

**U.S. Environmental Protection Agency  
EPA Science Advisory Board (SAB) Staff Office  
Clean Air Scientific Advisory Committee (CASAC)  
CASAC Lead Review Panel**

**Summary Meeting Minutes of the CASAC’s Public Advisory Meeting**

**Tuesday, February 28, 2006 – 9:00 a.m. to 5:30 p.m. Eastern Time  
Wednesday, March 1, 2006 – 8:30 a.m. to 2:30 p.m. Eastern Time**

**Hilton Durham near Duke University  
3800 Hillsborough Road, Durham North Carolina, 27705**

**CASAC’s Peer Review of EPA’s *Air Quality Criteria for Lead*  
(*First External Review Draft*) (1<sup>st</sup> Draft Lead AQCD)**

Panel Members: See CASAC Lead Review Panel Roster – Appendix A

Agenda: See Meeting Agenda – Appendix B

Purpose: The purpose of this public meeting was for the CASAC Lead Review Panel to conduct its initial peer review of the *Air Quality Criteria for Lead (First External Review Draft)* (1<sup>st</sup> Draft Lead AQCD, December 2005).

Attendees:

Chair:	Dr. Rogene Henderson
CASAC Members:	Dr. Ellis Cowling Dr. James Crapo Dr. Frederick Miller Mr. Richard Poirot Dr. Frank Speizer Dr. Barbara Zielinska
Panel Members:	Dr. Joshua Cohen Dr. Deborah Cory-Slechta Dr. Bruce Fowler Dr. Andrew Friedland Dr. Robert Goyer Mr. Sean Hays Dr. Bruce Lanphear Dr. Paul Mushak Dr. Michael Rabinowitz Dr. Joel Schwartz Dr. Ian Von Lindern
EPA SAB Staff:	Mr. Fred Butterfield, CASAC Designated Federal Officer (DFO)

Dr. Tony Maciorowski, SAB Staff Office Associate  
Director for Science

Other EPA Staff: Tim Benner, ORD, OSP  
Lester Grant, ORD, NCEA-RTP  
John Hannon, OGC, ARLO  
Brooke Hemming, ORD, NCEA-RTP  
Jee Young Kim, ORD, NCEA-RTP  
Dennis Kotchmar, ORD, NCEA-RTP  
Karen Martin, OAR, OAQPS  
Zachary Pekar, OAR, OAQPS  
David Orlin, OGC, SWERLO  
John Vandenberg, ORD, NCEA  
Amy Vasu, OAR, OAQPS  
Tim Watkins, ORD, NERL  
Lydia Wegman, OAR, OAQPS  
Lewis Weinstock, OAR, OAQPS  
Lori White, ORD, NCEA-RTP

### Meeting Summary

The discussion followed the issues and general timing as presented in the meeting agenda (Appendix B).

### **TUESDAY, FEBRUARY 28, 2006**

#### Convene Meeting, Call Attendance, Introduction and Administration

Mr. Fred Butterfield, Designated Federal Officer (DFO) for the CASAC, opened the meeting and the teleconference line at 9:00 a.m., called attendance, and welcomed all attendees. He noted that CASAC is a Federal advisory committee chartered under the Federal Advisory Committee Act (FACA) to provide advice and recommendations to the EPA Administrator. Consistent with FACA regulations, its deliberations are held as public meetings and teleconferences for which advance notice is given in the *Federal Register*. The DFO is present at all such meetings to assure compliance with FACA requirements. Meeting minutes were taken (by DFOs from the SAB Staff Office) for this teleconference. The minutes will be certified by the CASAC (and Lead Review Panel) Chair and made available on the SAB Web site (<http://www.epa.gov/sab>). All Panelists have earlier submitted documentation with respect to possible financial conflicts-of-interest, which was reviewed by a SAB staff member prior to the meeting and found to be satisfactory.

Dr. Tony Maciorowski, SAB Staff Office Associate Director for Science, thanked the members of the CASAC Lead Review Panel for taking part in this review. He also thanked the managers and staff from the Agency's National Center for Environmental Assessment (NCEA), Research Triangle Park (RTP), NC.

### Purpose of Meeting and Welcome by EPA's National Center for Environmental Assessment

Dr. Rogene Henderson, CASAC and Lead Review Panel Chair, briefly stated the purpose of the meeting, which was to provide a peer review of the 1<sup>st</sup> Draft Lead AQCD.

Dr. John Vandenberg, Acting Associate Director for Health, EPA's National Center for Environmental Assessment, gave a brief welcome from NCEA and also thanked the members of the Lead Panel for their participation in this review.

### Overview of Lead NAAQS Review Process and Projected Schedule (OAQPS) and Overview Presentation on EPA's 1<sup>st</sup> Draft Lead AQCD (NCEA-RTP)

Dr. Karen Martin of EPA's Office of Air Quality Planning and Standards (OAQPS) gave a brief overview of the process for the review of the national ambient air quality standard (NAAQS). Dr. Martin also spoke from the OAQPS' *Plan for Review of the National Ambient Air Quality Standards for Lead* (February 2006). (OAQPS' Lead NAAQS can be accessed at the following URL: [http://www.epa.gov/ttn/naaqs/standards/pb/s\\_pb\\_cr\\_pd.html](http://www.epa.gov/ttn/naaqs/standards/pb/s_pb_cr_pd.html); and a hard-copy of this document is also found in the EPA Science Advisory Board (SAB) staff office's FACA file for this meeting.)

Dr. Les Grant, Director of NCEA-RTP, and members of his staff gave a detailed overview presentation that addressed the *Air Quality Criteria for Lead (First External Review Draft)*, including highlights and relevant issues associated with each chapter of the 1<sup>st</sup> Draft Lead AQCD. (A hard-copy of the NCEA-RTP presentation is located in FACA file for this meeting.)

### Public Comment Period

Mr. Butterfield facilitated the formal public comment period. (A summary listing of the public speakers is found in Appendix C.)

- Mr. Peter Goode, P.E., Washington University in St. Louis Interdisciplinary Environmental Clinic – Speaking on behalf of the Missouri Coalition for the Environment and Jack and Leslie Warren, Mr. Goode's comments covered four areas: (1) the neurotoxic effects of lead; (2) the air lead to blood lead level relationship; (3) the lead emissions inventory; and (4) the ambient lead monitoring network. Their first concern related to the relationship between ambient air lead concentrations and blood lead levels; specifically, that the draft Lead AQCD underestimates the contribution of air lead to blood lead levels. Mr. Goode noted that the draft Lead AQCD document needs to clearly establish the air-lead and soil-lead relationship to blood lead levels. Their second concern relates to quantification of lead emissions, *i.e.*, that the inventory of lead emissions in Chapter 2 is deficient. Finally, he noted that ambient monitoring data is severely lacking in the draft Lead AQCD. In summary, Mr. Goode stated that, while they believe that the draft Lead AQCD does a good job of addressing the fact that there is no safe blood lead level, it needs to provide both: a clear method and rationale for relating the contribution of air lead to blood lead levels; and more information and analysis for both lead emission and ambient lead monitoring. (A hard-copy of Mr. Goode's presentation is located in FACA file for this meeting.)

There was opportunity for questions for the presenter from the members of the Lead Panel following Mr. Goode's presentation.

### Summary of CASAC Lead Review Panel Discussion and Deliberations re: the 1<sup>st</sup> Draft Lead AQCD

#### **Chapter 2 (Chemistry, Sources, and Transport of Lead)**

Overall, Lead Panel members found Chapter 2 to be a well-written section of the 1<sup>st</sup> Draft Lead AQCD that provides an adequate summary of the pertinent information regarding chemistry, natural and anthropogenic sources and transport of lead in the environment.

Some of the specific issues and concerns with Chapter 2 that Panel members expressed were as follows:

- The information in the document relative to production, active sources, emission rates, particle size, total lead emissions and ambient air lead levels is outdated or missing. The Lead Panelists noted that accurate and up-to-date emissions inventory data are critical to establishing and implementing health- and environmental-protective standards for lead in ambient air.
- Agency staff have limited their review of the lead scientific criteria to information that is available in the peer-reviewed literature. Panel members felt that better information and associated data relative to lead production, emissions, industry transition and economic indicators might be available in the trade literature and Federal agency records. If that is the case, the Panel noted that data quality and reliability should be assessed and discussed as this information is incorporated in the Lead AQCD.
- This chapter also fails to put the various lead emission categories in a broader historic, national and global context, while acknowledging local problem areas in the U.S. In addition, it is somewhat fragmented, and is not well-integrated with the remainder of the 1<sup>st</sup> Draft Lead AQCD. For example, several sources and source categories are listed, but it is not clear which are most important. Finally, a number of additional examples that tie chemical and physical mechanisms in environmental and biological processes (*e.g.*, with respect to particle size) to material presented later in the AQCD would be useful.

#### **Chapter 3 (Routes of Human Exposure to Lead and Observed Environmental Concentrations)**

The Lead Panel thought that, in general, this chapter represented a good discussion of the key aspects of this technical field. However, Panel members noted several modifications that would enhance the chapter, including: the addition an overview and introduction; a better description of the systematic approach that the Agency used to identify the critical papers on lead exposure published since 1990; and a stronger focus on the relative contributions of various sources of lead exposure. The Panel was of the opinion that information on lead from multi-media sources should be included in the Lead AQCD, and noted that not all smelter, lead refineries, and lead corroding works have been identified.

Other specific issues and concerns that Lead Panel members expressed with Chapter 3 were as follows:

- The chapter includes substantial information about dust lead as opposed to airborne lead, although the discussion of their inter-connectedness should be strengthened. The Panel members deemed this important because these two exposure sources are substantially interrelated, and dust is the most likely exposure source for children in contemporary settings. Panelists felt that, for clarity, information on these two related exposure sources should be organized into two separate sections of Chapter 3. Moreover, the chapter should also include a discussion of how human activity affects soil and road dust.
- This chapter omits information on studies that relate drinking water lead to blood lead. Since the Agency is also in the process of revising its lead standard for drinking water, Panel members thought that this updated information should be included in this chapter.
- Chapter 3 should include an explanation of the contribution and trends in lead exposure, such as the fact that the various sources of lead intake are cumulative, and that blood lead (in children) and bone lead (in adolescents and adults) are cumulative biomarkers of lead exposure.
- The Lead AQCD should describe the relative contribution of various sources of lead exposure by age (particularly in children) in the relevant epidemiologic studies (for example, early-childhood exposure to, and intake of, lead-contaminated floor dust, as compared with: lead-contaminated windowsill dust that is not a major source of intake until the second year of life, when children stand upright; and soil ingestion, which peaks during the second year of life and diminishes thereafter.
- Panel members also felt that the chapter gave the impression that exterior sources of lead are a more significant contributor to lead in house dust than interior sources such as lead-contaminated paint. While this may be true for mining, milling or smelting communities, it is not true for many older urban communities. Finally, several members of the Panel opined that the Agency needs to include studies that demonstrate adverse health effects due to lead exposure, especially at low levels of lead exposures, in order to help address the question whether the current Lead NAAQS are adequate to protect the public health.

#### **Chapter 4 (Models of Human Exposure That Predict Tissue Distribution of Lead)**

The members of the Lead Panel were generally complimentary with respect to Chapter 4, noting that Agency staff have provided a good, basic discussion of the strengths and weaknesses of the various kinetic-based dosimetry models for lead in humans incorporating the various exposure routes. Nevertheless, the chapter is currently missing a “bottom line” as to which model or models would be the most appropriate for use in the assessment of potential risks in humans from lead exposure. Panelists recognize that there is a need for models to relate blood lead levels to environmental lead concentrations. However, some members of the Panel feel that the most scientifically-valid approach is by using biokinetic and physiologically-based models, while others are of the opinion that slope-factor (*i.e.*, epidemiologic) models are better-suited for this purpose. The Lead Panel emphasized that Agency staff need to conduct a careful and thorough comparison of the usefulness of these two broad type of models in the 2<sup>nd</sup> Draft of the Lead

AQCD. This assessment should include an evaluation of the suitability of the Leggett and O’Flaherty models, as well as a “validation” of the Integrated Exposure Uptake Biokinetic (IEUBK) model for lead in children. In addition, the Panel does not consider that EPA’s “All-Ages” Lead Model (AALM) is ready for “prime time” use in routine applications since it is still under development; therefore, the material related to the AALM should be minimized in this chapter.

Lead Panel members expressed other issues and concerns with Chapter 4, including:

- The chapter currently focuses on blood lead in children, but the epidemiology data provide results for adverse effects in adults as well. Thus, Chapter 4 need to provide more information for predicting blood lead levels in adults. (The Panel noted that the IEUBK model, which is the model most currently used, only addresses children up to seven years of age.)
- Chapter 4 does not adequately address lead deposition and clearance by the inhalation exposure route, nor does it recognize the importance of lead particle size in determining where and how much lead is deposited in various regions of the human respiratory tract. In addition, more specifics are needed with respect to the bioavailability of lead once it has been ingested, inhaled or absorbed through the skin.

The DFO adjourned the meeting for the day at approximately 5:30 p.m.

## **WEDNESDAY, MARCH 1, 2006**

### Reconvene Meeting, Call Attendance

Mr. Butterfield reopened the meeting and the teleconference at 8:30 a.m., called attendance, and welcomed all attendees back to the second day of the meeting.

### Re-cap of Previous Day’s Meeting

Dr. Henderson suggested that the Panel move directly into the second day’s public comment period, the purpose of which is to permit members of the public who were unable to provide their oral comments on the first day with an opportunity to do so.

### Additional Public Comment Period

Mr. Butterfield facilitated the formal public comment period. (A summary listing of the public speakers is found in Appendix C.)

- Dr. Craig Boreiko, International Lead Zinc Research Organization (ILZRO) – Speaking on behalf of ILZRO, Dr. Boreiko noted as a general comment that much of the 1<sup>st</sup> Draft Lead AQCD is well-written and logically organized. However, he then went on to identify the following potentially-problematic aspects of the document: apparent. (1) Although the annexes to the Lead AQCD describe (in tabular format) many studies conducted on the

health effects of lead, only some of these studies are subsequently covered in the narrative review; (2) the tabular summaries in the annexes contain valuable information regarding the strengths and weaknesses of individual studies, but these did not appear to translate to the narrative review; (3) many seemingly-rigorous studies are ignored in the narrative review, and preferential attention is given to a subset of studies that appear to be deficient in a variety of key technical criteria; (4) the impression given in the draft Lead AQCD is that studies were critiqued, and the critiques ignored information in favor of a simplistic compilation of those studies that show effects at the lowest exposure levels; (5) in a number of instances, the document describes effects of lead, but the clinical significance that is to be attributed to the described effects is left uncertain; and (6) there are numerous instances where the draft Lead AQCD makes assertions about health effects without providing justification for the claims being made. (A hard-copy of Dr. Boreiko's presentation is located in FACA file for this meeting.)

There was opportunity for questions for the presenter from the members of the Lead Panel following Dr. Boreiko's presentation.

#### Additional NCEA-RTP Comments

Dr. Grant did not have any additional comments, other than thanking Panel members for yesterday's discussions.

#### Summary of CASAC Lead Review Panel Discussion and Deliberations re: the 1<sup>st</sup> draft Lead AQCD

### **Chapter 5 (Toxicological Effects of Lead in Laboratory Animals, Human, and *In Vitro* Test Systems)**

Lead Panel members felt that this chapter needed better organization and the addition of brief summaries to conclude each section. Significantly, Panel members noted that the current draft air quality criteria document for lead does not adequately or critically cover the experimental animal behavior literature that has been published since the last iteration of the Lead AQCD — and which shows blood lead level results that are comparable to the effects seen in humans at corresponding exposures. Instead, the authors choose to focus primarily on the neurochemical and electrophysiological effects of lead, although it was also noted that the levels of these effects are not clearly laid-out.

Furthermore, the blood lead levels at which effects are observed is inconsistently reported, and does not reflect the significant new information related to the basis of reported changes in IQ as found in the recent lead-toxicity literature. In addition, the discussion of cardiovascular effects of lead exposure need to briefly summarize the earlier literature that establishes the lead-blood pressure association before delving into the discussion of research studies that suggest potential pathways for that association.

Lead Panel members had wide-ranging concerns with respect to the portion of this chapter that discussed the neurobehavioral effects of lead exposure, and judged this section to be cursory and

incomplete. Specifically, Chapter 5 presented contradictory findings that are neither explained nor adequately-evaluated; and in addition, it does not include an update of the neurobehavioral literature published since the Agency issued its previous Lead AQCD (studies that are deemed to be especially important since they relate to those behavioral mechanisms that underlie cognitive deficits and, almost certainly, the observed changes in IQ). Thus, the Lead Panel recommends that this chapter undergo significant revision.

### **Chapter 6 (Epidemiological Studies of Human Health Effects Associated with Lead Exposure)**

The Lead Panel found Chapter 6 to be well-organized in its presentation of the findings from its previous (1986 and 1990) update of the Lead AQCD, and then updating the published literature to 2005. Nonetheless, it reflects the input of multiple authors, and as a result is highly redundant in parts, which merits substantial editing. Of greater significance is that multimedia exposure sources are not adequately presented in this chapter (*e.g.*, multiple biomarker methods). Moreover, while there are appropriate references to the accompanying Annex Tables, there are places where the insertion of a summary graph or table, *etc.* in the text would be helpful to the reader, especially in the discussion of neurobehavioral effects of low levels of lead exposure. Members of the Lead Panel also noted that traditional confounding factors occur among children who have higher blood levels, but not among children with lower blood lead levels.

Panel members also had a number of specific issues and concerns with this chapter, including:

- the issue of measurement error in outcomes or exposure, without any accompanying discussion of the statistical implications of measurement error for epidemiological findings;
- the discussion suggesting that long-term lead body burden represents the definitive benchmark for exposure, noting instead that acute exposures affecting blood lead levels may or may not change body burden but may still be important predictors of adverse effects; and
- insufficient coverage of chronic kidney disease.

Finally, Panel members suggested several data sets to Agency staff for the purpose of testing a number of the models being considered, and recommended that these be incorporated into the 2<sup>nd</sup> Draft AQCD for Lead.

### **Chapter 7 (Integrative Synthesis)**

NCEA-RTP staff did not complete the critical integrative synthesis chapter in time for the release of the 1<sup>st</sup> Draft Lead AQCD. The Agency is developing Chapter 7 for the 2<sup>nd</sup> Draft Lead AQCD, which will be reviewed by the Lead Panel in June 2006.

## **Chapter 8 (Environmental Effects of Lead)**

The Lead Panel felt that this final chapter in the 1<sup>st</sup> Draft Lead AQCD was well-organized and contained thorough and well-written summaries of the vast body of knowledge of terrestrial and aquatic effects of “atmospherically-deposited” lead. That having been said, Lead Panel members recommended that Agency staff include a detailed summary of the state of the science regarding the adverse effects of lead on both public health and the environment in the Executive Summary and the Integrative Synthesis chapter in its forthcoming 2<sup>nd</sup> Draft Lead AQCD. In particular, the Panel requested that the information in this chapter be presented in such a way that it informs the issue of whether the EPA Administrator should either retain, or increase or decrease, the present secondary (and primary) Lead NAAQS of 1.5  $\mu\text{g}/\text{m}^3$ .

The Panel also noted that the Nation has achieved substantial decreases in both air concentrations and atmospheric deposition of lead into the environment in recent decades, and that, therefore, the most current exposures of living organisms and ecosystems to lead are caused primarily by a redistribution of environmentally-persistent airborne lead that was previously-deposited in soils, sediments, and surface waters before the U.S. phased-out leaded gasoline in several decades ago. This, it would be helpful if the revisions to Chapter 8 in the 2<sup>nd</sup> Draft of the Lead AQCD would also consider the environmental effects of lead that might result from any current or anticipated future changes in atmospheric lead emissions, concentrations or deposition, including those that might be associated with either changes in global climate (and climate processes) or prospective loosening or tightening of air-quality regulations. EPA staff should also discuss expected future monitoring needs.

Finally, the Panel members were pleased to see that Chapter 8 included a reasonably-thorough discussion of the alternative concepts of critical loads, critical limits, target loads, and target times, which are reflected in the welfare-effects literature published by European and Canadian researchers.

### Summary, Wrap-up, Next Steps and Closing Remarks

The Chair thanked all members of the Lead Panel for their participation in meeting, and asked all Panel members to please provide their inputs for the draft/letter report from this meeting to both her as the Chair and to Fred Butterfield as DFO by no later than Friday, March 10. In addition, the Chair requested that Panel members send her and the DFO their initial or revised individual review comments, which will be appended to the CASAC’s final letter/report for this meeting, by the same date.

The DFO adjourned the meeting at approximately 12:30 p.m.

Respectfully Submitted:

Certified as True:

/s/

/s/

*Fred A. Butterfield, III*

*Rogene Henderson, Ph.D.*

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Fred A. Butterfield, III  
CASAC DFO

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Rogene Henderson, Ph.D.  
CASAC Chair

## Appendix A – Roster of the CASAC Lead Review Panel

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**U.S. Environmental Protection Agency  
Science Advisory Board (SAB) Staff Office  
Clean Air Scientific Advisory Committee (CASAC)  
CASAC Lead Review Panel**

### **CHAIR**

**Dr. Rogene Henderson\***, Scientist Emeritus, Lovelace Respiratory Research Institute, Albuquerque, NM

### **MEMBERS**

**Dr. Joshua Cohen**, Faculty, Center for the Evaluation of Value and Risk, Institute for Clinical Research and Health Policy Studies, Tufts New England Medical Center, Boston, MA

**Dr. Deborah Cory-Slechta**, Director, University of Medicine and Dentistry of New Jersey and Rutgers State University, Piscataway, NJ

**Dr. Ellis Cowling\***, University Distinguished Professor-at-Large, North Carolina State University, Colleges of Natural Resources and Agriculture and Life Sciences, North Carolina State University, Raleigh, NC

**Dr. James D. Crapo [M.D.]\***, Professor, Department of Medicine, National Jewish Medical and Research Center, Denver, CO

**Dr. Bruce Fowler**, Assistant Director for Science, Division of Toxicology and Environmental Medicine, Office of the Director, Agency for Toxic Substances and Disease Registry, U.S. Centers for Disease Control and Prevention (ATSDR/CDC), Chamblee, GA

**Dr. Andrew Friedland**, Professor and Chair, Environmental Studies Program, Dartmouth College, Hanover, NH

**Dr. Robert Goyer [M.D.]**, Emeritus Professor of Pathology, Faculty of Medicine, University of Western Ontario (Canada), Chapel Hill, NC

**Mr. Sean Hays**, President, Summit Toxicology, Allenspark, CO

**Dr. Bruce Lanphear [M.D.]**, Sloan Professor of Children's Environmental Health, and the Director of the Cincinnati Children's Environmental Health Center at Cincinnati Children's Hospital Medical Center and the University of Cincinnati, Cincinnati, OH

**Dr. Samuel Luoma**, Senior Research Hydrologist, U.S. Geological Survey (USGS), Menlo Park, CA

**Dr. Frederick J. Miller\***, Consultant, Cary, NC

**Dr. Paul Mushak**, Principal, PB Associates, and Visiting Professor, Albert Einstein College of Medicine (New York, NY), Durham, NC

**Dr. Michael Newman**, Professor of Marine Science, School of Marine Sciences, Virginia Institute of Marine Science, College of William & Mary, Gloucester Point, VA

**Mr. Richard L. Poirot\***, Environmental Analyst, Air Pollution Control Division, Department of Environmental Conservation, Vermont Agency of Natural Resources, Waterbury, VT

**Dr. Michael Rabinowitz**, Geochemist, Marine Biological Laboratory, Woods Hole, MA

**Dr. Joel Schwartz**, Professor, Environmental Health, Harvard University School of Public Health, Boston, MA

**Dr. Frank Speizer [M.D.]\***, Edward Kass Professor of Medicine, Channing Laboratory, Harvard Medical School, Boston, MA

**Dr. Ian von Lindern**, Senior Scientist, TerraGraphics Environmental Engineering, Inc., Moscow, ID

**Dr. Barbara Zielinska\***, Research Professor, Division of Atmospheric Science, Desert Research Institute, Reno, NV

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

**Mr. Fred Butterfield**, CASAC Designated Federal Officer, 1200 Pennsylvania Avenue, N.W., Washington, DC, 20460, Phone: 202-343-9994, Fax: 202-233-0643 ([butterfield.fred@epa.gov](mailto:butterfield.fred@epa.gov))

\* Members of the statutory Clean Air Scientific Advisory Committee (CASAC) appointed by the EPA Administrator

## Appendix B – Meeting Agenda

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**U.S. Environmental Protection Agency  
EPA Science Advisory Board (SAB) Staff Office  
Clean Air Scientific Advisory Committee (CASAC)  
CASAC Lead Review Panel**

**Public Advisory Meeting**

**Tuesday, February 28, 2006 – 9:00 a.m. to 5:30 p.m. Eastern Time  
Wednesday, March 1, 2006 – 8:30 a.m. to 2:30 p.m. Eastern Time**

***Hilton Durham near Duke University, 3800 Hillsborough Road, Durham, NC 27705***

**Meeting to Conduct a Peer Review of EPA’s 1<sup>st</sup> External Review  
Draft Air Quality Criteria Document (AQCD) for Lead**

**Meeting Agenda**

**Tuesday, February 28, 2006**

9:00 a.m.	<b>Convene Meeting; Call Attendance; Introductions and Administration; and Overview of Meeting Agenda</b>	Mr. Fred Butterfield, CASAC Designated Federal Officer (DFO)
9:10 a.m.	<b>Welcome &amp; Opening Remarks from EPA Science Advisory Board (SAB) Staff Office</b>	Dr. Tony Maciorowski, Associate Director for Science
9:15 a.m.	<b>Purpose of Meeting</b>	Dr. Rogene Henderson, Chair
9:20 a.m.	<b>Welcome from EPA’s National Center for Environmental Assessment</b>	Dr. John Vandenberg (tentative), Acting Associate Director for Health, EPA-NCEA
9:25 a.m.	<b>Overview of Lead NAAQS Review Process and Projected Schedule from EPA’s Office of Air Quality Planning and Standards</b>	Dr. Karen Martin, OAQPS
9:40 a.m.	<b>Overview Presentation on EPA’s 1<sup>st</sup> Draft Lead AQCD</b>	Dr. Les Grant, Director, NCEA-RTP; and other NCEA- RTP staff
10:30 a.m.	<b>Break*</b>	
10:45 a.m.	<b>Formal Public Comment Period</b>	Mr. Butterfield (Facilitator)
11:00 a.m.	<b>CASAC Lead Review Panel Discussion in Response to Charge Questions on 1<sup>st</sup> Draft Lead AQCD – Chapter 2: <i>Chemistry, Sources, and Transport of Lead</i></b>	Dr. Henderson, Lead Review Panel Members

\*Note: Periodic breaks will be taken as necessary and at the call of the Chair.

**Tuesday, February 28, 2006 (continued)**

12:00 p.m.	<b>Lunch (Hotel)</b>	
1:00 p.m.	<b>Continue CASAC Lead Review Panel Discussion on Chapter 2</b>	Dr. Henderson, Lead Review Panel Members
1:30 p.m.	<b>CASAC Lead Review Panel Discussion on Chapter 8: <i>Environmental Effects of Lead</i></b>	Dr. Henderson, Lead Review Panel Members
2:45 p.m.	<b>Break*</b>	
3:00 p.m.	<b>CASAC Lead Review Panel Discussion on Chapter 3: <i>Routes of Human Exposure to Lead and Observed Environmental Concentrations</i></b>	Dr. Henderson, Lead Review Panel Members
4:30 p.m.	<b>CASAC Lead Review Panel Discussion on Chapter 4: <i>Models of Human Exposure That Predict Tissue Distribution of Lead</i></b>	Dr. Henderson, Lead Review Panel Members
5:15 p.m.	<b>Summary, Wrap-Up and Next Steps</b>	Dr. Henderson
5:30 p.m.	<b>Adjourn Meeting for the Day</b>	Mr. Butterfield

**Wednesday, March 1, 2006**

8:30 a.m.	<b>Reconvene Meeting; Call Attendance</b>	Mr. Butterfield
8:35 a.m.	<b>Re-cap of Previous Day's Meeting</b>	Dr. Henderson
8:40 a.m.	<b>Public Comment Period**</b>	Mr. Butterfield (Facilitator)
8:55 a.m.	<b>Additional NCEA-RTP Comments</b>	Dr. Grant
9:00 a.m.	<b>Continue CASAC Lead Review Panel Discussion on Chapter 4</b>	Dr. Henderson, Lead Review Panel Members
9:45 a.m.	<b>Break*</b>	
10:00 a.m.	<b>CASAC Lead Review Panel Discussion on Chapter 5: <i>Toxicological Effects of Lead in Laboratory Animals, Humans, and In Vitro Test Systems</i></b>	Dr. Henderson, Lead Review Panel Members
11:30 a.m.	<b>Working Lunch (Hotel) Closing Remarks</b>	

Notes:

\*Periodic breaks will be taken as necessary and at the call of the Chair.

\*\*The purpose of the public comment period on the second day of the meeting is to permit members of the public who were unable to provide their oral comments on the first day with an opportunity to do so.

**Wednesday, March 1, 2006 (continued)**

12:15 p.m.	<b>CASAC Lead Review Panel Discussion on Chapter 6: <i>Epidemiologic Studies of Human Health Effects Associated with Lead Exposure</i></b>	Dr. Henderson, Lead Review Panel Members
2:15 p.m.	<b>Summary, Wrap-Up, Next Steps and</b>	Dr. Henderson
2:30 p.m.	<b>Adjourn Meeting</b>	Mr. Butterfield

## Appendix C – List of Public Speakers

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### List of Public Speakers

U.S. Environmental Protection Agency  
EPA Science Advisory Board (SAB)  
Clean Air Scientific Advisory Committee (CASAC)  
CASAC Lead Review Panel

### Public Advisory Meeting

Tuesday, February 28 & Wednesday, March 1, 2006

*Hilton Durham near Duke University*  
3800 Hillsborough Road, Durham North Carolina, 27705

Meeting to Conduct a Peer Review of EPA's 1<sup>st</sup> Draft External Review Draft  
Air Quality Criteria Document (AQCD) for Lead

#	Speaker's Name	Organizational Affiliation(s)	Organization(s) Represented (i.e., comments offered on behalf of)
1	Mr. Peter Goode, P.E.	Washington University in St. Louis, MO Interdisciplinary Environmental Clinic	Missouri Coalition for the Environment, and Jack and Leslie Warren
2	Dr. Craig Boreiko	International Lead Zinc Research Organization (ILZRO)	same