Summary Minutes of the
U.S. Environmental Protection Agency (EPA)
Chartered Clean Air Scientific Advisory Committee (CASAC)
Public Teleconference on Particulate Matter
October 22, 2019

Date and Time: Tuesday, October 22, 2019, 12:00 PM – 4:00 PM ET

Location: Telephone and live audio webcast only

Purpose: The purpose of the teleconference is to receive public comments for the CASAC to consider in their peer review of the EPA's Policy Assessment (PA) for Particulate Matter (PM)[1] on October 24-25, 2019.

Participants: Chartered CASAC Members (also see roster[2])
Dr. Tony Cox, Chair
Dr. James Boylan
Dr. Mark Frampton
Dr. Ronald Kendall
Dr. Sabine Lange
Dr. Corey Masuca
Dr. Steven Packham

Mr. Aaron Yeow, Designated Federal Officer (DFO)

Other Attendees (See Attachment A)

Convene Meeting and Review of Agenda[3]

Mr. Aaron Yeow, DFO, opened the meeting. He noted that, as required under the Federal Advisory Committee Act (FACA), CASAC meetings are held in public, with advanced notice given in the Federal Register.[4] He noted that the CASAC had received written public comments, which were posted on the meeting webpage and that oral public comments would be heard on the teleconference from members of the public who registered in advance with the SAB Staff Office. He stated that the meeting minutes will be made publicly available after the meeting. He stated that the SAB Staff Office determined that there were no financial conflicts of interest or an appearance of a loss of impartiality for any of the CASAC members.

He turned the meeting over to Dr. Tony Cox, Chair of the CASAC.

Dr. Tony Cox thanked the members of the public who gave their time, thought, and effort to contribute written and oral comments. He was especially grateful to the many speakers and writers who have suggested data sources, studies, and methods of data analysis and risk communication to help improve the scientific quality and integrity of the NAAQS review process. He indicated that he shared the same commitment to making sound science the foundation for NAAQS reviews and policies as the current EPA Administrator. He stated that the CASAC will pay close attention to the public comments as they formulate their advice to the EPA and their recommendations to the Administrator.

Public Comments

Mr. Yeow indicated that public commenters would speak in the order presented in the List of Registered Speakers[5] and indicated that comments would be limited to 5 minutes.

Julie Goodman, Gradient, provided an oral statement,[6] indicating that she was speaking on behalf of Gradient, but that her time spent on preparing comments was funded by the American Petroleum Institute. Her comments focused on why current available scientific evidence and risk-based information do not provide sufficient evidence to call into question the adequacy of the public health protection afforded by the current annual and 24-hour $PM_{2.5}$ standards.

Chris Frey, North Carolina State University, provided an oral statement[7] focusing on the Independent Particulate Matter Review Panel (IPMRP) and their comments that the annual and 24-hour standards for fine particulate matter are not protective of public health, that the annual standard should be revised to a range of 10 to 8 $\mu g/m^3$, that the 24-hour standard should be revised to a range of 30 to 25 $\mu g/m^3$, that the weight-of-evidence framework for causality determination is appropriate and well-vetted, that the coarse PM standard should be revised downward, that the annual secondary standard should be revised to a level at least equal to the primary annual fine PM standard, and that the current 24-hour secondary standard is not adequate to protect against visibility effects. Dr. Cox asked if Dr. Frey could provide studies showing the empirical validation of the weight-of-evidence framework. Dr. Frey said he would so if Dr. Cox provided studies showing the empirical validation of the causal analysis and inference methods that Dr. Cox was recommending. Dr. Cox responded that he would be glad to do so and provided these[8] after the teleconference. Dr. Frey referred to his individual comments in the IPMRP written comments[9] where he gave the history of the causality determination framework that has been reviewed by CASAC and CASAC panels and referencing this framework to other frameworks that have been proposed by the National Academy of Science.

Gretchen Goldman, Union of Concerned Scientists, stated that changes to the process has made it difficult for the agency and its science advisors to conduct a science-based review, but they now have an opportunity to make sure the standards are based on sound science. She referred to the IPMRP comments that the current standards are not protective of public health and asked CASAC to seriously consider these comments and if they didn't agree, to explain why they did not agree.

John Bachmann, Environmental Protection Network, provided an oral statement[10] that focused on restating what the Clean Air Act requires of EPA and CASAC in reviewing air standards; problems with the process followed in this review; highlighting some issues raised at this stage of the review process; and noting some accountability studies the CASAC may have overlooked.

Giffe Johnson, National Council for Air and Stream Improvement, Inc. (NCASI), provided an oral statement[11] that focused on NCASI's systematic review protocol for evaluating the potential impact of $PM_{2.5}$ on mortality and ischemic heart disease at policy relevant exposure scenarios, to stimulate dialog and demonstrate the benefits of a systematic review approach. Dr. Cox asked whether the presence of unmeasured confounders is crucial for evaluating studies. Dr. Johnson responded that it is crucial in evaluating the body of evidence. Dr. Cox asked for any additional information about how the NCASI review approach could be applied to Zigler et al., 2018.

James Enstrom, University of California, Los Angeles (retired) and Scientific Integrity Institute, stated that the PM PA obscures the null relationship between $PM_{2.5}$ and total mortality in the U.S., that the PM PA cites positive authors and omits most null authors and their criticism, that the PM PA authors must

acknowledge and address the $PM_{2.5}$ deaths controversy, that his analyses of data for four key cohorts support the need for the EPA Transparency Rule, and that the PM PA must be revised as per CASAC review and criticism by him and others.

Dan Greenbaum, Health Effects Institute (HEI), focused his comments on the determination of causality and the application of newly developing causal inference methods and the initial results of key, new, HEI-funded studies of low-level exposures of PM and ozone, which are cited in the PA. He indicated that HEI found the latest causal determinations to be generally carefully and well done, although they did raise questions about the determinations of nervous system effects. Two HEI accountability studies have been cited in the PA which contribute to the determination of causality. HEI has funded several studies examining development of causal inference methods, and, as has been noted by several CASAC consultants, these are still in the early stages of being applied in air pollution studies and are not a simple substitute for the broader evaluation of epidemiologic and other evidence to determine causality. He stated that they also come with their own significant uncertainties, which can rival those of other assessments of the evidence.

Richard Smith, University of North Carolina, Chapel Hill, indicated that, due to possible conflicts of interest, he would not be providing comments.

George Allen provided an oral statement[12] focused on the draft PM PA presenting a clear need to tighten the PM standards, especially the $PM_{2.5}$ annual standard. He stated that the 24-hour standard also needs to be tightened, that there is an urgent need to move to a PM-coarse standard instead of just a PM_{10} standard, and a need for improvements to the welfare (secondary) standards. He stated that the attempt to dismiss the evidence of PM-mortality presented in the ISA on the basis of new and unvetted approaches to causality is specious and that the appointment of a pool of consultants instead of a panel is a farce.

Albert Rizzo, American Lung Association (ALA), expressed the ALA's deep appreciation for EPA's diligence and thoroughness in preparing the PM PA and generally found much to support in the assessment and said that it should provide added evidence that more protective standards are needed for PM. ALA continues to express their deep objections to the changes in the NAAQS review process. They strongly disagree with the specious argument that EPA presents for justification of retaining some of the current standards and urges EPA to remove those arguments. The ALA also disagreed with EPA's arguments for retaining the short-term standard. He urged CASAC to recommend that EPA strengthen the annual standard to 8 $\mu g/m^3$ and the 24-hour standard to 25 $\mu g/m^3$.

Stewart Holm, American Forest & Paper Association and American Wood Council, presented an oral statement[13] that focused on EPA's process for evaluating and interpreting studies being insufficient for determining causality. He noted that the selection of studies, distillation of their data, and how they are presented are critically important and that omission of key studies can greatly diminish the quality and validity of the evaluation. He provided detail on the Pun et al., 2017 study that CASAC noted was omitted in the ISA and was still omitted in the PA. He urged the CASAC to recommend that EPA retain the current standard.

Skip Brown, Asphalt Consulting Services, LLC, provided an oral statement[14] and stated that he is the former owner of Delta Construction Company, a family roadbuilding business started by his father in 1943 with operations in Northern California. He provided the history of how the company was put out of business due to trying to comply with the California Air Resources Board's enforcement of particulate matter standards.

Steve Milloy, junkscience.com, stated that the EPA's claim that PM kills people is fraud. He stated that the epidemiology relied on is insufficient on its own to draw any conclusions about PM, that there is no evidence on biological plausibility that PM kills, and that EPA and EPA-funded researchers thwart any independent review of the controversial studies.

Matthew Malkan, University of California, Los Angeles, stated that he spent his career as an astrophysicist, gathering data to test scientific hypotheses and publishing results in over 400 articles. He stated that EPA regulations on PM have violated normal procedures for doing reliable science; incentives for researchers need to be as neutral as possible; negative results are as important as positive results; CASAC needs to be aware of confirmation bias, cherry-picking of results, and citation bias; correlation does not equal causation; CASAC needs to be aware of p-hacking; and that the non-release of data is unacceptable.

Ned Leiba, Citizen's Advisory Committee of the San Joaquin Valley Air Pollution Control District, California, stated that he wanted to offer reflections from the perspective of a citizen who evaluated the State Implementation Plan for the San Joaquin Valley. His fundamental question in evaluating the plan was, where are the studies showing a dramatic decrease in mortality and morbidity as the levels of $PM_{2.5}$ dropped from 60 $\mu g/m^3$ to 18 $\mu g/m^3$? He stated that when he asked that question, it was met with silence. He urged CASAC to evaluate the standards based on fundamental science, double-blinded, randomized studies, to reject controls based on the mass of $PM_{2.5}$, and that the focus of controls should be on the toxic constituents of PM.

Ted Hadzi-Antich, Texas Public Policy Foundation, provided an oral statement[15] that focused on an administrative petition[16] filed in 2017 asking the EPA Administrator to make less stringent the NAAQS for fine PM. He noted that the petition called into question the need for the stringent $PM_{2.5}$ standard and that it summarizes and includes copies of several peer-reviewed studies showing that the assumptions underlying the current $PM_{2.5}$ standard are incorrect. He urged the CASAC to review the petition and the studies before developing final recommendations to EPA.

Annette Rohr, Electric Power Research Institute (EPRI), provided an oral statement[17] that focused on three primary comments, all of which relate to treatment of uncertainty in the PA. These comments are: (1) uncertainty regarding the underlying epidemiological evidence due to confounding; (2) uncertainty in exposure assessment in PM epidemiological studies; and (3) uncertainty in the risk estimates presented in the risk-based considerations section of the PA. She stated that, overall, EPRI believes that EPA's consideration of the contribution of unmeasured confounding to overall uncertainty in the long-term epidemiological evidence is technically inadequate and that such confounding could result in significant variability in mortality risk. She noted that, overall, EPRI recommends that EPA conduct a more comprehensive evaluation of uncertainty in exposure assessment in the epidemiological studies underpinning the PA and that the Agency more fully integrate quantitative uncertainty assessment into the risk calculations contained within the PA.

Anne Smith, NERA Economic Consulting, provided an oral statement[18] focused on the quantitative risk analysis in Section 3.3 and Appendix C of the Draft PA. She concluded that the draft PA's risk analysis fails to provide useful or reliable information to support the science-policy judgement that the Administrator must make for the PM NAAQS because it fails to incorporate the most important types of uncertainty that affects its calculations. She indicated that integrated uncertainty analysis was a better method to address epistemic uncertainties in risk analysis and had been used in previous NAAQS

reviews, but that the BenMAP tool used in the current PA cannot perform integrated uncertainty analysis.

Lianne Sheppard, University of Washington, provided an oral statement[19] focused on addressing several of the CASAC member's preliminary comments. She stated that the PA did not deserve a wholesale revamping and should not discount the studies considered, that EPA only considers scientific evidence published in the scientific literature, that the weight of evidence causal determination framework is an appropriate tool for drawing causal conclusions and has been well-vetted over more than a decade, and that the scientific evidence alone is sufficient for drawing causal conclusions. Dr. Cox asked if she could send examples of the thorough vetting of the causal determination process, showing Type I and Type II errors. She indicated that she would look into it, but that she thinks other bodies such as the Institute of Medicine may have done this vetting and she would refer to their work.

Douglas Dockery, Harvard T.H. Chan School of Public Health, stated that the most important changes since the last PM NAAQS review have been in improved exposure assessment. Recently developed and validated hybrid $PM_{2.5}$ models provide substantially better exposure estimates for epidemiology at much finer resolution. Epidemiologic studies using the hybrid model exposure estimates are better and more informative because they are more representative of the population and of the range of exposures, more precise, more statistically powerful, and less biased towards weak associations. The powerful, new U.S. and Canadian studies in the PA clearly show the increased mortality associated with long-term exposures below the current annual standard and independently observed with short-term exposures below the current 24-hour standard. He commended EPA for summarizing this in the PA, but rejected their arguments for retaining the current standard as specious. Dr. Frampton asked whether Dr. Dockery found the PA document has adequately addressed potential uncertainties. Dr. Dockery indicated that there are many sources of uncertainty, both exposure assessment and confounding. He stated that the epidemiological data and modeling methods used were robust in controlling for confounding variables and model specification errors. Dr. Cox asked what the mean square error was referring to. Dr. Dockery indicated that was the error in the hybrid model used in the Di et al. study for areas, not for individuals. Dr. Cox asked if there were two different populations who have the same estimated exposure based on remote sensing, etc., in the presence of measurement error, are the people who responded likely to have been exposed to higher levels than the people who did not respond, given that they have the same estimated exposure. Dr. Dockery stated that he did not understand the question.

Jon Barela, The Borderplex Alliance, stated that there are gaps in EPA's analysis including: lack of a systematic methodology with appropriate justification or criteria to select studies; lack of consideration of significant confounder issues such as smoking, socioeconomic factors, age, and temperature; lack of appropriate evaluation or consideration of the statistical modeling applied in the selected studies; and lack of quality, transparency, reproducibility, and uncertainties in the studies reviewed. He urged CASAC to recommend retaining the current standard for this review cycle and addressing the above issues for the next review cycle.

Chad Whiteman, U.S. Chamber of Commerce, urged CASAC to recommend that any basis to distinguish between NAAQS options are quantitatively identified and associated uncertainties evaluated, when discussing any projected benefits that form the basis of modification or retention of the NAAQS. He stated that NAAQS compliance has the potential to adversely impact jobs, business investment, and permitting in a broad range of important economic sectors and activity. He indicated that although the Supreme Court ruled that costs cannot be considered in the setting of the level of the NAAQS, there was no contradiction for the CASAC to provide advice on any adverse economic impacts that may result in

implementation of the NAAQS. He stated that the Chamber is encouraging CASAC to recommend that the Administrator retain the current level of the PM NAAQS.

George Thurston, New York University School of Medicine, presented oral comments on behalf of the North American Chapter of the International Society of Environmental Epidemiology. He made several points with regard to the peer review of the PM PA: that CASAC should follow the advice of the IPMRP; that the latest scientific evidence indicates the current PM standards are not sufficient to protect public health and need to be made stricter; and that CASAC should add composition-based PM standards to more effectively protect against the most toxic components of PM. Dr. Cox asked if he believed that propensity score methods were robust to model misspecification error. Dr. Thurston referred him to Joel Schwartz.

Mary Rice, American Thoracic Society (ATS) Environmental Health Policy Committee, provided an oral statement[20] that focused on: the lack of an independent CASAC; clear evidence of serious health effects, including death, at exposures within the current NAAQS; that the annual standard needs to be lowered to 8 $\mu g/m^3$ and the 24-hour standard needs to be lowered to 25 $\mu g/m^3$; and that studies show no evidence of a threshold below which health effects of PM do not occur and therefore future cost/benefit analyses for PM should not falsely assume such a threshold exists. Dr. Cox asked that when describing adverse effects occurring at exposure levels below the current standard whether those were estimated exposures. Dr. Rice indicated that they were estimated exposures.

Peter Adams, Carnegie Mellon University, commended EPA staff for doing a good job on the PM PA. He also expressed consternation that EPA leadership has abandoned a tried and true process for NAAQS reviews, which was not broken. He expressed his concern about the overblown and dangerous level of skepticism that well-established epidemiological science has received in parts of this process. Lastly, he agreed with his colleagues on the IPMRP that EPA should give due consideration to the 24-hour standard as well as the annual standard.

Kevin Sunday, Pennsylvania Chamber of Business and Industry, stated that Section 109d of the Clean Air Act charges CASAC to not just focus on health and epidemiology, but also on economic and social impacts of implementation strategies to attain the NAAQS. He stated that it was puzzling why the PA did not include implementation strategies. He noted that industrial sources were a small contributor to PM emissions and that dust, agriculture, and fires, as non-point source contributors were larger contributors. He stated that there is no viable compliance mechanism for EPA to address those sources, leaving the brunt of compliance on industrial sources.

Bernard Goldstein, University of Pittsburgh Graduate School of Public Health (retired), indicated that Congress established the independent scientific committees at EPA to safeguard against the political arm of EPA exerting influence over the science/research arm of EPA and that what is currently happening at EPA is an attack against this provision. He stated that he served under Administrator Gorsuch, who had a disregard for science, but never messed with the integrity of the CASAC process. If she ever attempted anything close to what is actually happening now, he would have certainly resigned. Although there has been some marginal improvements to the process since his last comments, his conclusions that the CASAC members should consider resignation remain unchanged.

Shana Joyce, Texas Oil and Gas Association, stated that the draft approach in the PA has major limitations. She stated that retaining the current standard should be more heavily weighted in the options included in the draft PA. The draft PA appears to deemphasize various issues such as exposure measurement errors, exclusion of key studies and estimating pseudo design values, and an overreliance

on controlled human exposure studies. She indicated that the Texas Oil and Gas Association does not believe the evidence supports changing the PM standard.

John Dale Dunn, American Council on Science and Health NYC and Heartland Institute, Chicago, indicated that he was emphasizing several points from his written comments.[21] He stated that under the tenure of Administrator Browner, there was a conscious decision to fund and reference faulty epidemiological claims to support regulatory policy and that, prior to that time, CASAC adhered to the science promulgated by the *Reference Manual on Scientific Evidence* of the Federal Judicial Center. He stated that the EPA's failure to recognize, sponsor, and fund small particle effects research by scientists who recognize and adhered to the Bradford Hill Rules on proof of causation in epidemiological studies is unacceptable and administrative/scientific/policy malfeasance. He stated that the EPA has violated the basic rules of epidemiology and the PA is full of small association studies and claims of harm from $PM_{2.5}$ that cannot be supported by reliable epidemiological and toxicological scientific research.

The meeting was adjourned by Mr. Yeow at 2:35 pm.

Respectfully Submitted:	Certified as Accurate:	
/s/	/s/	October 31, 2019
Mr. Aaron Yeow	Dr. Louis Anthony Cox, Jr.	Date
Designated Federal Officer	Chair	
EPA SAB Staff Office	CASAC	

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 consensus advice from the Committee 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 October 22, 2019 meeting webpage: https://yosemite.epa.gov/sab/sabproduct.nsf/MeetingCal/A2DF51609E3DFC9C85258473006CF120?OpenDocument

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[1] *Policy Assessment for the Review of the National Ambient Air Quality Standards for Particulate Matter (External Review Draft – September 2019)*
[2] Chartered CASAC Roster
[3] Agenda
[4] Federal Register Notice Announcing the Meeting
[5] List of Registered Public Speakers
[6] Oral Statement from Julie Goodman, Gradient
[7] Oral Statement from H. Christopher Frey, North Carolina State University
[8] Selection of Literature on Validation of Modern Causal Analysis and Inference Methods from Dr. Tony Cox
[9] Written Comments from the Independent Particulate Matter Review Panel
[10] Oral Statement from John Bachmann, Environmental Protection Network
[11] Oral Statement from Giffe Johnson, National Council for Air and Stream Improvement (NCASI)
[12] Oral Statement from George Allen
[13] Oral Statement from Stewart Holm, American Forest & Paper and American Wood Council
[14] Oral Statement from Skip Brown, Asphalt Consulting Services, LLC
[15] Oral Statement from Ted Hadzi-Antich, Texas Public Policy Foundation
[16] Written Comments from Ted Hadzi-Antich, Texas Public Policy Foundation
[17] Oral Statement from Annette Rohr, Electric Power Research Institute
[18] Oral Statement from Anne Smith, NERA Economic Consulting
[19] Oral Statement from Lianne Sheppard, University of Washington
[20] Oral Statement from Mary Rice, American Thoracic Society Environmental Health Policy Committee
[21] Written Comments John Dale Dunn, American Council on Science and Health NYC, and Heartland Institute, Chicago

ATTACHMENT A – Other Attendees

Name	Affiliation
Allen, George	
Akers, Brad	
Allen, Phil	
Alman, Breanna	
Bachmann, John	Environmental Protection Network
Baer, Louis	Portland Cement Association
Becker, Michelle	USEPA
Billings, Paul	American Lung Association
Black, Hank	BirminghamWatch.org
Blake, Uni	American Petroleum Institute
Bloomer, Bryan	USEPA
Brown, James	USEPA
Brown, Marie	South Carolina DHEC
Buckley, Barbara	USEPA
Burkett, Jeff	Liberty Utilities
Butler, Craig	
Calma, Justine	
Cascio, Wayne	USEPA
Cashin, Michael	Minnestoa Power (ALLETE)
Chan, Elizabeth	USEPA
Chudow, Amanda	NYSDEC
Coffman, Evan	USEPA
Cone, Shane	DNREC
Copeland, Andrea	Phillips 66
Copley, Bruce	ExxonMobil Biomedical Sciences, Inc.
Corrales, Mark	USEPA
Cory-Slechta, Deborah	University of Rochester
Cromar, Kevin	New York University
Curtis, Holly	NESCAUM
Damberg, Rich	USEPA
Daniels, Rebecca	USEPA
Davidson, Kenneth	USEPA
Dolwick, Pat	USEPA
Dominici, Francesca	Harvard University
Dutton, Steven	USEPA
Enstrom, James	UCLA and Scientific Integrity Institute
Ewart, Gary	American Thoracic Society
Felker-Quinn, Emmi	USEPA

Name	Affiliation
Fine, Philip	South Coast Air Quality Management District
Fraiser, Lucy	
Frey, Betsy	Delaware DNREC/DAQ
Frey, H. Christopher	North Carolina State University
Frisby, Bradford	National Lime Association
Fritz, Patricia	NY State Department of Health
Fuller, Christine	Georgia State University
Gerhart, Seth	
Gledhill, Jonathan	Policy Navigation Group
Goldman, Gretchen	Union of Concerned Scientists
Goldstein, Bernard	University of Pittsburgh Graduate School of Public Health
Goodman, Julie	Gradient
Gorman, Teresa	LPI
Graham, John	
Greaver, Tara	USEPA
Greenbaum, Dan	Health Effects Institute
Hale, Zack	S&P Global Market Intelligence
Hansen, Michael	Gasp
Hantman, Irene	Verdant Law
Hassett-Sipple, Beth	USEPA
Herrick, Jeff	USEPA
Hersher, Rebecca	NPR
Hetes, Bob	USEPA
Hines, Erin	USEPA
Hogue, Cheryl	Chemical & Engineering News
Hotchkiss, Andrew	USEPA
Hoyer, Marion	USEPA
Hulse-Moyer, Laurie	Washington State Department of Ecology
Irby, Sebastian	
Isied, Margaret	
Jacobs, Wendy	
Jarabek, Annie	USEPA
Jenkins, Allison	TCEQ
Jenkins, Scott	USEPA
Johnson, Giffe	
Johnson, Seth	Earthjustice
Johnston, Greg	
Jones, Ryan	USEPA
Jones, Samantha	USEPA
Kalisz, Cathe	API

Name	Affiliation
Katz, Stacey	USEPA
Kaufmann, Rob	
Kaylor, Doug	USEPA
Kennedy, Diamond	NPR
Kerr, Lukas	USEPA
Kim, A.	
Kirrane, Ellen	USEPA
Kruger, Nancy	NACAA
Lamson, Amy	USEPA
Langworthy, Cindy	Hunton Andrew Kurth LLP
Lavelle, Marianne	InsideClimate News
Lavoie, Emma	USEPA
Lebens, Bob	WESTAR
Lefohn, Allen	A.S.L. & Associates
Lein, Mckayla	USEPA
Limaye, Vijay	Natural Resources Defense Council
Liu, Coco	Electric Power Research Institute
Long, Chris	
Long, Tom	USEPA
Lopez, Daniella	
Luben, Tom	USEPA
Marshall, Kristin	
Mazza, Karl	USEPA
McCaslin, Steve	
McDow, Steve	USEPA
Miller, Andy	USEPA
Mingle, Jonathan	
Miyasato, Lori	CARB
Mongoven, Karen	National Association of Clean Air Agencies
Mongoven, Karen	
Moutinho, Jennifer	ExxonMobil Biomedical Sciences, Inc.
Nichols, Jen	USEPA
Niebling, William	
Nolan, Sean	State Government
Nolen, Janice	American Lung Association
Novak, Kris	PA DEP
Ondras, Martha	Tufts University
Orlin, David	USEPA
Owens, Beth	USEPA
Papadogeorgou, Georgia	Duke University
Parent, Stephanie	

Name	Affiliation
Parker, Stuart	IWP News
Paunio, Mikko	
Peffers, Mel	House E&C Committee
Plautz, Jason	
Popovech, Marusia	ExxonMobil Biomedical Sciences, Inc.
Prettyman, Mark	
Raso, Lindy	Health Effects Institute
Rech, Amee	
Rees, Sarah	South Coast Air Quality Management District
Reilly, Sean	E&E News
Reyes, Jeanette	USEPA
Rice, Richard	USEPA
Richmond-Bryant, Jen	USEPA
Rizzo, Albert	American Lung Association
Rohr, Annette	Electric Power Research Institute
Ross, Mary	USEPA
Russo, Andrew	Illinois EPA
Sacks, Jason	USEPA
Saiyid, Amena	Bloomberg Environment
Salas, Paola	
Samet, Jonathan	Colorado School of Public Health
Sasser, Erika	USEPA
Schreiber, Danielle	Verdant Law PLLC
Schwartz, Joel	Harvard University
Shaikh, Rashid	
Shallal, Sue	USEPA
Sheppard, Lianne	University of Washington
Shprentz, Deborah	Atmospherix
Silverman, Steve	NGO
Skipper, Nash	
Smith, Linda	California Air Resources Board
Song, Jamie	
Steichen, Ted	American Petroleum Institute
Thayer, Kris	USEPA
Thurston, George	NYU School of Medicine
Tollefson, Jeff	Nature
Uhl, Mary	
Valberg, Peter	
Vinig, Rose	
Wajda-Griffin, Scott	New York State Department of Environmental Conservation

Name	Affiliation
Wakelyn, Phillip	
Weitekamp, Chelsea	USEPA
Wesson, Karen	USEPA
Winner, Darrell	USEPA
Woock, Steve	Weyerhaeuser Company
Wu, D Pei	Oregon DEQ
Wulf, Brian	Exxon Mobil Corporation
Zarba, Chris	
Zigler, Corwin	The University of Texas at Austin