

**PARTICULATE MATTER AND OZONE (AIR)  
MID-CYCLE SUBCOMMITTEE****Meeting Summary  
Tuesday, September 18, 2007****Welcome and Outline of Purpose**

*Dr. Rogene Henderson, Lovelace Respiratory Research Institute, Subcommittee Chair*

Mr. Lawrence Martin called the meeting to order at 10:00 a.m. Dr. Rogene Henderson, welcomed the Subcommittee members and others to the face-to-face meeting of the Particulate Matter (PM) and Ozone (Air) Mid-Cycle Subcommittee. She explained that 2 years ago, the Board of Scientific Counselors (BOSC) conducted a program review of the PM and Ozone Program, shortly after Dr. Dan Costa was named the National Program Director (NPD) for Air. The PM and Ozone Mid-Cycle Subcommittee was formed to conduct a mid-cycle review to assess the progress that the program has made in implementing the recommendations from the 2005 program review and working toward achieving its goals. Dr. Henderson said that she really enjoyed reading the Multi-Year Plan (MYP) and was looking forward to learning about the program's progress during the past 2 years.

Dr. Henderson stated that an additional question had been added to the charge questions. There now are six charge questions—Question #5 is new and was added in the September 6 version. She read Charge Question #5 aloud and asked the members to confirm that they had received the most recent version of the charge questions. She then asked if the members had any objections to the charge questions or if they had any comments. When no objections or comments were offered, Dr. Henderson informed the Designated Federal Officer (DFO), Mr. Lawrence Martin, that the Subcommittee had approved the charge questions. Dr. Henderson then introduced Mr. Martin, who presented the DFO's remarks.

**DFO Welcome and Charge**

*Mr. Lawrence Martin, U.S. Environmental Protection Agency (EPA)/Office of Research and Development (ORD), Subcommittee DFO*

Mr. Lawrence Martin, DFO for the PM and Ozone (Air) Mid-Cycle Subcommittee, welcomed the members to the meeting and reviewed the Federal Advisory Committee Act (FACA) procedures that are required for all BOSC Subcommittee meetings. As the DFO for the Subcommittee, Mr. Martin serves as the liaison between the Subcommittee, the public, and EPA and ensures that all FACA requirements are met.

A contractor, Beverly Campbell from The Scientific Consulting Group, was present to take notes and capture the presentations and discussions of the meeting. She will prepare a summary of the meeting, which will be made available to the public after certification by the Subcommittee Chair. The Chair must certify the summary within 90 days of the meeting. The summary then will be posted on the BOSC Web Site (<http://www.epa.gov/osp/bosc>).

All meetings and conference calls involving substantive issues, whether in person, by phone, or by e-mail, that include one-half or more of the Subcommittee members must be open to the public and a notice must

be placed in the *Federal Register* at least 15 calendar days prior to the call or meeting. All documents must be made public as well. Notice of this meeting was published in the *Federal Register* on August 20, 2007. An electronic public docket was established for the meeting on the Federal Docket Management System (FDMS), which can be accessed at <http://www.regulations.gov>. The number to search for this docket is EPA-HQ-ORD-2007-0700. Mr. Martin mentioned that he had not received any requests for public comment prior to the meeting, but there is time set aside at 1:00 p.m. for public comments. Mr. Martin will call for public comments at that time, and each comment must be limited to 3 minutes.

Regarding financial conflicts of interest, Mr. Martin works with EPA officials to ensure that all appropriate ethics regulations are satisfied. Each Subcommittee member has filed a standard government financial disclosure report and completed ethics training. Subcommittee members must notify Mr. Martin if there is a potential conflict of interest with any of the topics being discussed as the Subcommittee performs its work.

Mr. Martin stated that there are no scheduled breaks on the agenda, but Dr. Henderson can suggest breaks as needed. He reminded the members that the purpose of the meeting is to review the progress made by the Air Program since the program review conducted in 2005.

Dr. Henderson explained that Dr. Costa was unable to attend the meeting in person so he sent Mr. Tim Watkins, Deputy Director of the Human Exposure and Atmospheric Sciences Division in ORD's National Exposure Research Laboratory (NERL), to make his presentation. She welcomed Mr. Watkins and invited him to begin his presentation.

Mr. Watkins stated that he would be giving three presentations. The first focused on the program's response to the recommendations of the BOSC program review conducted in 2005; the second presentation covered the draft revisions to the Air Multi-Year Plan (MYP); and the third dealt with the development of performance measures and connecting progress with the long-term goals (LTGs).

### **Review of Action Items: Response to Recommendations of the 2005 Program Review**

*Mr. Timothy Watkins, NERL/ORD/EPA*

Mr. Watkins identified nine recommendations that were contained in the program review report as well as ORD's responses to those recommendations.

*BOSC Recommendation:* Develop a formal process for assessing customers' satisfaction.

*ORD Response:* A survey was developed and distributed to the Office of Air and Radiation (OAR), the program's primary client, in the fall of 2005. Thirty-one clients in OAR received the survey and 26 responded (84 percent response rate). The program received an average score of 3.61 out of a possible 5.

*BOSC Recommendation:* Revise the wording of the LTGs.

*ORD Response:* The wording of the LTGs has been updated consistent with the BOSC recommendation.

*BOSC Recommendation:* LTGs should embrace two to three hypothesis-driven pilots to demonstrate the source-to-outcome concept.

*ORD Response:* The program currently is piloting near-road and accountability to demonstrate the source-to-outcome concept. An expert panel has been established to review the pilots.

*BOSC Recommendation:* ORD should reconsider the decision to divest from ozone health research.

*ORD Response:* In the late 1990s, ORD moved toward PM and away from ozone research. Budget reductions have made it difficult to focus on both. Ozone health research is conducted as part of multi-pollutant studies, but significant expansion of the ozone health program is unlikely in the immediate future.

*BOSC Recommendation:* ORD should take a leadership role in establishing multi-agency goals for PM-Ozone.

*ORD Response:* A cross-agency strategy and research plan for PM has been developed. Several interagency activities have been identified to coordinate research, including environmental public health tracking with the Centers for Disease Control and Prevention (CDC), co-funding Requests for Applications (RFAs) with the National Institute of Environmental Health Sciences (NIEHS), and collaborating with the Department of Transportation on near-roadways studies.

*BOSC Recommendation:* Commit to maintaining a strong intramural/extramural balance in the program.

*ORD Response:* This balance is being maintained. ORD recognizes the importance of the Science To Achieve Results (STAR) program and is working to maintain its presence in the Air Program. The funding for STAR grants to support this program has been \$17 million since 2005.

*BOSC Recommendation:* Funding decisions for active intramural research should be reviewed by the Research Coordination Team (RCT).

*ORD Response:* The ORD planning process changed with the appointment of the NPDs, but the program has retained the RCT to provide input on prioritization and strategic direction. The RCT provided input for the new MYP as well as the laboratory implementation plans and the near-roadways study.

*BOSC Recommendation:* Indicate in the MYP how National Research Council (NRC) goals flow into cross-cutting research.

*ORD Response:* The recommendations of the NRC are a major consideration and the links are evident in the Annual Performance Goals (APGs) in the MYP; the current draft of the MYP focuses more on the recent recommendations of the NRC rather than the original 10 goals (e.g., science to support the development and implementation of National Ambient Air Quality Standards [NAAQS]).

*BOSC Recommendation:* Identify, highlight, and set aside funds for anticipatory research needs.

*ORD Response:* There is no explicit funding of anticipatory research, but the laboratories and centers have flexibility. There is an initiative process within the Agency that can be employed to fund exploratory research.

## ***Discussion***

Dr. Henderson commented that this presentation addresses the Subcommittee's first charge question: Do the currently planned revisions to the Clean Air Research program adequately address the 2005 BOSC PM/Ozone program review recommendations? She asked if the Subcommittee members had any questions on ORD's responses. Mr. Bart Croes asked about the survey. What did the scores 1 through 5 mean? Could respondents give narrative feedback on the things that the program did well and identify where the program needs improvement? Mr. Watkins responded that the respondents could provide narrative responses. He asked if Ms. Laurel Schultz could address these questions. Ms. Schultz stated that there is some information in the binder about the survey, including its purpose, results, and conclusions. Although the 1 through 5 scores were associated with different terms for different questions, in most cases 1 = low and 5 = high. Mr. Croes asked if there were any common themes in the feedback. One theme was that clients think it is particularly important that ORD involve them in planning and prioritizing science efforts. This was one area identified for potential improvement; another area for improvement was communication between program offices and ORD. Ms. Schultz said she did not have the narrative responses with her, but she offered to review the responses to determine if there were any recurring themes. Dr. Henderson asked that this information be distributed to the Subcommittee members via e-mail.

Dr. Henderson inquired if the program had gotten any feedback on why a small number of managers did not think their clients respected ORD's scientific reputation. Ms. Schultz indicated that she would follow up on that question.

Dr. Christian Seigneur asked how the RCT was involved in prioritization. Mr. Watkins replied that the RCT is involved in development of the MYP and in the formulation of the research for near-roadways and other efforts. The RCT is also involved in the laboratory implementation planning efforts that build on the MYP. Ms. Schultz added that the NPD has identified a contact in the program offices to work with the program researchers so that the program offices understand the research and are aware of the progress. Mr. Watkins mentioned that the RCT also is involved in the development of request for proposals (RFAs) with ORD's National Center for Environmental Research (NCER).

Dr. Demerjian asked if the Health Effects Institute's (HEI) research is considered part of the program's extramural efforts. Mr. Watkins replied that it is not. He added that the program staff is very familiar with HEI's research but it is not considered part of ORD's program; it is used, however, by ORD to help formulate its program. Dr. Costa commented that the program staff members are in close contact with HEI and HEI researchers attend the program's stakeholders meetings. Dr. Costa also has discussed a joint workshop with HEI on near-roadways efforts. He is trying to make ORD's program complementary to HEI's program. Dr. Costa noted that ORD's NCER funds HEI research out of the Air Program budget, but ORD does not define it as part of its program. Dr. Demerjian noted that STAR grants usually are included in the ORD programs. Mr. Watkins asked Dr. Henderson if Ms. Stacey Katz from NCER could address this issue. Ms. Katz stated that HEI is an integral part of the program and HEI's research is included in the MYP. It is considered part of the program in terms of content but not in terms of dollars. She assured the Subcommittee members that HEI's work is integrated into the program. Dr. Costa mentioned that HEI's publications were not included in the bibliometric analysis because the Agency did not want to take credit for HEI's publications.

Dr. Peipei Ping asked for more specific data on the survey respondents who thought their clients did not respect ORD's scientific reputation. This is probably not an issue if the vast majority indicated that ORD scientists are respected by clients and only a small number disagreed. Did any of these respondents provide an explanation or identify specific elements they thought hindered the scientific reputation of the program scientists? Dr. Costa said that he did not recall any specific reasons associated with these responses. He speculated that it probably reflects the fact that the program's clients generally think that ORD is not doing enough to specifically address ecological issues. Also, the regional offices often have questions or problems for which they need answers now, and this is not always possible given budget constraints. Dr. Costa explained that the program is trying to improve communications with clients to address some of these issues. Ms. Schultz pointed out that there were only two managers (of the 26 respondents) who thought their clients did not respect ORD scientists; overall, the respondents were very positive. The program has not conducted the follow-up that needs to be done to find out more about these responses. Dr. Ping commented that it is not surprising to have a few respondents with a minority opinion; however, if there are specific issues that could be addressed to improve, the program should try to do so. Dr. Henderson agreed and asked ORD to determine if any of the respondents provided more detail.

Dr. Henderson asked if there were any other questions on the ORD responses to the BOSC's recommendations. When there were none, she asked Mr. Watkins to proceed with his second presentation on the new MYP.

## **Review of Draft Revisions to the Clean Air MYP**

*Mr. Timothy Watkins, NERL/ORD/EPA*

Mr. Watkins identified the changes that had been made to the Clean Air MYP compared to the previous MYP that was reviewed by the BOSC in 2005. These changes included:

- ✧ PM, Ozone, and Air Toxics have been integrated into one Clean Air MYP.
- ✧ The new MYP focuses on two LTGs.
- ✧ The emphasis of the new MYP is integration.
  - Leveraging across projects/program is used to the extent possible.
  - Annual Performance Measures (APMs) have ORD and OAR leads to ensure communication.
  - Transparency of Air Toxics theme.
  - Shift in research approach—multi-pollutant; source-to-health outcome and accountability.
  - Near Road—prototype model for source-to-health outcome.

Research priorities were established using a variety of inputs, including:

- ✧ NRC Subcommittees—two primary groups
  - PM Research Priorities, 1998-2004
  - Air Quality Management, 2004 (Clean Air Act Advisory Committee response, 2004)
- ✧ RCT—client representatives
  - OAR—Office of Air Quality Planning and Standards (OAQPS), Office of Transportation and Air Quality (OTAQ), Office of Radiation and Indoor Air (ORIA), and Office of Atmospheric Programs (OAP)
  - National Center for Environmental Assessment (NCEA)
  - Regions—member contributions and NPD visits
- ✧ Science Advisory Board (SAB) and BOSC Reviews
- ✧ Science—emerging issues
  - Senior managers and staff; national and international meetings
- ✧ Public—less frequent (reflected in regional input).

LTG 1 of the new MYP is to reduce uncertainty in the science that supports standard setting and air quality management decisions. This research will inform regulatory decision-making (e.g., NAAQS), provide science on source-priority hazardous air pollutants (HAPs), and support implementation of regulations with tools (methods and models) and information provided to OAR, regions, states, and tribes.

The science questions addressed by this LTG are:

- ✧ What is the role of physical-chemical characteristics of air pollutants in eliciting adverse short- and long-term health effects, especially in susceptible populations?
- ✧ Which sources of air pollution most severely impact exposure and health, and how does this vary across the country?
- ✧ What are the characteristics of air pollutant emissions from different types of sources, and how do transformations in the atmosphere affect air pollutant concentrations and human exposures?
- ✧ What are the expected future concentrations of air pollutants, and how can we evaluate and manage their potential adverse consequences?

The outcomes of the research addressing these science questions will include PM standard revisions that more effectively address: (1) size fractions, components, and sources responsible for adverse health effects; (2) health effects in susceptible populations; (3) health endpoints outside the cardiopulmonary system; (4) plausibility of air pollutant-induced health effects; and (5) improved understanding of exposure-dose-response relationships. Other outcomes include:

- ✧ Use of air quality and receptor models to develop State Implementation Plans (SIPs) and control strategies and forecast air quality.
- ✧ Use of advanced techniques to better characterize emissions and ambient concentrations of air toxics leading to improved risk management decisions.
- ✧ Use of advanced tools, models, and technologies to formulate policies to reduce PM level in residual non-attainment areas.
- ✧ Development of improved risk management strategies via better inventories and enhanced capacity to determine which sources contribute to measured ambient levels of PM.

LTG 2 of the new MYP is to reduce uncertainties in linking health and environmental outcomes to air pollution sources. Mr. Watkins identified three themes for this goal: (1) launch a multi-pollutant research program; (2) identify specific source-to-health linkages, with initial emphasis on “near-roadway” impacts; and (3) demonstrate effectiveness of the science and its dependent policy decisions (accountability). The approach is to integrate across science and program objectives, apply multidisciplinary approaches, and leverage with federal and other organizations.

The science questions addressed by LTG 2 include:

- ✧ How can we assess and manage risks from real-world exposures involving complex mixtures of air pollutants that fall into multiple physical-chemical classes?
- ✧ Which sources of air pollution most severely impact exposure and health, and how does this vary across the country?
- ✧ How can we determine how past regulatory decisions have impacted exposures to air pollution that lead to adverse health outcomes?

The outcomes of the research to address these scientific questions include:

- ✧ ORD research will be used to inform consideration of alternatives to a mass-based standard, and target air quality management strategies. Researchers and policy makers will use ORD tools to understand relationships between sources and ambient air concentrations.
- ✧ Federal, state, and local agencies will use ORD tools to measure gradients of emissions from roads, and understand what these mean for exposure and risk.
- ✧ Understanding of the contribution of specific sources to risks will be improved, thereby reducing the uncertainty associated with evaluating the public health impacts of those sources.
- ✧ Relationships that provide the capability to directly link field measurements to health indicators will be established.

- ✧ EPA will have a framework to assess the effectiveness of regulations and control strategies in reducing impacts to the environment and human health.
- ✧ ORD will identify technology performance issues for air quality officials who will use the information to improve performance and minimize releases.

Mr. Watkins then presented a diagram of the APGs by LTG theme for the period 2008-2012, noting that some APGs relate to more than one LTG theme, but have been assigned to a primary theme. The color-coding of the diagram made it easy to understand the links between the LTG themes and APGs as well as the timing of the planned research. The five themes in the diagram were: (1) support development of NAAQS and other air quality regulations, (2) support implementation of air quality regulations, (3) pursue a multi-pollutant approach, (4) identify source-to-health linkages, and (5) assess health and environmental improvements due to past Agency activities. The first two themes were related to LTG 1 and the remaining three to LTG 2. He mentioned that most of the APGs associated with LTG 2 are towards the end of the plan period (i.e., 2012).

Mr. Watkins then described the action plan for the Near Roadway Effects research. There is a pressing program and regional need to understand the PM and air toxic implications of near roadway exposures. What do we really know about near-roadway exposure? What are the health implications? What interventions exist and what is their value? The research will include asthma, birth defects, cardiovascular effects, and cancer.

The research plan includes characterization of sources and emissions (both combustion and mechanically generated), source apportionment, and the impact of traffic conditions (e.g., volume, speed, fleet mix). The program will assess the spatial and temporal variability in air quality, atmospheric processes, and the impact of environmental conditions (e.g., topography, meteorology). The near-roadway research action plan also addresses how air quality relates to exposure assessment (gradients, source apportionment), health effects (source apportionment, toxicology and epidemiology panel study), and indoor micro-environments (source impacts, mitigation). In 2008, emphasis will be placed on source characterization and atmospheric assessments; the emphasis will shift toward exposure assessments and health outcomes as 2012 approaches.

The LTG vision is to develop a multi-pollutant program in coordination with OAR. The program will build around the source-to-health outcome paradigm and include climate-air pollution interactions. The LTG 1:LTG 2 resource ratio will shift from 70:30 in 2008 to 40:60 by 2012. The program will develop a framework for Air Accountability with input from the upcoming NARSTO report and OAR collaboration. It will build upon a platform of pilot projects to develop and advance broader approaches and systems to evaluate progress toward air quality management goals.

### *Discussion*

Dr. Henderson asked what the near-roadway program would be analyzing for and Mr. Watkins replied that they would be analyzing for PM components using X-ray fluorescence and other means, source apportionment, volatile organic compounds (VOCs), and other toxic compounds. Dr. Henderson asked if they will be analyzing for lead. Mr. Watkins answered that they would be looking for lead in filters and elemental analysis.

Mr. Watkins said the near-roadway effort will begin in 2008 and will last about 4 years. The program wanted to set definitive start and stop points. The study will begin in Las Vegas with a focus on source characterization and atmospheric process and then expand to Detroit and Research Triangle Park to enhance exposure assessment capabilities and shift the focus to health effects outcomes.

Dr. Henderson mentioned that the NAAQS review process is undergoing changes and one of those changes involves the criteria documents. Will these changes reduce the amount of time required by ORD in supporting the NAAQS review process? Will this affect ORD's LTG 1 effort? Mr. Watkins responded that he did not think it would change ORD's research plans. ORD's goal is to conduct the science needed to inform the standards development process and that goal has not changed. LTG 2 will feed into improving future NAAQS activities. There will be opportunities for the research produced under LTG 2 to inform the Integrated Science Assessment process. The new approach is designed to streamline the assessment process so that the Agency does not start from scratch every time EPA updates an assessment. Dr. Costa agreed, stating that the changes should not affect ORD's contribution.

Dr. Seigneur asked about the use of receptor models as stand alone models versus their use in support of the Community Multiscale Air Quality (CMAQ) model. Mr. Watkins replied that the program is doing research to better understand and use deterministic models, such as receptor-based models, in a complementary way to CMAQ. Both models can provide useful insights for source attribution studies. He mentioned that Positive Matrix Factorization (PMF) and the UNMIX and Chemical Mass Balance (CMB) models were developed as tools to help with non-attainment issues. ORD hopes to apply CMAQ and receptor-based modeling tools to provide valuable insights for state implementation planning efforts.

Dr. Demerjian stated that the program could have an air quality management process that would consider multi-pollutant controls based on minimization of ambient levels as they support NAAQS. He then mentioned that there are interactions between pollutants. Under LTG 2, will the program be addressing the health effects of these interactions or is that to be addressed sometime in the future? Mr. Watkins replied that ORD hopes to begin to investigate this issue as part of the near-roadway project. The health research is planned for the out-years. He added that multi-city studies are planned through the STAR program and they will provide insights on the pollution mix in different areas across the United States. He commented that Dr. Demerjian's question lies at the heart of accountability—trying to assess if air quality management practices actually achieve environmental improvements and health protection. Dr. Costa mentioned that ORD has done work to compare the components of fresh air samples versus the components collected on filters. ORD also has worked with researchers at the University of North Carolina using their roof-top photosensor. Dr. Demerjian asked if ORD anticipated that the epidemiology community would take on time series analyses of multi-pollutants. Dr. Costa responded that the epidemiology community certainly has that interest and epidemiologists always want more data. ORD will seek input from the epidemiology community to ensure that the program is collecting the data they need to do that kind of analysis. He mentioned that there is a workshop planned for April 2008.

Dr. Ping asked if the plan included an effort to increase public awareness of the potential health issues associated with air pollution. She did not see that element in the plan. Mr. Watkins replied that he did not think the plan includes a specific activity focused on communication and outreach of the program's products. Dr. Costa commented that ORD has been expanding the PM research Web page to cover the entire air program. It is available as a resource to the scientific community and others interested in information on air pollution. The Web site also offers access to databases, program publications, and abstracts of papers. Mr. Watkins mentioned that much of the outreach and public awareness efforts are conducted by OAR (e.g., Air Quality Index [AQI]) and ORD works with OAR on these activities. ORD is trying to assess the effectiveness of the AQI in reducing exposure. For example, are people taking steps to reduce emissions and exposure on ozone-action days? He noted that the MYP mentions the interactions between the Air Program and the Human Health Program (e.g., community-based assessments).

Referring to the four major health effects (i.e., asthma, birth defects, cardiovascular effects, cancer) Mr. Watkins had mentioned earlier with respect to the near-roadways project, Dr. Ping wanted to clarify that scientists currently are exploring whether there is any link between air pollution exposure and these health effects. Mr. Watkins agreed.

Dr. Henderson asked if the budget of the program had expanded now that it covers PM, ozone, air toxics, and indoor air. Is the budget sufficient to cover all of these areas? Mr. Watkins stated that there has not been a large increase in the Air Program budget. The primary focus of the program will be PM, but the MYP integrates across disciplines and takes advantage of the opportunities to make more effective use of the resources available. Dr. Henderson said that, in the future, air pollution likely will be regulated based on sources of mixtures rather than compound by compound. Therefore, she is very pleased to see LTG 2 as part of the MYP.

Dr. Henderson reported that ORD has more information on the survey available for the Subcommittee and it will be distributed as soon as it is copied.

Mr. Croes asked about the APG on different PM size fractions under 2009 in the color-coded diagram. A key question for regulators is what portion of health effects is caused by ultrafine particles. He thought it might be ambitious to have results by 2009. Mr. Watkins responded that ORD expects to have some results by 2009; they may not necessarily be definitive, but by 2009, the program expects to advance the Agency's understanding of the health effects of ultrafine and coarse particles. Dr. Costa noted that OAR is very interested in this issue and by 2009, the program will have pulled together all of the information available on PM size fractions and prepared a report. He considers this an interim product to aid the program office.

Mr. Croes said that he did not see anything on threshold for effects in the plan. Mr. Watkins responded that it is integrated throughout the program and not specifically addressed in the MYP. Dr. Costa agreed, stating that data suggest there is no threshold but it is uncertain.

Dr. Henderson asked if there were any plans to look at coarse particles such as rural dust from agricultural operations, adding that the toxicity of these particles is unknown. Mr. Watkins answered that the program is analyzing coarse particles and working to better understand their composition. He mentioned that there is a coarse particle RFA that addresses rural particles. There also is a Regional Applied Research Effort (RARE) project in Region 9 that is looking at rural agricultural as well as mining particles.

When there were no additional questions, Dr. Henderson asked Mr. Watkins to proceed with his third presentation.

### **Review of Development of Performance Measures: Connecting Progress With LTGs**

*Mr. Timothy Watkins, NERL/ORD/EPA*

Mr. Watkins identified the current measures for the Air Program, which included:

- ✧ The BOSC Rating Tool, which is used across all ORD programs.
- ✧ Percentage of program outputs that appears in OAR's National Ambient Air Quality Standard Staff Paper.
- ✧ Percentage of publications that are deemed "highly cited."
- ✧ Progress toward completion of a hierarchy of air pollutant sources based on the risk they pose to human health.
- ✧ Percentage of planned annual outputs completed related to LTG 1.
- ✧ Percent variance from planned cost and schedule ("Efficiency Measure"), which is used across all ORD programs.

Mr. Watkins stated that the program is seeking feedback from the Subcommittee on appropriate measures of progress in reducing uncertainty in standard setting and implementation (LTG 1). The BOSC rating tool is being piloted in program and mid-cycle reviews. Currently, the percentage of program products cited in OAR Staff Papers was tentatively accepted as a measure. With the migration to the Policy Assessment document, the bulk of the science will be in the Integrated Science Assessment (ISA) and Risk/Exposure Assessment document. Is a measure of citations in the ISA appropriate? What is an appropriate balance between EPA-funded and other contributions? The program also is seeking feedback on the utility of bibliometric measures. How can the program use bibliometric measures in the assessment?

The program is seeking feedback on its proposed approach for implementing a measure based on the hierarchy of emission sources relative to human health risk (percent completion). The proposal is to:

- ✧ Identify about 10-15 source categories (with OAR) and develop two sub-measures that track in parallel as technology and indicators allow.
  - Source to Air Quality: Reduce uncertainty in characterizing relationships between source emissions and air quality.
    - Enhanced emission characterization, atmospheric process measurement and modeling, and source apportionment techniques.
    - Focus on indicators—what to measure and how to handle the uncertainty reduction in multiple sources with a single index.
  - Air Quality to Health: Reduce uncertainty in characterizing relationships between Air Quality and Health Outcomes.
    - Enhanced exposure assessment and application of toxicology and epidemiological approaches.
    - Source attributable health impacts.
    - Indicators? Metrics?

Mr. Watkins introduced Mr. Phillip Juengst, who works in ORD's Office of Resources Management and Administration (ORMA) to expand on these measures. Mr. Juengst explained that he had been involved with the development of many of these measures. ORMA is trying to put together a suite of measures across ORD. He noted that measures for outcomes are difficult to capture and the BOSC rating tool was designed to help provide information on the quality of the research and its relevance and impact on decision-making. ORD is trying to develop a number of other measures that capture ORD's progress in completing outcomes. He noted that it is difficult to identify annual measures that determine whether a program is on track in achieving its outcomes. Therefore, ORD is seeking feedback from the BOSC regarding what the programs are tracking and measuring.

Dr. Seigneur asked how ORD was defining the source categories. Mr. Watkins replied that the program had not made that determination yet. OAQPS just issued a report with a figure that identified 11 or 12 different source categories that were responsible for HAPs. There are many questions on how to do this. Should on-road and off-road mobile sources be two categories or one? Should electricity generating units be one category or several (e.g., coal, nuclear). After answering these and other questions, ORD might identify 15 categories.

### ***Discussion***

Dr. Henderson stated that it is difficult to identify metrics for measuring progress in research that is never ending. If ORD could identify a marker for a source and demonstrate that it has declined, that would be an appropriate measure. Dr. Costa explained that the Agency is looking for specific indicators of sources

to air quality measures. Dr. Henderson said she thinks it makes sense to break this into two parts—modeling can be used to assign sources, but the next step has much more uncertainty. Mr. Watkins commented that, in the first part, the program would be developing modeling tools that would provide probabilistic assessment, reducing uncertainty in air quality estimates. He agreed that the second part would be more difficult. Dr. Henderson asked if there were any additional comments.

Dr. Ping thought the program needed another level of evaluation. Most of the metrics identified by the program are related to scientific productivity rather than reducing the impact of air pollution on human health and the environment. She will give this some thought and try to prepare a sentence or two to explain her comment.

Mr. Watkins has talked with NARSTO and others about accountability—understanding the relationship between sources and health. The framework would be a set of indicators along sources to outcomes plus conceptual models. The program staff hopes to develop a set of indicators over time; initially, researchers may have to rely on conceptual understanding.

Dr. Demerjian had a question about using source to air quality information to develop a hierarchy of emission sources relative to human health. He noted that exposure has to be addressed—some sources are more likely to affect population exposure than others. Has the program developed different criteria to be used to rank the sources? He mentioned that models cannot scope down to identify hot spots and this needs to be factored into the criteria. Mr. Watkins said the program is actively involved in using modeling tools to predict ambient concentrations. The program uses hybrid approaches—employing different models to get more specific data on exposure, particularly for areas that have hot spots where regular models are not accurate.

Referring to the removal of lead sources and the decline of blood lead levels as well as lead levels in air, Dr. Henderson asked if the program could work with CDC to identify biomarkers that could be used to take advantage of this approach. Mr. Watkins responded that the program is working with CDC on the pilot phase of the Environmental Public Health Tracking Program. This program is focusing initially on asthma and cardiovascular disease endpoints to see if air pollution has an effect. Dr. Costa commented that the key is finding appropriate indicators in which we have confidence. That is the main reason for the two-step approach. Dr. Henderson stated that, as with lead, the program should be looking for biomarkers of exposure rather than toxic endpoints. Mr. Watkins agreed that finding appropriate indicators would be a great achievement because then the connection to human health endpoints could be made. He noted that several grants awarded under the Human Health Research Program are related to air pollution.

Mr. Watkins mentioned that NARSTO has done an assessment of ozone and recently did one on PM for policy makers. The PM assessment involves concepts for developing an accountability framework—multi-pollutant program management and assessment mechanism.

Dr. Henderson asked the Subcommittee members if they had any additional questions. When no questions were posed, Dr. Henderson asked Dr. Costa if he had anything to add. Dr. Costa thanked Mr. Watkins for making the presentations in his absence and both Mr. Watkins and Ms. Schultz for pulling all the materials together. He expressed his hope that the materials have been useful to the members in conducting the mid-cycle review.

Dr. Henderson thanked Mr. Watkins for responding to the Subcommittee's questions and Dr. Costa for making himself available by telephone.

**Public Comment***Lawrence Martin, Air Mid-Cycle Subcommittee DFO*

At 1:00 p.m., Mr. Martin asked if any member of the public wanted to make a comment. No comments were offered.

**Work Period***Air Mid-Cycle Subcommittee Members*

During the first administrative conference call, Dr. Henderson asked for volunteers to address the charge questions and assignments were made. She asked if anyone had any concerns about their assignments. She noted that all members should submit comments to be included in the response to each question. The individual assigned as the lead for a charge question will be responsible for compiling the comments and drafting a coherent response for that question.

Dr. Seigneur has the lead for Charge Question #1. This question was covered in the first presentation. Dr. Henderson stated that the guidance from the BOSC Executive Committee is to prepare about a 2-page response for each charge question. This is not intended to be a long report. Dr. Seigneur said he thought the program provided ample information to address this question. Dr. Henderson asked if there was consensus that the program had addressed the BOSC's recommendations from the program review. There was general agreement that the program had been responsive to the recommendations from the 2005 program review.

Dr. Ping has the lead for Charge Question #2. In brief, Dr. Ping thought the proposed structure for the revised MYP provided a coherent framework for addressing the priority research needs. The plan had been clearly articulated in today's presentation. Priorities are clearly identified and established and the program did a terrific job of presenting that in the color-coded figure. She was comfortable drafting a response to this question.

Mr. Croes has the lead for Charge Question #3. Dr. Henderson asked him if he had adequate information to respond to this question. Mr. Croes replied that it was evident that the MYP addresses critical research to meet regulatory mandates. He would be interested in receiving additional information on the client survey. Mr. Martin said that some additional information was available and it would be sent to Mr. Croes and the other members by e-mail. Mr. Croes mentioned that, in the program review, the BOSC expressed some concern about the lack of ozone research. He asked if there were any remaining issues on ozone standards; it is clear that the program has adequately covered PM research needs. Dr. Henderson asked if Mr. Croes had any questions for the program staff regarding ozone. Mr. Watkins commented that a low-dose ozone exposure study is planned—it is in the late stages of development. OAQPS is involved in that effort. Mr. Croes asked if EPA's standard pollutant reviews include a list of questions that need to be addressed. Mr. Watkins responded that he was not sure about the new process, but in the past the last chapter of the Air Quality Criteria Document included research recommendations. He assumes that there will be a similar chapter in the Integrated Science Assessment.

Dr. Demerjian has the lead for Charge Question #4. Dr. Demerjian said he was comfortable preparing the response to this question. He had one issue concerning the lack of research related to ozone health outcomes. The program has made it clear that it cannot pursue this research. The Subcommittee cannot say that the program has not been responsive because the staff considered the recommendation and determined that it still is not a priority. He noted that the multi-pollutant studies will include ozone.

Dr. Henderson stated that she has the lead for Charge Question #5 (this is the question that was added in the latest draft). She asked the members to e-mail their comments on this question to her to be incorporated into the draft response. Dr. Demerjian said that it would be useful to have an example of the

hierarchical approach—an example of how the program will address a particular criteria pollutant. This may help the Subcommittee members identify measures. Dr. Henderson asked Mr. Watkins if he could provide an example. Mr. Watkins replied that the staff should be able to provide an example. One example could be mobile sources and near-roadway exposures. The program also is working to understand the impact of the Clean Air Interstate Rule, which involves linking air pollution to sources. Those may be examples that could be used to demonstrate how we could measure progress. Dr. Demerjian commented that the program may want to consider a combination of the Clean Air Interstate Rule and mobile source NO<sub>x</sub> controls. What are the tradeoffs? Mr. Watkins added that the program is working with OAR on the Clear Air Interstate Rule and trying to understand the NO<sub>x</sub> SIP Call.

Dr. Henderson asked if there were any additional questions. She asked that the members send their 2-page drafts to her so that she could compile them into a single report. The drafts should be sent to her via e-mail by October 2, 2007. Dr. Ping asked if there is minimum word requirement for each response. Dr. Henderson responded in the negative, explaining that the 2 page guidance is just a suggestion so that the Subcommittee will realize that this is supposed to be a short, concise report. Dr. Ping asked if each member was supposed to assign a rating to the program. Dr. Henderson replied that the Subcommittee members will discuss the rating next.

### **Discussion of Program Rating**

#### *Air Mid-Cycle Subcommittee*

Dr. Henderson explained that there are four terms in the rating tool: exceptional, exceeds expectations, meets expectations, and not satisfactory. Not satisfactory indicates that the program is failing to meet a substantial number of its goals. Meets expectations means that the program is meeting most of its goals in terms of quality and timeliness. Exceeds expectations indicates that the program is meeting all of its goals in terms of quality and timeliness. Exceptional means that the program is meeting all of its goals and surpassing some in terms of quality and timeliness. The Subcommittee is to assign a rating for the entire program, rating its progress since the 2005 program review. She asked for members' thoughts on the rating.

Dr. Seigneur commented that meets expectations implies that the program is not meeting all of its goals. He thought the Air Program was meeting all of its goals so he would assign it a rating of exceeds expectations or exceptional.

Dr. Demerjian went through the charge questions and assigned a rating to each one as follows: #1 = exceeds expectations, #2 = exceeds expectations, #3 = meets expectations, #4 = meets expectations, and #5 = at least meets expectations. Therefore, he probably would assign the program a rating of exceeds expectations. He did not think that meeting all of its goals should be the only determining factor for assigning a rating.

Mr. Croes said he reviewed the bibliometric analysis and was very impressed with the air program. EPA is second only to Harvard and is making a substantial impact on the field. He thought the program was exceptional with respect to its publications; however, he may need more information from clients about the program meeting regulatory needs before assigning that rating to the program.

Dr. Henderson was glad that Mr. Croes mentioned the bibliometric analysis. It was very impressive and is indicative of the program's success. Dr. Ping said she would assign a rating of exceptional or exceeds expectations to the program. She wants to go back through the bibliometric analysis and the results of the client survey to make a final determination. Dr. Henderson indicated that she also would assign a rating of exceptional or exceeds expectations. The publications are high quality and they are published in high impact journals. This is exceptional and any organization would be proud of that record. She agreed with Dr. Ping and Mr. Croes that more information on the client survey would be helpful.

Mr. Martin reported that Ms. Schultz had sent Mr. Croes the additional information on the client survey via e-mail. Dr. Henderson asked Ms. Schultz if she had any information on the question that was posed earlier about the survey (i.e., why some managers thought their clients did not respect ORD scientists). Ms. Schultz explained that the additional information included a description of the four different types of questions that were included on the survey—outreach, contributions to client activities, contributions to client decisions, and scientific reputation. Two of the 26 respondents, self identified as managers, did not think that their clients respected ORD's scientific reputation. Ms. Schultz was not sure if these respondents provided a specific reason for their responses. This result was highlighted on the summary provided to the Subcommittee because, in general, the feedback was positive. These responses were unusual but she did not think the program had any additional information explaining why these respondents answered the question the way they did. Dr. Henderson commented that she was surprised the program had not followed up on this in the past 2 years since the survey was administered. Dr. Ping said that she was not concerned about these two respondents; in her opinion, there is no evidence to indicate that the program's scientific reputation is other than outstanding.

Dr. Henderson asked if everyone agreed with a rating of exceeds expectations. She asked if any member wanted to defend an exceptional rating. Mr. Croes replied that he thought the scientific outputs from the program were exceptional but the client survey indicates that the program's clients are not convinced that the research is meeting all of their needs. For this reason, he agreed with the exceeds expectations rating.

Dr. Henderson mentioned that text had to be written to explain the rationale for this rating. That text could explain that the publications are exceptional. Dr. Demerjian noted that many of the publications originated from the Supersites program, which was funded by OAR. Should ORD get credit for those publications? Mr. Watkins replied that the initial funding for Supersites was from OAR, but over time the resources were transitioned to ORD's budget. At least \$6 million of the Supersites funding came from ORD's budget. ORD made adjustments in full-time equivalents (FTEs) and dollars to address policy relevant findings and get the information published.

Dr. Henderson asked if there were any additional questions or comments. She instructed the Subcommittee members to send their comments on each charge question to the individual who has been assigned to develop the response to that question. The assigned lead will compile all of the comments and draft a 2-page response to the question. Comments on the questions should be sent to the assigned leads by September 25, 2007. The 2-page responses should be sent to Dr. Henderson by October 2, 2007. Dr. Henderson will compile the responses into a single report, which will be distributed to the Subcommittee for review. Mr. Martin stated that if additional discussions of the draft are required for approval, a Subcommittee conference call will be scheduled. In response to Dr. Demerjian's question, Mr. Martin said that the assigned lead should wait to receive members' comments prior to preparing and submitting the draft response to Dr. Henderson. The lead cannot send out a draft response to the Subcommittee members for comment prior to receiving their comments; the members must comment independently and send their comments to the lead before the draft response is prepared.

Dr. Henderson noted that the BOSC Executive Committee expects to review this report at its January 2008 meeting. She thought it would be best to complete the report by the end of November.

Dr. Ping asked Dr. Henderson to review the assigned leads. Dr. Henderson stated the assignments as follows:

- ✧ Charge Question #1 = Dr. Christian Seigneur
- ✧ Charge Question #2 = Dr. Peipei Ping
- ✧ Charge Question #3 = Mr. Bart Croes
- ✧ Charge Question #4 = Dr. Ken Demerjian

✧ Charge Question #5 = Dr. Rogene Henderson

Dr. Henderson stated that Charge Question #6 was addressed during the meeting and she will prepare the text for that response.

Mr. Martin asked if there were any other points of business. Hearing none, he adjourned the meeting at 1:47 p.m.

### **Action Items**

- ✧ Ms. Schultz agreed to review the client survey results to determine if there were any recurring themes among the narrative responses. She will provide that information to Mr. Martin for distribution to the Subcommittee.
- ✧ Ms. Schultz will determine if either of the two survey respondents who indicated that their clients did not respect ORD's scientific reputation provided any narrative to explain their responses.
- ✧ Dr. Ping will prepare some text indicating that the program needs another level of evaluation because most of the metrics identified by the program are related to scientific productivity rather than reducing the impact of air pollution on human health and the environment.
- ✧ The Air Program staff will provide the Subcommittee an example of how the program will address a particular criteria air pollutant.
- ✧ Subcommittee members should send their comments on each charge question to the individual who has been assigned to develop the response to that question by September 25, 2007, as follows:
  - Charge Question #1 = Dr. Christian Seigneur
  - Charge Question #2 = Dr. Peipei Ping
  - Charge Question #3 = Mr. Bart Croes
  - Charge Question #4 = Dr. Ken Demerjian
  - Charge Question #5 = Dr. Rogene Henderson
- ✧ Dr. Seigneur will compile the comments on Charge Question #1, draft a 2-page response, and submit it via e-mail to Dr. Henderson by October 2, 2007.
- ✧ Dr. Ping will compile the comments on Charge Question #2, draft a 2-page response, and submit it via e-mail to Dr. Henderson by October 2, 2007.
- ✧ Mr. Croes will compile the comments on Charge Question #3, draft a 2-page response, and submit it via e-mail to Dr. Henderson by October 2, 2007.
- ✧ Dr. Demerjian will compile the comments on Charge Question #4, draft a 2-page response, and submit it via e-mail to Dr. Henderson by October 2, 2007.
- ✧ Dr. Henderson will compile the comments on Charge Question #5 and draft a 2-page response.
- ✧ Dr. Henderson will draft text to explain the rationale for the exceeds expectations rating for Charge Question #6.

- ✧ Dr. Henderson will combine the responses to the six charge questions into a single report and submit it to Mr. Martin for distribution to the Subcommittee.
- ✧ Mr. Martin will distribute the draft report to the Subcommittee members for review, and will schedule a Subcommittee conference call to discuss and approve the report.

## PARTICIPANTS LIST

### Subcommittee Members

**Rogene F. Henderson, Ph.D., DABT, Chair**  
Scientist Emeritus  
Lovelace Respiratory Research Institute

**Bart Croes, P.E.** (via telephone)  
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**AIR RESEARCH MID-CYCLE REVIEW MEETING**

**Key Bridge Marriott  
1401 Lee Highway  
Arlington, VA 22209**

**Tuesday, Sept. 18, 2007**

**AGENDA**

9:30-10:00 a.m.	Registration	
10:00-10:10 a.m.	Welcome and Outline of Purpose	Dr. Rogene Henderson Chair, Air Mid-Cycle Subcommittee
10:10-10:15 a.m.	DFO Welcome and Charge - Administrative Procedures/FACA Rules - Objective of Subcommittee/Charge	Mr. Lawrence Martin (EPA) DFO, Air Mid-Cycle Subcommittee
10:15-10:55 a.m.	Review of Action Items: Response to Recommendations of 2005 Review - Discussion and Q&A	Mr. Timothy Watkins (EPA) Dr. Dan Costa (EPA – by phone) Air Mid-Cycle Subcommittee
10:55-11:35 a.m.	Review of Draft Revisions to the Air Multi-Year Plan (MYP) - Discussion and Q&A	Mr. Timothy Watkins (EPA) Dr. Dan Costa (EPA – by phone) Air Mid-Cycle Subcommittee
11:35-12:15 p.m.	Review of Development of Performance Measures: Connecting Progress with LTGs - Discussion and Q&A	Mr. Timothy Watkins (EPA) Dr. Dan Costa (EPA – by phone)  Air Mid-Cycle Subcommittee
12:15-1:00 p.m.	Lunch	
1:00-1:15 p.m.	Public Comments	
1:15-2:15 p.m.	Work Period	Air Mid-Cycle Subcommittee
2:15-2:45 p.m.	Discussion of Program Rating	Air Mid-Cycle Subcommittee
2:45-3:00 p.m.	Wrap-up and Report Out	Dr. Rogene Henderson Chair, Air Mid-Cycle Subcommittee
3:00 p.m.	Adjourn	