAC)
Oxides of Nitrogen and Sulfur Oxides Secondary NAAQS Review Panel
Public Meeting
Carolina Inn, 211 Pittsboro Street, Chapel Hill NC 27516
February 15 – 16, 2011**

CASAC NO_x and SO_x Secondary NAAQS Review Panel Members:

Dr. Ted Russell, Chair
Dr. Christopher Frey
Mr. George Allen
Dr. Praveen Amar
Dr. Andrzej Bytnerowicz
Ms. Lauraine Chestnut,
Dr. Ellis Cowling
Dr. Rudolf Husar
Dr. Dale Johnson
Dr. Naresh Kumar
Dr. Myron Mitchell
Mr. Richard Poirot
Dr. Charles Driscoll (by phone for part of the meeting)

Purpose: To provide advice on *Policy Assessment for the Review of the Secondary National Ambient Air Quality Standards for Oxides of Nitrogen and Oxides of Sulfur*, January 14, 2011, posted at <http://yosemite.epa.gov/sab/sabproduct.nsf/bf498bd32a1c7fdf85257242006dd6cb/7f4c00f9da9bb75e852577ed005f026c!OpenDocument&Date=2011-02-15>.

Designated Federal Officer: Dr. Holly Stallworth, Designated Federal Officer

Other EPA Staff: John Hannon, Ginger Tennant, Karen Martin, Doug Johns, Randy White, Jeffrey Herrich, Kris Novak, Travis Smith, Tara Greaver, Sarah Mazur, Larke Williams

Public: Eladio Knipping (Electric Power Research Institute), Ted Steichen (American Petroleum Institute), Aaron Flynn (Hunton & Williams), Ona Papageorgio (New York State Department of Environmental Conservation)

Members of the CASAC Air Monitoring and Methods Subcommittee: Eric Edgerton, Doug Burns, Yousheng Zeng, Kenneth Demerjian, Dirk Felton, Philip Fine, Phil Hopke, Judith Chow

Meeting Webpage: The following items may be found posted at URL below: EPA Presentation on Final Policy Assessment, Transmittal Memo of final Policy Assessment, Compendium of Panelists' Comments, List of Public Speakers, Public comments from the

American Road and Transportation Builders Association, the Electric Power Research Institute and the National Park Service.

<http://yosemite.epa.gov/sab/sabproduct.nsf/bf498bd32a1c7fdf85257242006dd6cb/7f4c00f9da9bb75e852577ed005f026c!OpenDocument&Date=2011-02-15>

Meeting Summary

The discussion followed the plan presented in the meeting agenda.

TUESDAY, FEBRUARY 15, 2011

Dr. Stallworth made a statement declaring the Panel's compliance with the Federal Advisory Committee Act and federal conflict of interest laws. Dr. Russell reviewed the agenda.

Ms. Lydia Wegman of EPA's Office of Air Quality Planning and Standards (OAQPS) presented the schedule for completing the NO_x-SO_x Secondary NAAQS. According to Ms. Wegman, the proposed rule should be issued in mid-July 2011; the final rule is expected in March 2012. Dr. Richard Scheffe of OAQPS reviewed the major changes made to the final Policy Assessment since the second draft, emphasizing that Chapter 7 links together all the elements (indicator, form, averaging time and level) while much of the technical analysis is relegated to appendices. Dr. Scheffe highlighted the newer information on the response behavior of the standard. Dr. Scheffe reviewed a conceptual model of an aquatic acidification standard and displayed maps showing the Omernik Ecoregion III classification scheme which divides the U.S. into ecologically relevant regions.

Dr. Eladio Knipping, on behalf of the Electric Power Research Institute, presented comments that were critical of EPA's use of Omernik Level III ecoregions to spatially aggregate water bodies for the purposes of the standard. Dr. Knipping also challenged EPA's "F" factor values for the Adirondacks and the assumption of a universal relationship between acid neutralizing capacity (ANC) and pH.

On behalf of the Utility Air Regulatory Group, Mr. Aaron Flynn of Hunt & Williams LLP criticized EPA for not providing tradeoff curves that would allow estimation of allowable NO_x and SO_x concentrations and comparison of that information to current ambient concentrations.

Dr. Russell then turned the Panel's attention to the sequence of topics reflected in the agenda: indicators, form, averaging time, level, other considerations and uncertainty.

On the topic of indicators, panelists expressed concurrence that acid neutralizing capacity (ANC) is the most appropriate indicator of ecosystem response. One panelist qualified that support by saying ANC isn't applicable to all water bodies. Another panelist stressed the need for EPA to be flexible, saying there might be other metrics besides NO_y

that would work. EPA representatives noted that both oxidized and reduced form nitrogen are incorporated in the standard and that while total N deposition is scientifically at issue, EPA is targeting oxides due to legal considerations.

On the topic of the form of the standard, one panelist, noting the chemical form (AAI = F1 – F2 – F3 – F4) and spatial (Omernicks' Level III ecoregions), said the form was consistent with our conceptual model of the problem. This panelist said the projected non-attainment areas that resulted from the ranges for the proposed ANC indicator and the percentile of surface water to be protected confirmed the validity of EPA's approach. Although standards should not be set based on projected non-attainment, this panelist thought the results supported EPA's work. One panelist thought the CMAQ was off by a factor of 2 and pointed out the Adirondacks modeled data doesn't correspond to real data. Several panelists voiced concern about the representativeness of the water quality data while EPA representatives pointed out that their intent is to capture the 70th – 90th percentile of sensitive water bodies. Panelists speculated as to how EPA might consider incorporating sulfur retention in the future.

On the topic of averaging time, panelists voiced concurrence with the 3 – 5 year averaging time for the AAI parameters, particularly in view of the expected interannual variability. Panelists discussed the advantages and disadvantages of choosing the low end (3 years) or the high end (5 years) and the implications of various averaging times (and methods) for non-attainment determinations.

Panelists supported the 25 – 75 microequivalents per liter (µeg/L) level for the AAI standard but some time was devoted to the issue of acidification of soil versus acidification of surface water. It was pointed out that acidic soils are a necessary but not sufficient condition for the acidification of soil water which, in turn, is a necessary precondition for acidification of surface waters. It was also noted that climate change would render biogeochemical systems even less static than they are now.

In discussing EPA's uncertainty analysis, one panelist raised questions about the appropriate temporal and spatial scale of the analysis and was critical of EPA's "bootstrapping" method which may have minimized uncertainties in individual terms. Another panelist said he would like to see the input data because he could not understand the bootstrapping and Monte Carlo analysis presented by EPA in Appendix G.

In discussing "other considerations," it was noted that there is no uncertainty as to the adversity of welfare effects from bad water quality but rather it was the magnitude of the economic value that could be associated with such effects that was uncertain. This panelist voiced some skepticism about using the 50th percentile critical load for ecoregions that are not sensitive to acidification versus the 70th – 90th percentile for sensitive ecoregions. Panelists discussed whether EPA's classification of Atlantic coastal areas as non-sensitive was reasonable.

At the end of the day, Dr. Russell asked lead discussants to draft consensus comments on their assigned topics (indicators, form, averaging time, level, other considerations and uncertainty) and send them to Dr. Stallworth for packaging into a draft letter for discussion the following morning.

WEDNESDAY, FEBRUARY 16, 2011

The Panel reassembled at 8:00am to review the draft letter (attached below) circulated by Dr. Stallworth and projected on the overhead screen. Minor edits were suggested as Dr. Russell walked the Panel through the letter, primarily to highlight uncertainties such as the potential bias in the selection of percentiles of water bodies to be protected. Before adjourning the meeting, Dr. Stallworth said she would circulate a revised draft for the Panel's comment. Once the Panel had a consensus draft, the letter would go to the chartered CASAC for their quality review and approval in a public teleconference.

On Behalf of the Committee,
Respectfully Submitted,

Holly Stallworth, Ph.D. /s/
Designated Federal Officer

Certified as True:

Armistead (Ted) Russell, Ph.D. /s/
Chair, Clean Air Scientific Advisory Committee
Sulfur Oxides Primary NAAQS Review Panel

NOTE AND DISCLAIMER: The minutes of this public meeting reflect diverse ideas and suggestions offered by committee members during the course of deliberations within the meeting. Such ideas, suggestions, and deliberations do not necessarily reflect definitive consensus advice from the panel members. The reader is cautioned to not rely on the minutes represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters, or reports prepared and transmitted to the EPA Administrator following the public meetings.

Attachment A: Draft Letter Discussed in the meeting of the CASAC NO_x and SO_x Secondary NAAQS Review Panel on February 16, 2011.

The Honorable Lisa P.
Jackson
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Subject: Review of the *Policy Assessment for the Review of the Secondary National Ambient Air Quality Standard for NO_x and SO_x: Final*

Dear Administrator Jackson:

The Clean Air Scientific Advisory Committee (CASAC or Committee) NO_x-SO_x Secondary NAAQS Review Panel met on February 15-16, 2011 to consider the information in EPA's *Policy Assessment for the Review of the Secondary National Ambient Air Quality Standards for NO_x and SO_x* and to provide our recommendation on the review of the standard. **(To be inserted pending review/approval by CASAC:** "The Chartered CASAC held a public teleconference on XXXX to review and approve the report.") This letter provides CASAC's overall comments and recommendations. The CASAC and Panel membership is listed in [Enclosure] Attachment? A. The Panel's responses to EPA's charge questions are presented in Enclosure B. Finally, Enclosure C is a compilation of individual panel member comments.

First, our further discussions still support our comments from the review of the second draft of the PA: "EPA staff has demonstrated through the Integrated Science Assessment (ISA), Risk and Exposure Characterization (REA) and the draft PA that ambient NO_x and SO_x can have, and are having, adverse environmental impacts. The Panel views that the current NO_x and SO_x secondary standards should be retained to protect against direct adverse impacts to vegetation from exposure to gas phase exposures of these two families of air pollutants. Further, the ISA, REA and draft PA demonstrate that adverse impacts are also occurring due to deposition of NO_x and SO_x. Those impacts include ecosystem acidification and undesirable levels of nutrient enrichment in some ecosystems. The levels of the current NO_x and SO_x secondary NAAQSs are not sufficient, nor the forms of those standards appropriate, to protect against adverse depositional effects; thus a revised NAAQS is warranted."

The final version of the PA is significantly improved from the last draft, and has responded to our last review. EPA staff is to be commended, particularly given the novelty of the approach developed where it effectively integrates the combined effects of oxides of sulfur and nitrogen deposition, and also addresses the impact of reduced nitrogen in the system. This new approach has led to the development of the Aquatic Acidification Index (AAI). At this point, the Panel views that the PA is adequate to be used to inform you and others on determining an appropriate secondary standard to help protect ecosystems from the deposition of oxides of sulfur and nitrogen. As discussed below, the Panel generally supports the recommendations by EPA staff on the indicators, form, range of averaging time, and range of level that should be considered for a revised

secondary NO_x-SO_x NAAQS. Detailed comments on each aspect of the standard follow. While we have discussed each aspect of the standard separately, ultimately the final choice of the indicators, averaging time, form and level should be considered in an integrated fashion, accounting for the other considerations and uncertainties also discussed.

Indicators

The use of NO_y and SO_x as atmospheric indicators of oxidized N and S atmospheric concentrations is well justified. The use in the AAI ($AAI = F1 - F2 - F3[NO_y] - F4[SO_x]$) of NO_y and SO_x as atmospheric indicators of N and S concentrations is useful and corresponds with other efforts by EPA. The use of the chemiluminescence technique for measuring, NO_y, has considerable merit. However, monitoring of individual ambient N chemical species that is more consistent with the current understanding of atmospheric deposition science is also recommended for evaluation of dry deposition values generated by CMAQ. Nitric acid, NO₂ and NH₃ are routinely and reliably monitored with passive samplers. Since they account for the majority of the dry deposited N, a commitment to their monitoring is encouraged. These measurements are especially important for NH_x. Such empirical data would also help in calculation of the transference ratios from CMAQ model simulations. Ambient air monitoring with passive samplers in conjunction with the CASTNET measurements, would greatly improve robustness of the available air chemistry data that would be essential for validation of the CMAQ outputs. The *in situ* measurements of total N & S deposition at a subset of monitoring sites are also recommended for evaluating CMAQ.

There was general concurrence that ANC is an appropriate ecological indicator of general aquatic ecosystem response and resiliency to acidification although for some ecosystems additional parameters such as pH may be useful. Although the focus on an ecological indicator of effects of acidification on aquatic ecosystems is appropriate, some further linkage with associated effects on terrestrial ecosystems would be helpful.

Form

Given the multi-pollutant, multi-media, environmentally modified, geographically variable nature of SO_x/NO_x deposition-related aquatic acidification effects, the form of any national ambient air standard intended to address those effects is guaranteed to be more complex than prior NAAQS. The Panel believes that the form of the NAAQS proposed in this final PA is consistent with and directly reflective of the current scientific understanding of the problem.

The proposed form consists of two general parts - a chemical component, and a spatial component. The chemical component, expressed in terms of the AAI equation, links an environmental indicator (a protective level of ANC in surface waters) to measurable concentrations of SO_x and NO_y in the ambient air. For any given spatial area and specified level of the standard, compliance can then be directly determined from new and continuing measurements of SO_x and NO_y. The Panel agrees that the form of this

equation is fundamentally sound. However, given the importance of CMAQ and ecological model calculations in the equation, there is a continuing need to evaluate model performance, account for model uncertainties, and to make the model-dependent factors in the NAAQS more transparent. There may also be directional biases associated with the determination of critical loads in the AAI.

The role of dissolved organic carbon (DOC) and its effects on ANC including differences in measured and calculated ANC values need some further clarification. This text should include some discussion on how the supply of DOC affects overall sensitivity of aquatic ecosystems to acidic deposition, and the use of ANC as an indicator of surface water acidification. **There is concern about the different formulations in the AAI of NO_y and reduced N deposition ($F_2 = \text{NH}_x / Q_r = \text{NH}_x \text{ deposition divided by } Q_r$). Clarification is needed on why these two different formulations of N atmospheric inputs are needed for providing information on the overall amount of the atmospheric input of reactive N.** In future consideration of the standard, accounting for aluminum availability should also be considered.

The proposed form also includes a spatial component which would define the spatial areas (Omernick's Ecoregions, Level III), over which separate, spatially aggregated, chemical AAI calculations would apply. It divides those ecoregions into subsets considered "sensitive" and "non-sensitive" to acidification, and also proposes separate ranges of percentiles of critical loads for surface waters to be protected from acidification within each sensitivity category. The current staff recommendations include a using a more protective range of the 70th to 90th percentile critical load values in acid sensitive ecoregions and the 50th percentile critical load in non-sensitive areas

The proposed spatial components of the form generally appear to be reasonable, and the use of Omernick's ecoregions (Level III) appears to be appropriate for a secondary NAAQS intended to protect the environment – especially where there are geographical variations in the inherent sensitivity of ecosystems to pollutant effects. It is difficult to evaluate the logic or implications of the proposed percentiles (70% to 90%) for critical loads of lakes in sensitive ecoregions when taken in isolation. However, when these percentile ranges are combined with alternative levels within the staff recommended ANC range of 20 to 75 µeq/L, the resulting range of combined levels and forms appears to generally focus on the right problem areas, and to indicate reasonable degrees of the problem. This "logical performance" of the combined proposals of level and form provides confidence in the overall design of the standard, in the individual elements of the level and form, and in the ranges recommended by staff. These combined recommendations provide the Administrator with a broad but reasonable range of adequately **to minimally** protective options for the standard.

The division of ecoregions into "sensitive" and "non-sensitive" subsets, with a more protective percentile applied to the sensitive areas, seems reasonable. However, it's not entirely clear how the various sensitivity criteria will actually be applied. There is also likely to be some geographical variability in the ability of soils to take up (and release) atmospheric sulfur that could be considered as part of the sensitivity criteria. The

naturally poorly buffered coastal plain areas are initially identified as sensitive areas, but are later identified as anomalous and found in CMAQ model runs with future SO_x & NO_x emissions reductions to be “non-responsive” to SO_x and NO_x deposition changes. While consideration of “responsiveness” is one of several screening criteria that might logically be applied, the proposed rule should clearly specify how these or other screening criteria will be applied.

Critical load calculations will be either performed using the MAGIC model or the F-factor approach. The critical loads calculated using the F-factor approach are consistently lower than those calculated using the MAGIC model. A full scale evaluation of the MAGIC model conducted in the Adirondack lakes showed that the effective F-factor predicted by MAGIC model is lower by more than a factor of 2 compared to the measured effective F-factor, indicating that the MAGIC model will also predict lower critical loads. Either approach may result in a bias in the calculated critical loads that are crucial in defining the level of the standard. This potential bias could suggest choosing a lower percentile for the final form of the NAAQS.

The representativeness of available data to use for an ecoregion is a critical. Waterbodies that are actively sampled in the U.S. are predominantly located in the more acid sensitive regions. This has implications on the percentile of waterbodies to be protected in an ecoregion. The critical load calculated based on the 70th percentile of waterbodies that have are chosen, in part, as being more acid sensitive will be lower than the critical load calculated based on 70th percentile of all waterbodies in the ecoregion. This potential bias could suggest choosing a lower percentile for the final form of the NAAQS.

Averaging time

Considering the cumulative nature of the long-term adverse ecological effects and the year-to-year variability of atmospheric conditions (mainly precipitation), the Panel concurs with EPA that an averaging time of 3 to 5 years for the AAI parameters is appropriate. A longer averaging time would mask possible trends of AAI, while a shorter averaging time would make the AAI more dependent on the particular years selected.

Level

The Panel agrees with EPA staff’s recommendation that the “level” of the proposed alternative Aquatic Acidification Index (AAI) standards should be within the range of 20 and 75 µeq/l. We also recognize that both the “level” and the “statistical form” of any proposed AAI standards are so closely linked in their effectiveness that these two elements of any proposed AAI standard should be considered together.

Other Considerations

Adverse effects: Protection from adverse effects to public welfare is the motivation for

this standard setting process, and there is clear evidence that such adverse effects exist in sensitive ecosystems as a result of anthropogenic deposition. There are uncertainties about the magnitude of the economic value of the losses in ecosystem services, but there is no doubt that adverse effects to public welfare exist when fish species and other aquatic life that are native to an ecosystem are unable to survive.

Ecoregions not sensitive to acidifying deposition: An important aspect of the application of the proposed standard is the differentiation between ecoregions that are sensitive to the effects of acid deposition and those that are not. This differentiation needs to be formalized for the proposed rule based on some objective measures. The most relevant questions to answer are whether these areas currently suffer adverse effects from anthropogenic deposition and whether there is any hope of improvement in the condition of these areas if anthropogenic deposition were reduced. Very low calculated critical loads that result from natural acidity are not an accurate measure of potential for adverse effects from anthropogenic deposition. Responsiveness to changes in deposition may be useful to consider, but this alone is not sufficient to designate an area as not sensitive to anthropogenic deposition.

Data underlying distributions of water bodies (percentiles for target ANC). Calculations of critical loads for individual water bodies within each region are done using available data. The percentile of water bodies to select to meet the target ANC values is drawn from this distribution. There are important questions about how representative the available data are for all water bodies in each region. Are they sampled based on the whole population of water bodies or on those most likely to be sensitive to acidification, or does this vary from region to region? The meaning of a given percentile depends on the answers to these questions.

Process for updating the AAI: EPA will be providing values for the elements of the AAI for each ecoregion as part of the proposed rule. These values may be different across the regions, but nationally consistent methods for their determination should be used. The suggestion was made that in some cases states might adjust some of these values with their own data, but the panel is concerned that this would be problematic. However, it is extremely important to recognize that during each review cycle for the standard, new data and modeling approaches should be considered to update and improve the values for the elements of the AAI. This includes the estimates of ammonia deposition, data and models used in the critical load calculations, data and models used to determine the deposition transference ratios, the retention rates for N and S, and weathering and runoff data.

We also emphasize two other closely related issues:

1) The important distinction between acidification of soil and acidification of surface water. This distinction relates to the often discussed delays in both response and recovery of aquatic ecosystems from acidification. Acidic soils, whether acidified by natural processes or by air pollutants, are a necessary but not sufficient condition for the acidification of soil water which, in turn, is a necessary precondition for acidification of surface waters.

2) The chemical necessity for a balance between negatively charged ions (anions) and positively charged ions (cations) in any solution. In the context of the present Policy Assessment document, the anions of greatest concern are sulfate and nitrate. In order to maintain charge balance, these anions must be balanced by positively charged ions (cations); in acidic soils, a large proportion of such cations will be the acid cations, H⁺ and Al³⁺. Thus, the introduction of nitrate and/or sulfate anions into acidic soils results in immediate acidification of soil water because they increase the concentrations of H⁺ and Al³⁺. On the other hand, removal of these anions results in immediate decreases in the concentrations of H⁺ and Al³⁺ and therefore the immediate recovery from acidification to the degree that such anions are removed.

A delayed acidification of surface waters can be expected if soils are not acidic initially, but are acidified gradually over time as the result of nitrate and sulfate deposition; this is typically a very slow process. On the other hand, an immediate increase in acidity can be expected if sulfate and/or nitrate anions are introduced into a naturally acidic soil (naturally acidic soils are very common). In both cases, recovery of the acidity of surface water should be immediate, to the extent that sulfate and/or nitrate are removed, but recovery of the soils to a less acidic condition, if it occurs at all, will be very slow.

Another issue raised in the context of the proposed Aquatic Acidification Index (AAI) is the matter of chemically reduced forms of nitrogen (NH_x). These compounds including gaseous ammonia (NH₃) and ammonium ion (NH₄⁺) – which are dissolved or suspended in precipitation and particulate matter -- and are transferred into ecosystems from the atmosphere by wet and dry deposition processes.

The panel understands fully that these two ecosystem-acidifying airborne pollutant chemicals are NOT now recognized as “criteria pollutants,” and thus are NOT subject to direct regulation under the National Ambient Air Quality Standards of the US. Nevertheless, they are well known scientifically and well recognized in the present Policy Assessment document for NO_x and SO_x, as “regionally significant environmental factors” that “must be taken into account” or considered “as given” because they do contribute to the acidification of aquatic ecosystems in various parts of the US – especially in ecoregions in which human food-animal-rearing facilities are commonplace.

Aquatic ecosystems respond to these chemically reduced forms of nitrogen in much the same way they do to chemically oxidized forms of reactive nitrogen when they are deposited from the atmosphere in excess of biological demand by plants and heterotrophic (decomposer) soil microbes. After deposition, these chemically reduced forms of nitrogen are ultimately converted microbially to nitrate ion, and, in the process, cause acidification of aquatic ecosystems – in much the same way that atmospheric deposition of nitric acid does.

While policy and political considerations require the separation of the chemically reduced and chemically oxidized forms of nitrogen, the ecosystems into which these NH_x substances are deposited do not so distinguish, and thus, from a scientific perspective, it is very important to bear in mind that any controls on the emission of oxidized forms, which are emitted primarily as a result of combustion of fossil fuels, will not address the

Attachment A: Draft Letter Discussed in the meeting of the CASAC NO_x and SO_x Secondary NAAQS Review Panel on February 16, 2011.

inputs of chemically reduced forms of nitrogen, which are emitted mainly from food-animal rearing facilities -- such as feed lots, hog farms, and poultry production facilities.

These chemically reduced forms of nitrogen (NH_x) are taken into account in the factor F₂ in the equation that defines the AAI Index where: $AAI = F_1 - F_2 - F_3[NO_y] - F_4[SO_x]$.

Uncertainties

Given all the uncertainties in the details of the AAI, it will be especially important that EPA collect data over time to verify the response of ecosystems to reductions in deposition.

It is difficult to judge the adequacy of the uncertainty analysis performed by EPA because of lack of details on inputs and the methodology used. For example, to merely describe the methodology as “bootstrapping” is not useful – there are many kinds of bootstrapping. What exactly was bootstrapped and how? The key input data should have been clearly introduced and either presented or at least described. The methods by which the data were bootstrapped should have been clearly explained. The approach for Monte Carlo analysis and by which the probabilistic trade-off curves for SO_x and NO_x were derived should have been adequately explained, including documentation of the key equation(s), key input distributions, analysis/simulation methods, and results. The units for different terms for which the distribution are shown should have been provided.

In its analysis EPA ignored the variability in the parameters in an ecoregion, which is a critical omission because variability also affects the degree of confidence in a given value of a parameter. Instead of using the mean ecoregion values and the unexplained bootstrapping method to assign uncertainty, EPA could have used the distribution of the values in an ecoregion. If the distribution in an ecoregion is homogeneous, the effect of variability would be minimal. Under those conditions, the degree of confidence in the response surfaces for SO_x and NO_y is influenced solely by the uncertainty in the measurements or estimations of the AAI parameters. EPA’s uncertainty analysis ignores the impact of variability in judging the degree of confidence in the response surfaces by assuming average conditions and defining fixed levels of uncertainty for the average value of the parameters.

The parameters of the AAI equation are derived using air quality and aquatic models. Given that these models are being used in the standard setting process, a more rigorous model evaluation should have been conducted to more provide more confidence in the use of the models. CMAQ model evaluation statistics are shown for modeled quantities averaged over the continental U.S.A., which limits the understanding of how well it simulates deposition in spatial areas of interest. The MAGIC model was evaluated by EPA for 104 waterbodies, but results are only shown for 4 waterbodies. It is important to know how the model fared for the remaining 100 waterbodies.

Future Consideration

Attachment A: Draft Letter Discussed in the meeting of the CASAC NO_x and SO_x Secondary NAAQS Review Panel on February 16, 2011.

The novelty of this proposed form of a combined NO_x-SO_x secondary NAAQS has led to the Panel, EPA staff and other stakeholders to identify a number of areas that should be the subject of further research. These areas have been documented in this and past transmittals, including member comments attached here. In many cases, EPA staff has been able to address the issues identified. Particular areas that the Panel views would benefit from further study or consideration in potential revisions or modifications to the proposed form of the NAAQS include sulfur retention in the soil, aluminum availability, soil versus water acidification and ecosystem recovery times. The important role that reduced and organic nitrogen have in not only ecosystem acidification, but also excess nutrient loading, suggests that the agency identify ways to limit future emissions.

We have identified areas in the final PA which should be strengthened and/or clarified to further support deliberations. However, as noted in our last review, “the Panel remains very supportive of this novel approach.” The Panel and CASAC trust that our comments are useful to you and your agency in developing a proposal for a multipollutant NAAQS.

Sincerely,