

**Summary Minutes of the  
U.S. Environmental Protection Agency Clean Air Scientific Advisory Committee  
Secondary National Ambient Air Quality Standards Review Panel for  
Oxides of Nitrogen and Sulfur  
Public Teleconference  
December 1, 2015**

**Date and Time:** Tuesday, December 1, 2015, 1:00 p.m. – 5:00 p.m.

**Location:** By teleconference

**Purpose:** To peer review EPA's *Integrated Review Plan for the Secondary National Ambient Air Quality Standards for Oxides of Nitrogen and Oxides of Sulfur* prepared jointly by the Office of Air Quality Planning and Standards (OAQPS) and the National Center for Environmental Assessment (NCEA).

**Participants:**

*Members of the Clean Air Scientific Advisory Committee (CASAC) Secondary National Ambient Air Quality Standards Review Panel for Oxides of Nitrogen and Sulfur*

(Panel roster is provided in attachment A):

Dr. Ivan Fernandez  
Dr. Edith Allen  
Dr. Praveen Amar  
Dr. James Boyd  
Dr. Elizabeth Boyer  
Dr. Douglas Burns  
Ms. Lauraine Chestnut  
Dr. Charles Driscoll, Jr.  
Dr. Mark Fenn  
Dr. James Galloway  
Dr. Frank Gilliam  
Dr. Robert Goldstein  
Dr. Daven Henze  
Dr. Donna Kenski  
Dr. William McDowell  
Dr. Erik Nelson  
Dr. Hans Paerl  
Mr. Richard Poirot  
Dr. Armistead (Ted) Russell  
Dr. Stephen Schwartz  
Dr. Kathleen Weathers

*EPA Science Advisory Board (SAB) Staff:*

Dr. Sue Shallal, Designated Federal Officer  
Dr. Thomas Armitage, EPA SAB Staff Office

### *EPA Representatives:*

Dr. Erika Sasser, EPA Office of Air Quality Planning and Standards  
Ms. Ginger Tennant, EPA Office of Air Quality Planning and Standards  
Dr. John Vandenberg, EPA Office of Research and Development  
Ms. Karen Wesson, EPA Office of Air Quality Planning and Standards

### *Other Attendees:*

A list of others who requested access to the teleconference is provided in attachment B.

## **Teleconference Summary:**

### **Convene the Teleconference**

Dr. Sue Shallal, Designated Federal Officer (DFO) for the Panel, convened the teleconference at 1:00 p.m. Eastern Time. She identified Panel members who were on the call. She noted that the Panel operated as part of the EPA Clean Air Scientific Advisory Committee (CASAC), which is a chartered Federal Advisory Committee under the Federal Advisory Committee Act (FACA) and is empowered by law to provide advice to the EPA Administrator. She stated that summary minutes of the teleconference would be prepared and certified by the Chair. She noted the Panel's compliance with ethics requirements. Dr. Shallal indicated that meeting materials were available on the SAB web site. These meeting materials included: the Federal Register Notice announcing the teleconference,<sup>1</sup> teleconference agenda,<sup>2</sup> Panel roster,<sup>3</sup> draft Nitrogen Dioxide and Sulfur Dioxide Integrated Review Plan for Secondary (Welfare-based) National Ambient Air Quality Standards (NAAQS),<sup>4</sup> Charge for Nitrogen Dioxide and Sulfur Dioxide Integrated Review Plan for Secondary (Welfare-based) National Ambient Air Quality Standards (NAAQS),<sup>5</sup> EPA Presentation on the Background, Schedule, and Draft Integrated Review Plan (IRP) for the Secondary NAAQS of NO<sub>x</sub> and SO<sub>x</sub>,<sup>6</sup> and preliminary written comments from Panel members.<sup>7</sup> She noted that time had been included on the agenda to hear oral public comments, one request had been received to present oral comments, and no written public comments had been received.

### **Review of Agenda and Purpose of the Teleconference**

Dr. Ivan Fernandez, Chair of the CASAC Panel, reviewed the teleconference objectives and agenda. He indicated that the Panel was holding the teleconference to conduct a review of the EPA draft document titled *Nitrogen Dioxide and Sulfur Dioxide Integrated Review Plan for Secondary (Welfare-based) National Ambient Air Quality Standards (NAAQS)*. He noted that this CASAC review was part of EPA's process for periodic review of the ambient air quality standards for oxides of nitrogen and sulfur. Dr. Fernandez indicated that on the teleconference the Panel would deliberate on responses to EPA's specific charge questions and could also provide additional advice to EPA beyond the charge.

Dr. Fernandez also indicated that on the call the Panel would first hear a presentation from Dr. Erika Sasser, Director of the Health and Environmental Impacts Division in EPA's Office of Air Quality Planning and Standards. The Panel would then review the charge questions from EPA and hear public comments. Dr. Fernandez noted that one request had been received to present oral public comments. He also noted that following public comments the Panel would begin its discussion of the responses to EPA's charge questions. Dr. Fernandez indicated that as each question was discussed by the Panel he would first ask lead discussants to provide their comments and then ask all other members of the Panel

to provide comments. In addition, Dr. Fernandez noted that members of the Panel had submitted preliminary written comments that had been distributed to all Panel members and posted on the CASAC website.

## **EPA Presentation**

Dr. Fernandez introduced Dr. Erika Sasser, Director of the Health and Environmental Impacts Division in EPA's Office of Air Quality Planning and Standards (OAQPS). Dr. Sasser and Ms. Ginger Tennant of OAQPS presented an overview of EPA's process for reviewing the secondary national ambient air quality standards (NAAQS) for oxides of nitrogen and sulfur. They provided background information, discussed the anticipated schedule for conducting the review, and identified key issues to be addressed in the review.

Dr. Sasser thanked members of the Panel for participating in the review. She discussed the Clean Air Act requirements for establishment, review, and revision of NAAQS. She noted that review of the NAAQS was an iterative process and that the last review of secondary standards for oxides of nitrogen and sulfur had been completed in 2012. She then presented an overview of the NAAQS review process. She indicated that the process includes CASAC reviews of the following EPA documents: 1) the Integrated Review Plan (IRP), 2) the Integrated Science Assessment (ISA), 3) the Risk/Exposure Assessment (REA), and 4) the Policy Assessment (PA). She noted that after CASAC review of these documents, EPA would initiate the rule making process for the NAAQS. Dr. Sasser also discussed the role of the IRP in the NAAQS review and the anticipated schedule for EPA's review of the secondary NAAQS for NO<sub>x</sub> and SO<sub>x</sub>.

Ms. Ginger Tennant of OAQPS discussed the history of secondary NAAQS for NO<sub>x</sub> and SO<sub>x</sub>, the scope of EPA's review of the secondary NAAQS for NO<sub>x</sub> and SO<sub>x</sub>, and the overarching questions and key issues to be addressed in the review. She indicated that the initial NO<sub>2</sub> and SO<sub>2</sub> secondary NAAQS were established in 1971 and EPA completed the first joint review of NO<sub>x</sub> and SO<sub>x</sub> secondary NAAQS in 2012. She noted that the combined review allowed consideration of the combined and individual effects on atmospheric chemistry and public welfare, especially with respect to acid deposition. Ms. Tennant indicated that in the last review, EPA considered an approach that used an aquatic acidification index (AAI) to relate deposition to acidification based on acid neutralizing capacity of different waterbodies. She indicated that uncertainties associated with the approach had precluded setting new standards to protect against the deposition effects. Ms. Tennant indicated that the current review of the secondary NAAQS would consider both gaseous and particulate species of nitrogen and sulfur oxides with an emphasis on depositional effects. She noted that two overarching questions would be considered: (1) whether the currently available scientific evidence and exposure/risk information support or call into question the adequacy of protection afforded by the current secondary standards, and (2) whether there are alternative standards that are supported by the currently available scientific evidence and exposure/risk based information, and are appropriate for consideration. Ms. Tennant discussed a number of key issues to be addressed in the review. She noted that many of the key issues were based on uncertainties in evidence and exposure/risk information identified in the previous review. She indicated that the ecological endpoints to be addressed were terrestrial and aquatic eutrophication, terrestrial and aquatic acidification, and mercury methylation.

## *Questions from Panel Members*

Dr. Fernandez thanked Dr. Sasser and Ms. Tennant for their remarks and called for questions from Panel members.

A member noted that EPA had stated that a risk/exposure assessment may be warranted in the review. He asked whether EPA would, in fact, be developing a risk/exposure assessment for the secondary NAAQS for oxides of nitrogen and sulfur. Dr. Sasser responded that in each NAAQS review, EPA makes an independent decision about whether to develop a risk/exposure assessment. She noted that for the review of the NO<sub>x</sub>/SO<sub>x</sub> secondary NAAQS, EPA anticipated that a risk/exposure assessment would be needed.

There were no additional questions for EPA staff so Dr. Fernandez indicated that the Panel would discuss the charge questions from EPA.

### **Discussion of Charge Questions**

Dr. Fernandez reviewed the charge questions. Charge question 1 addressed the overall organization and clarity of the IRP. Charge question 2 addressed the appropriateness of the key policy relevant questions presented in the IRP. Charge question 3 addressed the adequacy and clarity of the description in the IRP of issues to be considered in the ISA. Charge question 4 addressed the clarity and adequacy of the description in the IRP of specific issues (including the most important uncertainties) to be considered in developing the REA. Charge question 5 addressed the clarity of the description in the IRP of the general process for the policy assessment and rulemaking phase of the review.

Dr. Fernandez indicated that the Panel would deliberate on the responses to each of the charge questions and he asked whether Panel members had questions about the charge. A member expressed support for some of the preliminary written comments provided by other Panel members. Dr. Fernandez responded that the Panel would discuss the responses to all of the questions and there would be an opportunity to further develop points raised in the preliminary written comments.

Another panelist asked whether members could contact each other to discuss responses to the charge questions. Dr. Fernandez asked the Designated Federal Officer to respond to the question. Dr. Shallal (the DFO) indicated that during the review, panelists could communicate with individual or small groups of members (comprising less than one half of the Panel). She stated that the DFO and the Panel chair should be included in any such communication. She advised members that they should not communicate with the Panel as a whole because such communications were considered to be Panel deliberations and therefore had to be conducted in a public forum.

There were no further questions concerning the charge so Dr. Fernandez next called for public comments.

### **Public Comments**

Dr. Fernandez indicated that one member of the public had registered to provide oral comments. Dr. Fernandez called for comments from Mr. Ted Steichen of the American Petroleum Institute.

#### *Comments from Mr. Ted Steichen*

Mr. Ted Steichen, Senior Policy Advisor at the American Petroleum Institute (API) provided a written copy of his statement.<sup>8</sup> Mr. Steichen commented that EPA's draft IRP did not focus on key uncertainties and data gaps that had been identified during the previous review of the secondary NAAQS for oxides of nitrogen and sulfur. He noted that these uncertainties included: (1) how deposition varies across

regions, (2) the lack of NO<sub>x</sub> and SO<sub>x</sub> ambient concentration data throughout the U.S., and (3) limited information on ecosystem sensitivity outside of a handful of areas studied because they were known to be particularly sensitive. In addition, Mr. Steichen commented on the importance of performing a quantitative uncertainty analysis and addressing information gaps that had been previously identified. He noted that the draft IRP did not mention the EPA Pilot program that had been proposed to fill information gaps.

Dr. Fernandez thanked Mr. Steichen for his comments and asked whether any other members of the public on the call wanted to provide comments to the Panel. There were no additional comments so Dr. Fernandez indicated that the Panel would begin the discussion of the responses to EPA's charge questions.

## **Panel Discussion**

Before calling for the discussion of the first charge question Dr. Fernandez asked whether Panel members had any questions or comments about the review process. A member commented that he appreciated the historical background information that EPA had presented. He suggested that this information be included in the IRP. There were no other questions or comments so Dr. Fernandez called for discussion of the first charge question.

### *Charge Question 1 – Overall Organization and Clarity of the Draft IRP*

The Panel discussed the overall organization and clarity of the draft IRP. A member commented that the opening chapter of the IRP provided information to understand the context of the review. The member noted that it would be helpful to include additional background information. Another member commented that the IRP did not contain enough information describing the aquatic acidification index (AAI) approach that was developed in the last review, nor did the IRP contain enough information about ammonia. He also commented that the IRP should discuss how the uncertainties identified in the previous review would be addressed.

A member commented that the overall clarity and organization of the IRP was good, but he commented that the document should more specifically address why the approach developed in the last review was not accepted by the Administrator to establish new NAAQS. He noted that the IRP should discuss the extent to which EPA intends to rely on information in the previous assessment and the extent to which new information may be needed. Other members commented that the IRP should contain additional discussion of the AAI and the EPA decisions concerning its use. Members commented that additional background information in EPA's presentation to the Panel should be included in the first chapter of the IRP.

A member commented that the uncertainties identified in the last review should be explicitly listed and the IRP should discuss how the uncertainties will be addressed. He reiterated that that the initial section of the IRP should explain why EPA previously decided to make no changes in the NAAQS for oxides of nitrogen and sulfur. Another member commented that in the previous review concerns had been raised about the uncertainties associated with the AAI, deposition of nitrogen and sulfur oxides, and translation to an ambient air quality standard. He commented that the IRP should indicate whether new approaches were now being considered.

Panelists discussed the form of the NAAQS for oxides of nitrogen and sulfur. A member commented that EPA should give consideration to using depositional flux as the form of the standard. A member

commented that form is one aspect of the standard and another is level. Several members noted that EPA was legally constrained to using a standard based on ambient air concentration not depositional flux. Members questioned whether a depositional standard was legally permissible. The Chair asked EPA staff whether a depositional standard would be allowed. EPA staff responded that they needed to research the question and clarify this point in the IRP. EPA staff also noted that the Administrator must judge whether a standard provides requisite protection.

A member asked EPA staff whether ammonia could be taken into account in the NAAQS for oxides of nitrogen. An EPA staff member responded that a standard was comprised of four parts (the indicator, averaging time, form, and level), one of which was the indicator. She indicated that ammonia could be taken into account as an indicator.

Another member commented that an important aspect of the previous review was use of the Community Multi-scale Air Quality (CMAQ) model to develop estimates of total deposition. He noted that this approach might again be used. Another member commented that in the draft IRP EPA considered only ecosystem effects. He noted that it was also important to consider visibility and effects on cultural resources.

### *Charge Question 2 – Key Policy Relevant Issues*

Dr. Fernandez called for discussion of Charge Question 2. The Panel discussed whether the policy relevant questions in Chapter 2 of the IRP appropriately characterized the key scientific and policy issues to be addressed in the review.

A member commented that EPA's presentation to the Panel had clearly communicated the key policy relevant issues. However, some of this information did not appear in the draft IRP. The member indicated that more history from the previous review should be incorporated into the IRP. He noted that the questions, issues, and uncertainties addressed in the last review should be brought into the IRP. The following additional points were discussed with regard to the key policy relevant issues addressed in the draft IRP:

- Even if EPA did not plan to use the AAI, it should be described as an approach for developing a joint standard based on an indicator other than concentration.
- The use of models should be more clearly discussed.
- The status of the proposed pilot study addressing uncertainties should be discussed.
- Integration of reduced forms of nitrogen and organic nitrogen and sulfur should be discussed.
- The first key question should focus on how the uncertainties have been addressed.
- Legal and technical issues concerning a joint standard for NO<sub>x</sub> and SO<sub>x</sub> should be discussed.
- The IRP should explain why EPA is not considering deposition to man-made structures.

A member commented that in the IRP some of the terminology and definitions concerning ecosystem services were confusing. He also commented that a clear conceptual model was needed to distinguish between processes and functions and how to measure the benefits of ecosystem services.

Another member commented that the following questions should be addressed in the IRP:

- What are the uncertainties associated with the AAI and how can they be addressed in the current review?
- Could deposition be the basis for the NAAQS?

- Can reduced nitrogen species be considered?

A member indicated that, as previously discussed, it was important to state why visibility was not being considered in the IRP and how to consider reduced and organic nitrogen. The Panel further discussed the importance of considering visibility. A member commented that visibility was an important welfare effect that was well characterized and was an output of the CMAQ model. He noted that cost benefit analysis had indicated that it was of equivalent importance to mortality caused by particulate matter. Another panelist indicated that it was important to clearly define ecosystem services. He also questioned the meaning of “sensitive ecosystems” and questioned whether this term referred to the whole ecosystem or parts of it.

### *Charge Question 3 – Science Assessment*

Dr. Fernandez called for discussion of Charge Question 3 which focused on the plan for the Integrated Science Assessment (ISA). The Panel discussed the extent to which Chapter 3 of the IRP clearly and adequately described the scope, specific issues to be considered, and the organization of the ISA.

A member indicated that he supported EPA’s proposed approach to developing the ISA but greater emphasis was needed on looking at reduced nitrogen. He noted that the effects of reduced nitrogen were a critical issue. He also indicated that there had recently been reduction in the deposition of nitrate and sulfate in the eastern U.S. and it was important to look at what had been learned from the ecosystem response. In addition he stressed the need for integration of information in the ISA. He recommended that information in EPA’s review of mercury in air toxics be incorporated into the ISA.

Other members agreed that reduced forms of nitrogen should be considered. A member commented that it was important to look at ammonia. She noted that total nitrogen deposition should be taken into account. Another member commented that reduced forms of nitrogen had been directly linked to harmful algae blooms. He commented that nitrogen limitation had been observed in freshwaters and that the following issues should be considered in the review:

- The internal cycling of carbon, nitrogen, and phosphorus in lakes is affected by nitrogen deposition. Increased nitrogen input can make these waters more sensitive to eutrophication (positive feedback is observed).
- There can be a fine line between nutrient enrichment and under enrichment.
- It is important to consider connections between freshwater and coastal systems.

A member agreed that it was important to consider nitrogen oxides and the reduced forms of nitrogen. He provided the following suggestions:

- The findings of the last CASAC report on secondary NAAQS for oxides of nitrogen and sulfur should be considered.
- The reasons why EPA previously decided not to change the secondary NAAQS for oxides of nitrogen and sulfur should be considered.
- The findings in the report of the EPA Science Advisory Board Integrated Nitrogen Committee<sup>9</sup> (EPA-SAB-11-013, August 2011) should be considered.

A member questioned whether gray literature would be reviewed in the ISA. EPA staff responded that some gray literature like government reports would be included along with peer reviewed literature.

Another member commented that the organization and scientific basis of the ISA would be improved by taking a holistic approach to assessing impacts in terrestrial and aquatic systems. He suggested that the science assessment consider whole flowpaths. He also suggested that the same questions be considered for each type of system. A member commented that damage to agricultural systems was an important issue to be considered. In this regard, he noted that peroxyacetyl nitrate (PAN) was phytotoxic.

#### *Charge Question 4 – Quantitative Risk and Exposure Assessment*

The Panel discussed the extent to which Chapter 4 of the IRP clearly and adequately described the scope and specific issues to be considered in developing the quantitative risk and exposure assessment (REA).

A member recognized that EPA needed additional information to develop the REA. She noted, however, that the description of the scope of the REA was so preliminary that it was difficult to evaluate. She noted that the key uncertainties in Table 4.1 of the IRP were broadly described, but it was important to provide quantitative estimates of the magnitudes of these uncertainties. She further commented that many models were listed in the IRP but it was not clear which tools would be used to develop the REA. She also noted that there were many inconsistencies in writing style in the IRP and that editing was needed to correct errors.

Another member commented that chemical transport models were listed in the IRP, but the limitations of the models were not clearly described. He indicated that the REA should include more information on ammonia emissions. He noted that even in areas not influenced by agriculture there were high levels of ammonia. He also commented that lichens might be one of the best indicators of critical loads and suggested that this be discussed in the REA.

A member commented that biodiversity was not a valid assessment endpoint because no clear definition, method of measurement, or indication of significance had been provided. He also noted that in the IRP use of the term “ecosystem services” was vague and ambiguous. In addition, he indicated that the empirical approach was not a good way to develop critical loads. The member also recommended that EPA consider using the Watershed Analysis Risk Management Framework (WARMF) biogeochemical cycling model in developing the REA.

A member commented that the scope of the REA extended from atmospheric concentrations or deposition to ecosystem services. He noted that a more comprehensive and useful entry point for an integrated assessment would be emissions (rather than atmospheric concentrations or deposition). The member suggested that the scope of the REA could be expanded to consider the impacts of climate change. The member also suggested that the scope of the proposed atmospheric modeling work be expanded to address factors such as N<sub>2</sub>O emissions. He also suggested that high resolution modeling may be warranted.

Other members provided the following additional comments on Chapter 4 of the IRP:

- The IRP lacked a detailed description of the models and how their outputs would be integrated.
- It would be useful to include in the IRP a more detailed description of the previous review, information on how the AAI was developed, and discussion of why the approach was not adopted.
- EPA proposed using emissions information from the 2011 National Emissions Inventory (NEI) in the REA but recent modeling studies have indicated that there are shortcomings in the 2011 NEI NO<sub>x</sub> emissions data.

- The section in the IRP on uncertainty and variability needs a more detailed discussion of how the uncertainty would be handled and why EPA did not develop new secondary NAAQS.
- The IRP should more clearly indicate whether EPA intends to monetize ecosystem services (panelists noted that it would be preferable to not use monetary valuations).
- The discussion of the biophysical ecosystem services framework should clearly describe inputs to the system.
- Valid economic assessments come from incremental analyses.

Panelists further discussed the use of biodiversity as an indicator. A member noted that some good standard definitions of biodiversity (and how it relates to ecosystem services) were available. A member indicated that nitrogen enrichment can increase biodiversity and therefore it is hard to interpret. He also noted that if biodiversity included exotic and pest species, it was not a useful measure. Another member commented that in some cases nitrogen enrichment can decrease species diversity.

#### *Charge Question 5 – Policy Assessment and Rulemaking*

The Panel discussed the extent to which Chapter 5 of the IRP clearly summarized the general process for the policy assessment and rulemaking phase of the NAAQS review.

A member commented that in the previous review uncertainties had prevented EPA from moving forward. Therefore, it was likely that newly synthesized information would be included in the policy assessment and EPA should take time to develop more than one draft of the policy assessment for the Panel's review. Another member agreed with previous comments from Panelists about the importance of considering visibility. She also agreed with previous comments about the limitations of monetary valuation. She noted that the change in resources was the outcome to be measured. She stressed that the incremental change in the resource was more informative than total value.

Another member indicated that it was important to investigate ways to present the results to the public. He suggested that the use of narratives about the outcomes associated with different choices could be a good approach. He noted that tradeoffs should be presented.

A member asked EPA staff whether an assessment of the effects of nitrogen emissions on endangered species could play a role in evaluating ecosystem services. EPA staff responded that this would be considered.

#### **Clarifying Comments**

There was no further discussion on the response to charge question 5. Dr. Fernandez thanked the Panel members for their comments and indicated that time had been included on the agenda to hear brief clarifying comments from members of the public. He asked whether any members of the public wanted to provide clarifying comments. There were no requests to speak.

#### **Summary of Key Recommendations and Action Items**

Dr. Fernandez reviewed action items and the next steps to be completed. He indicated that Panel members should provide revisions in their written comments to the DFO by Tuesday, December 8<sup>th</sup>. In addition, he asked the lead writers to prepare draft synthesis responses to their assigned charge questions and send them to the DFO by Tuesday, December 8<sup>th</sup>. He indicated that these synthesis responses would be circulated to the lead discussants for review. The DFO would work with the Chair to incorporate

comments from the lead discussants. The DFO would then work with the Chair to incorporate the synthesis responses into an integrated draft report which would be sent to the Panel for review. The written comments from individual Panel members would be included as an appendix to the Panel's draft report. The DFO would schedule a second teleconference, if needed, for the Panel to discuss the report and reach concurrence on a final draft to be provided to the full CASAC for its consideration.

The Chair then asked the lead writers and members of the Panel to discuss the key points that had been raised in the discussion of the responses to the charge questions. Members of the Panel identified the following key points.

#### *Key Points in Response to Charge Question 1*

- The first chapter of the IRP should contain more historical background information.
- The first chapter of the IRP should contain more information on how and why EPA made decisions following the last review.
- The IRP should explain what is meant by "form of the standard."
- More information was needed on the findings of the previous CASAC review.

#### *Key Points in Response to Charge Question 2*

- The major uncertainties in the last review should be identified and EPA should indicate how they were addressed.
- The IRP should explain why effects on man-made structures and visibility were not being addressed in the review.
- The description of ecosystem services was incorrect and should be revised to incorporate comments from the Panel.
- Reduced nitrogen and organic nitrogen and sulfur should be included in the NAAQS review.
- Policy issues associated with a joint standard should be addressed.

#### *Key Points in Response to Charge Question 3*

- The atmospheric sciences section of the ISA should contain more information on the state of science concerning emissions, chemistry and deposition of reduced nitrogen.
- The science assessment should consider changes in deposition of nitrogen and sulfur oxides over the past few years and how systems have responded.
- There should be more emphasis in the science assessment on integration across effects.
- The ISA should address uncertainties that led to rejection of the approach developed in the last review.

#### *Key Points in Response to Charge Question 4*

- Editorial review is needed to improve the wording of Chapter 4 of the IRP and focus on what will be done in the REA.
- More detail is needed in the overall description of the REA.
- More information is needed on how models will be used and integrated in developing the REA.
- More information is needed to describe how uncertainties will be addressed.
- Table 4.1 in the IRP should contain information describing what needs to be done to get beyond the limitations of the last review.

- The measurement of biodiversity and its validity as an endpoint should be discussed.
- Monetary valuation of ecosystem services should not be emphasized.

*Key Points in Response to Charge Question 5*

- Newly synthesized material will be seen for the first time in the policy assessment. Therefore, EPA should provide the CASAC ample review time and perhaps a second draft.
- Communication of policy options to the public is important. EPA should present a clear narrative description and summarize the consequences of various policy choices.
- There should be an emphasis on assessing incremental change to resources.

The Chair asked members whether there were any additional key recommendations. Members commented that: (1) it would be useful to say that visibility should be included in the review, (2) EPA should consider using the WARMF model, and (3) more than one model should be used.

Dr. Fernandez then asked members if there were questions or additional issues to be discussed. There were none so he asked the DFO to adjourn the teleconference. The DFO then thanked the members for their participation, reminded them of the specific action items to be completed, and adjourned the call.

Respectfully Submitted:

Certified as Accurate:

*/signed/*

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Dr. Suhair Shallal  
Designated Federal Officer

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Dr. Ivan Fernandez, Chair  
CASAC Secondary National Ambient Air Quality  
Standards Review Panel for Oxides of Nitrogen and  
Sulfur

NOTE AND DISCLAIMER: The minutes of this public meeting reflect diverse ideas and suggestions offered by Panel members during the course of deliberations within the meeting. Such ideas, suggestions and deliberations do not necessarily reflect consensus advice from Panel members. The reader is cautioned to not rely on the minutes to 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: PANEL ROSTER

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**U.S. Environmental Protection Agency  
Clean Air Scientific Advisory Committee  
Secondary NAAQS Review Panel for Oxides of Nitrogen and Sulfur**

### **CHAIR**

**Dr. Ivan J. Fernandez**, Distinguished Maine Professor, School of Forest Resources and Climate Change Institute, University of Maine, Orono, ME

### **MEMBERS**

**Dr. Edith Allen**, Professor of Plant Ecology, Department of Botany and Plant Sciences, University of California Riverside, Riverside, CA

**Dr. Praveen Amar**, Independent Consultant, Lexington, MA

**Dr. James Boyd**, Senior Fellow and Director, Center for the Management of Ecological Wealth, Resources for the Future, Washington, DC

**Dr. Elizabeth W. Boyer**, Associate Professor of Water Resources, Department of Ecosystem Science and Management, Pennsylvania State University, University Park, PA

**Dr. Douglas Burns**, Research Hydrologist, New York Water Science Center, U.S. Geological Survey, Troy, NY

**Ms. Lauraine Chestnut**, Managing Economist, Stratus Consulting Inc., Boulder, CO

**Dr. Charles T. Driscoll, Jr.**, Distinguished Professor and University Professor of Environmental Systems Engineering, Department of Civil and Environmental Engineering, College of Engineering and Computer Science, Syracuse University, Syracuse, NY

**Dr. Mark Fenn**, Research Plant Pathologist, Pacific Southwest Research Station, USDA Forest Service, Riverside, CA

**Dr. James Galloway**, Sidman P. Poole Professor of Environmental Sciences, Department of Environmental Sciences, University of Virginia, Charlottesville, VA

**Dr. Frank Gilliam**, Professor, Department of Biological Sciences, Marshall University, Huntington, WV

**Dr. Robert A. Goldstein**, Senior Technical Executive for Water and Ecosystems, Electric Power Research Institute, Palo Alto, CA

**Dr. Daven Henze**, Assistant Professor and Charles C. Gates Faculty Fellow, Department of Mechanical Engineering, University of Colorado, Boulder, CO

**Dr. Robert W. Howarth**, David R. Atkinson Professor of Ecology & Environmental Biology, Department of Ecology and Evolutionary Biology, Cornell University, Ithaca, NY (did not participate in this teleconference)

**Dr. Donna Kenski**, Data Analysis Director, Lake Michigan Air Directors Consortium, Rosemont, IL

**Dr. William McDowell**, Professor of Environmental Science, Department of Natural Resources and the Environment, University of New Hampshire, Durham, NH

**Dr. Erik Nelson**, Assistant Professor, Department of Economics, Bowdoin College, Brunswick, ME

**Dr. Hans Paerl**, Kenan Professor of Marine and Environmental Sciences, Institute of Marine Sciences, University of North Carolina - Chapel Hill, Morehead City, NC

**Mr. Richard L. Poirot**, Air Quality Planning Chief, Air Quality and Climate Division, Vermont Department of Environmental Conservation, Montpelier, VT

**Dr. Armistead (Ted) Russell**, Howard T. Tellepsen Chair and Regents Professor of Civil and Environmental Engineering, Department of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA

**Dr. Stephen E. Schwartz**, Senior Scientist, Environmental and Climate Sciences Department, Brookhaven National Laboratory, Upton, NY

**Dr. Kathleen Weathers**, Senior Scientist, Cary Institute of Ecosystem Studies, Millbrook, NY

#### **SCIENCE ADVISORY BOARD STAFF**

**Dr. Sue Shallal**, Designated Federal Officer, U.S. Environmental Protection Agency, Washington, DC

## ATTACHMENT B: OTHER ATTENDEES

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List of others who requested access to the teleconference

| <b>NAME</b>      | <b>AFFILIATION</b>                                |
|------------------|---|
| Gilberto Alvarez | EPA Region 5                                      |
| Patrick Ambrosio | Bloomberg, BNA                                    |
| Marion Deerhake  | RTI International                                 |
| Shannon Ethridge | TECQ  |
| Todd Goldman     | EPA OIG   |
| John J. Jansen   | Southern Company                                  |
| J. Kelly         | EPA   |
| Lew Linker       | EPA Chesapeake Bay Program Office                 |
| Stuart Parker    | Inside EPA  |
| David Rostker    | Small Business Administration, Office of Advocacy |
| Ted Steichen     | American Petroleum Institute                      |
| Stephanie Tsao   | Argus Media                                       |
| Larke Williams   | EPA ORD   |

## Materials Cited

The following meeting materials are available on the CASAC website, [www.epa.gov/casac](http://www.epa.gov/casac), on the December 1st meeting page of the Secondary National Ambient Air Quality Standards Review Panel for Oxides of Nitrogen and Sulfur.

<http://yosemite.epa.gov/sab/sabproduct.nsf/MeetingCal/8A8BEFF0F138A4185257E750072E0B5?OpenDocument>

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<sup>1</sup> Federal Register Notice

<sup>2</sup> Agenda

<sup>3</sup> Panel Roster

<sup>4</sup> Draft Nitrogen Dioxide and Sulfur Dioxide Integrated Review Plan for Secondary (Welfare-based) National Ambient Air Quality Standards (NAAQS)

<sup>5</sup> Charge for Nitrogen Dioxide and Sulfur Dioxide Integrated Review Plan for Secondary (Welfare-based) National Ambient Air Quality Standards (NAAQS)

<sup>6</sup> EPA Presentation on the Background, Schedule, and Draft Integrated Review Plan (IRP) for the Secondary NAAQS of NO<sub>x</sub> and SO<sub>x</sub>

<sup>7</sup> Panel Members' Comments

<sup>8</sup> Statement presented by Ted Steichen of the American Petroleum Institute

The following document is available on the EPA Science Advisory Board website ([www.epa.gov/sab](http://www.epa.gov/sab)).

<sup>9</sup> Reactive Nitrogen in the United States: An Analysis of Inputs, Flows, Consequences, and Management Options, A Report of the EPA Science Advisory Board (EPA-SAB-11-013, August, 2011) [Available at: [http://yosemite.epa.gov/sab/sabproduct.nsf/67057225CC780623852578F10059533D/\\$File/EPA-SAB-11-013-unsigned.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/67057225CC780623852578F10059533D/$File/EPA-SAB-11-013-unsigned.pdf)]