

**Summary Minutes of the
U.S. Environmental Protection Agency (EPA)
Clean Air Scientific Advisory Committee (CASAC)
Ozone Review Panel
Public Meeting
January 9-10, 2012**

Date and Time: Monday, January 9, 2012, 8:30 AM – 5:45 PM ET; Tuesday, January 10, 2012, 8:30 AM – 11:30 AM ET

Location: Marriott at Research Triangle Park, 4700 Guardian Drive, Durham, NC, 27703

Purpose: The purpose of the meeting was to conduct a peer review of EPA's *Integrated Science Assessment for Ozone and Related Photochemical Oxidants (Second External Draft - September 2011)*.

Participants: Ozone Review Panel (for full roster, see Attachment A)

Dr. Jonathan Samet, CASAC Chair

Mr. George Allen

Dr. Michelle Bell (01/09/12 only)

Dr. Joseph Brain

Dr. David Chock

Dr. Ana Diez-Roux

Dr. W. Michael Foster

Dr. H. Christopher Frey (01/09/12 only)

Dr. Judith Graham

Dr. David Grantz

Dr. Jack Harkema

Dr. Daniel Jacob

Dr. Steven Kleeberger

Dr. Frederick Miller

Dr. Howard Neufeld

Dr. Armistead (Ted) Russell

Dr. Helen Suh

Dr. James Ultman

Dr. Sverre Vedal

Dr. Kathleen Weathers

Mr. Aaron Yeow, Designated Federal Officer (DFO),

Dr. Vanessa Vu, EPA Science Advisory Board Staff Office

Dr. John Vandenberg, EPA National Center for Environmental Assessment (NCEA)

Dr. James Brown, EPA NCEA

Ms. Lydia Wegman, EPA Office of Air Quality and Planning Standards (OAQPS)

Dr. Karen Martin, EPA OAQPS

Dr. Bryan Hubbell, EPA OAQPS
Dr. Scott Jenkins, EPA OAQPS
Ms. Karen Wesson, EPA OAQPS

Other Attendees (See Attachment B)

Monday, January 9, 2012

Opening Remarks

Mr. Aaron Yeow, the DFO for the public meeting of the CASAC Ozone Review Panel opened the meeting. He noted that as required under the Federal Advisory Committee Act (FACA), the Panel's deliberations are held in public with advanced notice given in the Federal Register¹, and the meeting minutes will be made publicly available after the meeting. He noted that the Panel received several requests from the public to present oral comments, and several set of written public comments. He also noted that the SAB Staff Office determined that there were no issues with conflict-of-interest or appearance of a lack of impartiality for any of the advisory panel members participating in the review. He then turned the meeting over to Dr. Vanessa Vu, the Director of the SAB Staff Office, who welcomed the Panel members and thanked them for their public service. She indicated that the purpose of the meeting was for the Panel to peer review EPA's *Integrated Science Assessment for Ozone and Related Photochemical Oxidants (Second External Review Draft – September 2011)*. She indicated that public input is very critical for the advisory process, thanked the public for their comments, and asked the Panel to take them into consideration during their deliberations. She then turned the meeting over to Dr. Jonathan Samet, Chair of the CASAC.

Dr. Samet welcomed everyone, and had the Panel introduce themselves. He reiterated the purpose of the meeting and the expectations of the results from the meeting. He reviewed the Agenda², and noted that in addition to the public comment period on the first day, there was an opportunity for the public to provide additional brief clarifying remarks during the morning of the second day. He introduced Dr. John Vandenberg, from EPA's National Center for Environmental Assessment (NCEA) for his presentation.

EPA Presentation

Dr. John Vandenberg, EPA NCEA, made a presentation³ to the Panel. He thanked the Panel members and the public for their participation. He discussed the timetable for the 2nd draft Ozone Integrated Science Assessment (ISA) and provided an overview of the major revisions made to it. He then turned it over to Dr. James Brown, who continued with the presentation, going over the charge questions and highlighting some of the key issues. These included: human health causal determinations, background ozone concentrations, human averting behavior in response to high ozone concentrations, mode of action/possible pathways, controlled human exposure studies decrements in lung function, and a new causality refinement in the environmental effects chapter.

One panel member noted that information regarding background ozone concentration calculations in section 3.9 was incorrect and NCEA agreed that it would be deleted. Another member asked whether ISAs of other criteria pollutants would maintain a similar structure to this ISA. NCEA indicated that the front chapters would be carried forward to other ISAs, but the later chapters would be tailored for each specific pollutant being assessed.

Ms. Lydia Wegman, EPA Office of Air Quality and Planning Standards (OAQPS), made a presentation to the panel⁴. She discussed the anticipated schedule for the National Ambient Air Quality Standards (NAAQS) review for ozone. Ms. Karen Wesson, EPA OAQPS, then discussed the structure of first draft Risk and Exposure Assessment (REA), provided a summary of analytical components of the REA, and highlighted key issues in the REA pertaining to air quality, background, city selection, the primary standard, and the secondary standard. There was some discussion between the panel members and EPA regarding EPA's plan for assessing the total health effects of ozone without consideration of background ozone concentrations. Dr. Scott Jenkins, EPA OAQPS, discussed the structure of the first draft Policy Assessment (PA) and the key issues in the PA related to the primary and secondary standards.

Public Comments

There were 16 registered public speakers and they presented according to the order in the List of Public Speakers⁵.

Mr. George Wolff, Air Improvement Resource, Inc., gave oral comments⁶ via teleconference on behalf of the Alliance of Automobile Manufacturers, focusing on background ozone concentrations. He stated that EPA needs to use daily 8-hour Policy-Relevant Background (PRB) estimates based on CAMx, not monthly averages and that U.S. background based on CAMx, not PRB, should be used in the eastern and southwestern U.S. due to significant contributions from Canada and Mexico.

Dr. G. Bruce Copley, ExxonMobil Biomedical Sciences, gave his oral statement⁷, focusing on two areas of concern – EPA's weight of evidence methodology and the application of the methodology for long-term or chronic ambient ozone exposure and respiratory mortality.

Dr. Neeraja Erraguntla, Texas Commission on Environmental Quality, gave her oral statement via teleconference. She indicated that EPA should be transparent in its process of choosing key studies and provide clear documentation of how it arrived at its conclusions. She stated that the roles of uncertainty and bias in EPA's assessments have been severely downplayed and should be reexamined. She indicated that it is imperative that EPA distinguish true risk from just an association because an association does not necessarily represent causation. She stated that EPA should rely on biological and not statistical significance in identifying an adverse health effect in clinical studies.

Dr. Roger McClellan, Toxicology and Human Health Risk Analysis, presented his oral comments. He did not think that many sections of the ISA followed a rigorous process in exercising scientific judgments and documenting them. He urged the Panel not to let personal preferences for a particular standard influence the scientific review, to approach the review of the

2nd draft ISA with the same rigor as the review of the 1st draft ISA, to focus attention on the critical pieces of the ISA that will elements of the ozone standard, to focus on whether adverse health effects occur at ambient ozone levels, critically evaluate the adequacy of the ISA for informing policy judgments on both the level and the statistical form of the NAAQS recognizing these are interrelated decisions. He encouraged the Panel to recommend development of a third draft of the ISA for review by CASAC and the public.

Ms. Deborah Shprentz, Consultant to the American Lung Association, provided her oral comments. She indicated that new evidence reinforces the case for strengthening the ozone standards, particularly several new chamber studies or analyses of data from chamber studies that point to ozone impacts in healthy young adults down to 60 ppb or below. She highlighted several specific comments on various chapters in the ISA, from her written comments⁸.

Dr. William McDonnell, William F. McDonnell Consulting presented remarks⁹ regarding a dynamic ozone FEV1 exposure response model. He discussed the model results and validation of the model. He indicated that should EPA decide to update its FEV1 risk assessment, this model could provide the foundation of a substantially improved health risk model based upon much more data. The panel members had questions regarding the data range, the exercise state of the subjects, peer review status, and range of BMIs in the study.

Dr. Christopher Emery, ENVIRON, made remarks about the uncertainties related to the estimates of background ozone. He stated that the ISA needs to expand the background ozone estimates, the model ozone estimates to include regional modeling at the finer resolution, especially at where stratospheric influences play a role.

Dr. Richard Smith, University of North Carolina at Chapel Hill, presented his oral statement¹⁰ regarding statistical analysis of the Kim et al. (2011) paper. He stated that there are outliers which are hard to attribute to any medical effect of ozone; that statistical significance measures lead to variable results when applied to different data samples collected in the experiment; and that it is possible to extend Kim et al.'s results using regression analysis.

Dr. Mark Nicolich, COGIMET, made oral comments¹¹ pertaining to the Kim et al. (2011) paper. He indicated that the subset analyses reported in the journal article is weaker than one using the full data set that was collected and that the statistical significance of the 60 ppb exposure group response depends on the statistical method of analysis.

Dr. Nicole Downey, Earth System Sciences, made an oral statement¹² and her comments focused on background ozone and the uncertainties in modeling background ozone. She stated that that the ISA needs to more adequately discuss the sources of background ozone, the uncertainties related to those, and that the peak background ozone concentrations are underestimated in these models.

Dr. Julie Goodman and Dr. Sonja Sax, Gradient, split their allotted time so that both could make oral statements¹³. Dr. Goodman stated that the second draft ozone ISA does not follow an objective and rigorous weight of evidence approach for evaluating the available data and therefore, cannot be relied upon to support a causal relationship between ozone and health

outcomes at exposure levels below the current NAAQS. Dr. Sax does not believe that EPA is interpreting the human exposure studies appropriately and therefore those data should not be relied upon to support a causal relationship between ozone exposure and adverse effects below the current NAAQS.

Mr. Doug Blewitt, Air Quality Resource Management, presented¹⁴ an alternate approach that should be considered in using background in a risk assessment process. He also noted issues with the averaging time of the standard.

Mr. John Jansen, Southern Company, made an oral statement¹⁵ pertaining to background levels of ozone. He stated that the definition of background ozone should be the level of ozone that could be achieved in the U.S. if all anthropogenic emissions of ozone precursors in this country were eliminated. He also stated that background concentrations (and perhaps a range of plausible background concentrations) should be derived using predictions produced by a variety of models and using monitoring data as a check on the plausibility of those predictions.

Dr. Samuel Oltmans, University of Colorado at Boulder, presented his oral comments¹⁶. He indicated that although North American Background Ozone is not a directly measured quantity, he believes that it is very important to make measurements of "background ozone" not only as a validation tool for models, but also as a quantity that can be directly compared with measurements made at locations that must meet air quality compliance requirements. He presented results from monitoring at Trinidad Head, CA, and stated that a broader perspective on background ozone can be provided using observations along with the modeled background ozone.

Dr. Allen Lefohn, A.S.L. & Associates, made an oral presentation¹⁷. He indicated that sufficient evidence exists to illustrate that the stratosphere contributes to background ozone concentrations at the surface at both high and low-elevation monitoring sites.

Dr. Milan Hazucha, University of North Carolina at Chapel Hill, presented his oral comments¹⁸. He stated that the use of filtered air may not be an appropriate control exposure because the 0 ppb ozone filtered air generated in the laboratory does not exist under ambient or indoor air conditions. He indicated that comparing the average changes across corresponding time intervals using either the absolute or relative difference between the ozone and filtered air responses and expressing them as "ozone-induced" is misleading.

Discussion of EPA Charge Questions

Dr. Samet indicated that the next part of the agenda was an opportunity for the Panel to discuss issues that may have been left out of the charge questions or that related to the totality of the document. One member identified issues with the flow throughout the document in describing old studies versus new studies and also raised a process issue with respect to the level of external review prior to the Panel's review. Other members raised issues pertaining to adaptation in ozone toxicology and attenuation in ozone-induced pulmonary function changes.

Atmospheric Chemistry and Ambient Concentrations (Chapter 3)

The Panel's discussions focused on PRB. The Panel indicated that the ISA did not have an adequate discussion of long term trends in ozone and indicated that the models used to quantify PRB were not able to reproduce the high extremes of observed ozone concentrations. The members had some discussion of how the chapter was lacking a bottom line conclusion that would aid in linking to the REA and PA documents. The Panel recommended that a more integrative synthesis be included.

Exposure to Ambient Ozone (Chapter 4)

The Panel members noted that this chapter was a substantive improvement over the version in the 1st Draft ISA. However, they noted that there needed to be more integrative synthesis and less summary of the science. The Panel noted the need for long-term exposure data and noted issues with using proximity to monitors as an exposure surrogate.

Dosimetry and Mode of Action (Chapter 5)

The members generally found that most of the comments on the 1st Draft ISA were adequately addressed in the 2nd Draft ISA, but still had additional comments and recommendations. They recommended that dosimetry terms be listed and defined early in the chapter and that they should be used consistently throughout the chapter. The members noted that ventilation is important for dose and that the term "exercise" is used throughout the chapter without any modifier. The Panel recommended that the term "exercise" be better defined with respect to ventilation. There was some discussion on how to better organize the material in the chapter including whether to split the material into different chapters and which order to present them, but the Panel did not have a clear recommendation.

Integrated Health Effects – Short-Term and Long-Term (Chapter 6 - 7)

The Panel members noted that there needed to be consistent definition and usage of the term "new studies". There were a range of opinions on how best to present and balance the existing scientific evidence with the new studies and the Panel concluded that key studies that existed during the last review should still be discussed. The Panel noted that health effects with short-term exposures were included in Chapter 7 (Long-term Health Effects Chapter) and recommended that they be placed in Chapter 6. The Panel recommended an upgrading of the classification for cardiovascular effects to "likely causal" due to the strength of the evidence as well as to make it consistent with the classification for cardiovascular-related mortality.

At Risk Populations (Chapter 8)

The members discussed the need for clear definitions for the terms "vulnerability", "susceptibility", "sensitive populations", etc. and the need for consistent usage of those terms. They recommended discussion of two broad processes that place population at increased risk – greater exposure/dose and greater adverse health effects at a given exposure.

Ozone Effects on Vegetation and Ecosystems (Chapter 9)

The Panel members generally thought that EPA did a good job in responding to the Panel's comments on the 1st Draft ISA. The Panel had a few recommendations to improve the chapter such as: adding a table of causal determinations, additional technical editing, and adding definitions and explanations of terms.

Role of Tropospheric Ozone in Climate Change and UV-B Effects (Chapter 10)

The Panel members recognized that the chapter was shortened compared to the first draft and generally thought that the chapter was okay. There were a few areas of improvement noted including: more clearly stating how emission controls, relevant to ozone pollution, will impact climate change; using more recent scenarios from the Intergovernmental Panel on Climate Change (IPCC) for future emissions projections; and being more conclusive that the effect of ozone on UV-B is very small.

Preface, Preamble, Executive Summary (Chapter 1) and Integrative Overview (Chapter 2)

The Panel was favorable with regard to the reorganization of the front section of the document into these four pieces. They thought that ISAs for other NAAQS pollutants could include the content and structure of the Preamble. They recommended that additional information be included in the Preface, such as the 2010 decision not to reconsider the 2008 Ozone NAAQS. They recommended that the language in the Executive Summary be simplified to a level appropriate for a non-technical audience and that the Integrative Overview should provide a thoughtful synthesis and integration of the scientific evidence covered in the chapters of the ISA.

Dr. Samet went over the assignments and discussed what was expected of the lead authors for the discussion on the next day.

The meeting was recessed for the day at 5:10 pm.

Tuesday, January 10, 2012

The meeting was reconvened at 8:30 am.

Opportunity for Clarifying Remarks from Members of the Public

The public was offered an opportunity to provide clarifying remarks and presented in the order in the List of Public Speakers¹⁹.

Ms. Dana Wood, BP America Production Company, stated that although EPA has claimed that background ozone can be dealt with in the implementation process, there is no legal way, nor technology available, to do so. Therefore, EPA must deal with the background ozone in the standard-setting process.

Dr. Roger O. McClellan, Toxicology and Human Health Risk Analysis, continued to urge a third draft of the ISA. He stated²⁰ that the ISA needs to be revised, critically reviewed with attention focusing on ambient background ozone, and that the concentration response coefficients for all

health endpoints be quantitatively estimated.

Dr. G. Bruce Copley, ExxonMobil Biomedical Sciences, Inc., stated that there are nine other studies that show no or very limited evidence for an ozone-climate-mortality relation, yet are ignored in EPA's weight of the evidence analysis.

Dr. Julie Goodman, Gradient, stated²¹ that the causal framework EPA used in the ISA needed to be improved and stated that the Panel should make recommendations to EPA on improving the weight of the evidence framework, similar to the CASAC Lead Review Panel's October 2010 review of EPA's 1st Draft Lead ISA.

Dr. Christopher Emery, Environ International Corporation, clarified that although the effects models couldn't get small-scale details, it was due to the model inputs, and that it was possible

Dr. Mark Nicolich, COGIMET, stated²² that his comments from the prior day on the Kim paper were also applicable to the Adams paper. He asked that the Panel be very careful and critical of the statistical results from the chamber studies and to not be seduced by the p-value.

Mr. Doug Blewitt, Air Quality Resource Management, made some clarifying comments on winter ozone. He stated that you needed a number of things to generate ozone including snow cover, stable meteorological conditions, topography to trap the emissions in a basin, and local emissions.

Discussion of Key Points

Dr. Samet had the lead authors present their summary of key points²³. For Chapter 3, there was discussion about how the chapter needed a bottom line and a better discussion of how information in the chapter would relate to the REA and PA. For Chapter 4, there was discussion about how there was the need for integration, which could be accomplished in several ways, such as better cross-referencing from the other chapters. For Chapter 5, there was discussion about the need to define exercise. For Chapters 6 and 7, there was discussion about revising the bullet on cardiovascular causality to reflect the discussions the prior day. For Chapter 8, the Panel agreed with the bullets and did not have many further comments on them. For Chapter 9, there was discussion that a summary table of causal determinations should be added. For Chapter 10, there was discussion that the comments on the new scenarios from the ICCP reports be brought forward to the letter to the Administrator. There was some discussion about who the intended audience of the Executive Summary was and that Chapters 1 and 2 should remain separate, intended for different audiences.

The Panel had some discussion on the need for a third review of the ISA. The Panel came to agreement that a third review was needed, but focused only on the major changes recommended by the Panel. EPA provided some information on the schedule of the future reviews of the third draft Isa, the REA, and the PA. EPA also provided some clarification of what they meant regarding how background would be taken into consideration in the PA.

Dr. Samet discussed next steps and the meeting was adjourned by the DFO at 11:30 am.

Respectfully Submitted:

Certified as Accurate:

/Signed/

/Signed/

Mr. Aaron Yeow
Designated Federal Officer
EPA SAB Staff Office

Dr. Jonathan M. Samet
Chair
CASAC

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 the 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.

Materials Cited

The following meeting materials are available on the CASAC website:

<http://www.epa.gov/casac>, at the [January 9-10, 2012 CASAC Ozone Review Panel Meeting page](#):

¹ Federal Register Notice Announcing the Meeting

² Agenda for January 9-10, 2012 Public Meeting

³ EPA Presentation of Revisions to Draft Ozone Integrated Science Assessment

⁴ EPA Presentation on Review of the Ozone NAAQS: Schedule and Preview of the REA and PA

⁵ List of Public Speakers - 01/09/12

⁶ Oral Statement from George T. Wolff, Air Improvement Resource, Inc.

⁷ Oral Statement from G. Bruce Copley, ExxonMobil Biomedical Sciences, Inc.

⁸ Written Comments from the American Lung Association

⁹ Oral Statement from Christopher Emery, ENVIRON International Corporation

¹⁰ Oral Statement from Richard L. Smith, University of North Carolina at Chapel Hill

¹¹ Oral Statement from Mark Nicolich, COGIMET

¹² Oral Statement from Nicole Downey, Earth System Sciences, LLC.

¹³ Oral Statement from Julie Goodman and Sonja Sax, Gradient.

¹⁴ Oral Statement from Doug Blewitt, Air Quality Resource Management

¹⁵ Oral Statement from John J. Jansen, Southern Company

¹⁶ Oral Statement from Samuel Oltmans, University of Colorado at Boulder

¹⁷ Oral Statement from Allen S. Lefohn, A.S.L. & Associates

¹⁸ Oral Statement from Milan Hazucha, University of North Carolina at Chapel Hill

¹⁹ List of Public Speakers - 01/10/12

²⁰ Oral Statement from Roger O. McClellan, Toxicology and Human Health Risk Analysis (01/10/12)

²¹ Oral Statement from Julie Goodman, Gradient (01/10/12)

²² Oral Statement from Mark Nicolich, COGIMET (01/10/12)

²³ Draft Key Points for Discussion at the January 10, 2012, Meeting

ATTACHMENT A - ROSTER

U.S. Environmental Protection Agency Clean Air Scientific Advisory Committee Ozone Review Panel

CASAC CHAIR

Dr. Jonathan M. Samet, Professor and Flora L. Thornton Chair, Department of Preventive Medicine, Keck School of Medicine, University of Southern California, Los Angeles, CA

CASAC MEMBERS

Mr. George A. Allen, Senior Scientist, Northeast States for Coordinated Air Use Management (NESCAUM), Boston, MA

Dr. Ana Diez-Roux, Professor of Epidemiology, School of Public Health, University of Michigan, Ann Arbor, MI

Dr. H. Christopher Frey, Professor, Department of Civil, Construction and Environmental Engineering, College of Engineering, North Carolina State University, Raleigh, NC

Dr. Armistead (Ted) Russell, Professor, Department of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA

Dr. Helen Suh, Program Area Director, Environmental Health, Public Health Division, National Opinion Research Corporation (NORC) at the University of Chicago, West Newton, MA

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

CONSULTANTS

Mr. Ed Avol*, Professor, Preventive Medicine, Keck School of Medicine, University of Southern California, Los Angeles, CA

Dr. John Bailar, Scholar in Residence, The National Academies, Washington, DC

Dr. Michelle Bell, Professor, School of Forestry and Environmental Studies, Yale University, New Haven, CT

Dr. Joseph D. Brain, Cecil K. and Philip Drinker Professor of Environmental Physiology, Department of Environmental Health, Harvard School of Public Health, Harvard University, Boston, MA

Dr. David Chock, Independent Consultant, Bloomfield Hills, MI

Dr. William Michael Foster, Professor, Pulmonary and Critical Care Medicine, Duke University Medical Center, Durham, NC

Dr. Judith Graham, Independent Consultant, Pittsboro, NC

Dr. David Grantz, Department of Botany and Plant Sciences, University of California at Riverside, Kearney Agricultural Center, Parlier, CA

Dr. Jack Harkema, Professor, Department of Pathobiology, College of Veterinary Medicine, Michigan State University, East Lansing, MI

Dr. Daniel Jacob, Professor, Atmospheric Sciences, School of Engineering and Applied Sciences, Harvard University, Cambridge, MA

Dr. Steven Kleeberger, Professor and Lab Chief, Laboratory of Respiratory Biology, National Institute of Environmental Health Sciences, National Institutes of Health, Research Triangle Park, NC

Dr. Frederick J. Miller, Independent Consultant, Cary, NC

Dr. Howard Neufeld, Professor, Department of Biology, Appalachian State University, Boone, NC

Dr. James Ultman, Professor, Chemical Engineering, Bioengineering Program, Pennsylvania State University, University Park, PA

Dr. Sverre Vedal, Professor, Department of Environmental and Occupational Health Sciences, School of Public Health, University of Washington, Seattle, WA

Dr. Peter Woodbury, Senior Research Associate, Department of Crop and Soil Sciences, College of Agriculture and Life Sciences, Cornell University, Ithaca, NY

SCIENCE ADVISORY BOARD STAFF

Dr. Holly Stallworth, Designated Federal Officer, U.S. Environmental Protection Agency, Science Advisory Board (1400R), 1200 Pennsylvania Ave., NW, Washington, DC 20460

Mr. Aaron Yeow, Designated Federal Officer, U.S. Environmental Protection Agency, Science Advisory Board (1400R), 1200 Pennsylvania Avenue, NW, Washington, DC, 20460

* Did not participate in this review

**ATTACHMENT B – Other Attendees
CASAC Ozone Panel Public Meeting**

January 9, 2012

Name	Affiliation
Akhtar, Farhan	EPA
Anenberg, Susan Casper*	EPA
Baylon, Jacqueline*	InsideEPA
Blewitt, Doug	Air Quality Resource Management
Bowman, Christal	EPA
Bromberg, Philip	University of North Carolina at Chapel Hill
Buckley, Barbara	EPA
Cascio, Wayne	EPA
Clements, Carter Chandler	Hunton & Williams LLP
Copley, G. Bruce	ExxonMobil Biomedical Sciences, Inc.
Datko, Laura	EPA
Davis, Matthew*	EPA
Diaz-Sanchez, David	EPA
Downey, Nicole	Earth System Sciences, LLC
Drechsler, Deborah*	California Resources Board
Dubois, Jean-Jacques	EPA
Dutton, Steven	EPA
Emery, Chris	Environ International Corporation
Erraguntla, Neeraja*	Texas Council Environmental Quality
Garbe, Paul	CDC
Gephart, Larry	Exxon Mobil
Goodman, Julie	Gradient
Gordon, Terry	New York University
Hazucha, Milan	University of North Carolina at Chapel Hill
Henderson, Barron	EPA
Hines, Erin	EPA
Jansen, John	Southern Company
Johns, Doug*	EPA
Kelly, John J.*	EPA (Region 9)
Kotchmar, Dennis J.	EPA
Langstaff, John*	EPA
Lassiter, Meredith	EPA
Laughlin, Jan	ConocoPhillips
Lefohn, Allen S.	A.S.L. & Associates
Long, Tom	EPA

Luben, Tom	EPA
McClellan, Roger	Toxicology and Human Health Risk Analysis
McDonnell, William F.	William F. McDonnell Consulting
Meacham, Connie	EPA
Nicolich, Mark	COGIMET
Novak, Kris	EPA
Nystrom, Marci*	California Resources Board
Ollison, Will*	API
Oltmans, Samuel	University of Colorado at Boulder
Owens, Beth	EPA
Patel, Molini	EPA
Pekar, Zach	EPA
Rabideau, Chris	Chevron
Rice, Joann	EPA
Richard, Harry	Abt Associates
Ross, Mary	EPA
Sacks, Jason	EPA
Sax, Sonja	Gradient
Shprentz, Deborah	Consultant to the American Lung Association
Siporin, Kaylyn	EPA
Smith, Richard L.	University of North Carolina at Chapel Hill
Smith, Travis	EPA
Steichen, Ted	API
Stone, Susan	EPA
Svendsgaard, David	EPA
Vinikoor-Imler, Lisa	EPA
Walsh, Debra	EPA
Wells, Ben	EPA
Wilkie, Adrien	EPA
Wilson, Will E.	No affiliation given
Wolff, George*	Air Improvement Resource, Inc.
Wood, Dana	BP
Young, Brianna	EPA

* via teleconference

January 10, 2012

Name	Affiliation
Anenberg, Susan Casper*	EPA
Baylon, Jacqueline*	InsideEPA
Blewitt, Doug	Air Quality Resource Management
Buckley, Barbara	EPA
Clements, Carter Chandler	Hunton & Williams LLP
Copley, G. Bruce	ExxonMobil Biomedical Sciences, Inc.
Davis, Matthew*	EPA
Deason, Doug	Exxon Mobil
Diaz-Sanchez, David	EPA
Downey, Nicole	Earth System Sciences, LLC
Drechsler, Deborah*	California Resources Board
Dutton, Steven	EPA
Emery, Chris	Environ International Corporation
Erraguntla, Neeraja*	Texas Council Environmental Quality
Fajan, Pradeep	EPA
Gephart, Larry	Exxon Mobil
Goodman, Julie	Gradient
Gordon, Terry	New York University
Hazucha, Milan	University of North Carolina at Chapel Hill
Jansen, John	Southern Company
Johns, Doug*	EPA
Kalisz, Cathe	API
Kelly, John J.*	EPA (Region 9)
Langstaff, John*	EPA
Laughlin, Jan	ConocoPhillips
Lefohn, Allen S.	A.S.L. & Associates
Long, Tom	EPA
Luben, Tom	EPA
McClellan, Roger	Toxicology and Human Health Risk Analysis
McDonnell, William F.	William F. McDonnell Consulting
Meacham, Connie	EPA
Nicolich, Mark	COGIMET
Novak, Kris	EPA
Nystrom, Marci*	California Resources Board
Ollison, Will*	API
Pinto, Joseph	EPA
Rabideau, Chris	Chevron
Ross, Mary	EPA

Sacks, Jason
Sax, Sonja
Shprentz, Deborah
Steichen, Ted
Walsh, Debra
Wolff, George*
Wood, Dana

EPA
Gradient
Consultant to the American Lung Association
API
EPA
Air Improvement Resource, Inc.
BP

* via teleconference