

**U.S. Environmental Protection Agency
Office of Research and Development**

**BOARD OF SCIENTIFIC COUNSELORS
EXECUTIVE COMMITTEE MEETING**

**Alexandria, Virginia
April 30 - May 1, 1998**

Thursday, April 30, 1998

Introduction/Overview of the Meeting

Dr. Costel Denson (University of Delaware), Chair of the Board of Scientific Counselors (BOSC) Executive Committee, called the meeting to order at approximately 9:00 a.m. He quickly reviewed the agenda and indicated that one of the primary goals of this meeting was to wrap up the five Laboratory/Center review reports so that they may be finalized and submitted to the Assistant Administrator for Research and Development (AA/ORD). The five reports received conditional approval at the last meeting. During this meeting, each report will be discussed and the vettors will verify that the final changes have been incorporated. The latest draft of each of the five reports was provided in the meeting notebook.

Dr. Denson also mentioned that the BOSC charter is up for renewal (it has to be renewed every 2 years). Shirley Hamilton (Designated Federal Official, EPA/ORD) indicated that the paperwork required to renew the charter had been prepared and approved by EPA, and sent to the Office of Management and Budget (OMB). The new charter is included in the meeting notebook under the tab entitled "Miscellaneous." Dr. Raymond Loehr (The University of Texas) asked if there were any changes in the wording of the new charter. Ms. Hamilton replied that there were some minor changes in the wording to ensure that the charter is in compliance with Federal Advisory Committee Act (FACA) laws. She agreed to review the changes with BOSC members later in the meeting.

The meeting also will include time to discuss the future activities to be undertaken by the BOSC. Dr. Denson would like the members to have a common understanding of where the Board wants to go and how it plans to get there.

Chairman's Testimony at EPA Congressional Hearing

Dr. Denson reminded the BOSC Executive Committee members that he was asked to testify before the Congressional Subcommittee on Energy and Environment of the Committee on Science on March 11, 1998. Prior to testifying at the hearing, Dr. Denson solicited comments and recommendations from BOSC members. In his testimony, he tried to convey the purpose of the BOSC and provide a brief overview of its history. In addition, he described some of the BOSC's accomplishments, including the review of the research plan for arsenic in drinking water and the programmatic (not scientific/technical) reviews of ORD's Laboratories and Centers. In his testimony, Dr. Denson described the process employed by the BOSC for the reviews (i.e., self-study reports, site visits, Subcommittee reports). He identified four common themes among the five review reports: (1) strategic alignment, (2) focused resources, (3) integration and coordination, and (4) measures of success. Dr. Denson testified for approximately 5 minutes, followed by one round of questions. He responded to two questions and was asked to provide additional information to the Subcommittee by May

7, 1998. The subcommittee requested information on the differences between the BOSC and the Science Advisory Board (SAB); copies of the revised arsenic research plan and copies of ORD's interim and final responses; and copies of the reports on the Laboratories and Centers. Dr. Denson noted that he will be submitting copies of the current drafts of the reports. Mr. Henry Longest II (Acting AA/ORD), who was present at the hearing, also was asked to submit additional information to the subcommittee by May 7, 1998. Dr. Peter Preuss (EPA/ORD), Director of the National Center for Environmental Research and Quality Assurance (NCERQA), mentioned that other topics discussed at the hearing included fine particulates and global climate; whether ORD could do impartial, objective research in a regulatory agency; and how EPA coordinated environmental research with other agencies. Dr. Preuss noted that the testimony provided at the hearing is available on the Web at the following address:

<http://www.house.gov/science/welcome.htm>

Dr. Denson asked the BOSC members to review the copy of his testimony, which was provided in the meeting notebook, to determine if the BOSC could use it as the basis for preparing its report to the AA/ORD on the Laboratories/Centers review. The members quickly reviewed the testimony and most agreed that it would be a good start for the summary report to the AA/ORD.

Science Advisory Board

Dr. Donald Barnes (EPA), Executive Director of the SAB, provided a brief overview of the Board's recent activities. The SAB recently reviewed ORD's budget report and concluded that ORD does not get sufficient resources to accomplish what they need to do, let alone what they indicate they will do. Dr. Barnes provided BOSC members with a copy of *Happenings*, the SAB's newsletter, which resulted from their recent planning retreat (Dr. Denson attended that retreat). He noted that the SAB plans to host/participate in a workshop in early 1999 to examine where/when/how science can best encourage and improve innovative approaches to environmental protection, such as sector-based and place-based environmental protection. Dr. Barnes also provided BOSC members with the SAB calendar and a copy of the draft minutes of the April 15-16, 1998, SAB Executive Committee meeting. At that meeting, most of the discussion with Mr. Longest focused on the BOSC and the five review reports. The SAB members were impressed with what the BOSC had accomplished in such a short timeframe.

Dr. Barnes indicated that both the SAB and the BOSC need to examine the impact that ORD's reorganization has had on the Agency. Each Board could review this issue from a different point of view (i.e., the SAB has an external perspective and the BOSC has an internal perspective). Dr. Brian Leaderer (Yale University) asked if the BOSC and SAB should do independent reviews. Dr. Barnes replied that Mr. Longest would prefer that the two experiences be joined in the review. Dr. Leaderer asked how such a review could be accomplished. Dr. Barnes suggested that the SAB and BOSC could observe the impact of the reorganization by attending interactive workshops, such as ORD's recent workshop on pesticides and children, which brought together "customers" and "suppliers" at a mid-point in the research process. Dr. Denson suggested that the BOSC may want to work backwards by asking questions such as: Do the results of the research have an impact? Do they lead to identification and implementation of policy? Dr. Denson expressed some concern about the BOSC's role in such a review. The BOSC is not involved in policy making, but in the review of research plans and programs that should lead to informed policy decisions. The SAB, not the BOSC, reviews research results to evaluate whether they provide a sound scientific basis for regulatory decisions.

Dr. Barnes mentioned that Mr. Longest would like feedback from the SAB and the BOSC concerning the Science to Achieve Results (STAR) program. Dr. Preuss responded that NCERQA is currently conducting an assessment of the STAR program because EPA wants to be prepared to respond to congressional inquiries regarding the effectiveness of the program. NCERQA's review probably will include a description of how the program works, a summary of its accomplishments, and a discussion of the program's impacts. Dr. Preuss indicated that the insights of the SAB and the BOSC could be valuable

additions to this evaluation. Dr. Leaderer proposed that the BOSC could evaluate how well the STAR program is working in terms of research and development. Has it enhanced or decreased the effectiveness of the organization? Dr. Denson believes that the BOSC should evaluate how the STAR program is helping ORD and the Agency to reach their respective goals. He is concerned that focusing the evaluation on the STAR program alone, which is just one of ORD's extramural efforts, will lead to fragmentation. Dr. Denson wants the BOSC to take a global view of ORD's research efforts. Dr. Preuss concurred and added that the real issue is whether ORD is delivering the information that the Program Offices and environmental decisionmakers need, not whether the STAR program is achieving what the Congress and the Agency expected. Dr. Preuss raised another question to be examined by the BOSC—How does ORD measure success and value added of ORD programs?

Dr. Barnes noted that Mr. Longest also would like the SAB and BOSC to examine science within EPA as well as the impact of ORD's reorganization on the Agency. Dr. Mitchell Small (Carnegie-Mellon University) suggested that such a study could be accomplished by focusing on a particular need of a Program Office. The Program Office would work with ORD to determine what role the STAR program and other ORD programs will play in meeting these needs. The BOSC could evaluate whether the Program Office's needs are being met by ORD's research in conjunction with research conducted by the scientific community. The SAB could evaluate whether the science is good and responsive to the expressed needs. Dr. Loehr pointed out that such an approach would inherently involve the evaluation of problem-based research. He is concerned about the balance of core research and problem-based research. He also noted that core research issues are not identified by those who are "fighting fires" and implementing programs. It takes time to identify issues and develop plans to address future problems.

Dr. Denson indicated that the BOSC is open to working with the SAB; however, he would like specific tasks identified and some definition of what advice would be useful to the AA/ORD versus what advice would be useful to the Administrator. Dr. Rae Zimmerman (New York University) asked if there is a mechanism through which SAB Subcommittees could work with BOSC Subcommittees. Dr. Barnes responded that the SAB is currently setting up interdisciplinary *ad hoc* committees to allow such interaction. He also mentioned that Dr. Richard Bull would like to schedule a meeting of his committee in conjunction with a BOSC meeting to provide his committee members an opportunity to find out more about the activities of the BOSC.

Final Review of the NERL Report

Dr. Denson mentioned that two vettors had been assigned to each report. The vettors were responsible for reviewing their assigned report to ensure that the Board's comments were correctly incorporated into the report. He did not anticipate lengthy discussion of the comments, just confirmation that vetting has been completed. The vettors for the National Environmental Research Laboratory (NERL) report were Dr. Loehr and Dr. Thomas Burke (The Johns Hopkins University). Dr. Loehr indicated that both he and Dr. Burke believe that the suggestions made at the January meeting had been incorporated. Dr. Loehr mentioned that some additional changes were needed before the report could be finalized, including:

- The two sentences in Section 3.7 on page 19 should be moved to Section 3.4 on communication.
- Section 3.7 should be deleted.
- In Section 3.10 on page 20, there is an incomplete sentence that does not make sense. It is incomplete and must be corrected.

Dr. Burke noted that the NERL report was the shortest of the five reports and that the language is more terse than that used in the other reports. He suggested that some sentences be rewritten; such as the last sentence before Section 2.6 on page 16. Dr. Burke thought that particular sentence was too harsh and could be worded in a more constructive manner. Dr. Zimmerman was concerned about rewriting numerous

sentences in the report; she suggested that the comments would have been more helpful in January. Dr. Denson agreed and decided that the sentences in question did indeed convey the sentiments of the BOSC. He suggested that in lieu of rewriting various sentences, the executive summary of the reports identify positive advice that will help NERL move forward. He cautioned BOSC members that they cannot continue making editorial changes to the reports. The vettors should limit their review to ensuring that the Board's comments have been incorporated correctly. Dr. Denson mentioned that most of the reports, including the NRMRL report, included an appendix for the list of documents provided at the site visit. The Board members agreed that this appendix should be removed from all of the reports because the self-study documents submitted to the BOSC are included in the reports. The executive summary report will include a statement that additional materials were provided by the Laboratories and Centers during the site visits.

In addition to Dr. Loehr's comments, the Board agreed that the following changes should be made to the NERL report:

- Deletion of Appendix D.
- Replace "A Draft Report . . ." with "Final Report . . ." on the cover.
- Change the date on the report to April 30, 1998.
- Delete the sentence on the bottom of the cover page.

The vettors and the Board members agreed that once the changes noted above have been incorporated, the report can be finalized and formally submitted, along with the letter to the AA/ORD that Dr. Denson will prepare to accompany the reports. He expects to receive a formal response from the AA/ORD concerning each report.

Final Review of the NRMRL Report

The vettors for the National Risk Management Research Laboratory (NRMRL) report were Dr. Zimmerman and Dr. Jerald Schnoor (University of Iowa). Dr. Zimmerman indicated that she had sent her comments to Dr. Leaderer in February. She confirmed that those changes had been incorporated into the report. Dr. Denson noted that Dr. Schnoor had sent him a letter dated April 20, 1998, which stated that both he and Dr. Zimmerman had vetted the report. The Board agreed that, with the following changes, the NRMRL report would be ready for submission to the AA/ORD:

- Deletion of Appendix E.
- Replace "A Draft Report . . ." with "Final Report . . ." on the cover.
- Change the date on the report to April 30, 1998.
- Delete the sentence on the bottom of the cover page.

Discussion of Working with the SAB and Other Organizations

Dr. Denson led a discussion on how the BOSC can interact and work with the SAB and other organizations to assist ORD in accomplishing its mission. How can the BOSC assist ORD in positioning itself to have the programs in place to address future problems? How can the BOSC help ORD ensure that the research being done leads to informed decisions, policies, and regulations? He noted that the usefulness and appropriateness of the research results is the purview of the SAB; the infrastructure needed to achieve the results is the purview of the BOSC (e.g., human resources, programs, planning, implementation, leveraging resources, etc.). How do we identify the core research that needs to be conducted? How do we highlight the fact that core research needs to be conducted? Dr. Denson pointed out that problem-based

research should be planned in conjunction with EPA's Program Offices; these Offices should help identify research needs and work with ORD to translate them into a research plan.

Dr. Loehr suggested that the BOSC should not waste any energy discussing what the SAB is going to do. He thinks the members should determine how the BOSC can be of service to ORD and move forward with a plan. He does not think the BOSC should worry about "stepping on the SAB's toes." Dr. Loehr mentioned that he liked the idea of focusing on research planning—research for what purposes? To accomplish what? What is added value? What is EPA trying to get out of the research? What is EPA getting that could be accomplished elsewhere? The BOSC needs to try to get a handle on what research is being planned and whether it is the right type of research to meet the Agency's needs/goals. This is the question that EPA and ORD will be asked. Dr. Loehr suggested that the BOSC focus the remainder of the discussion on defining EPA's research planning process and how it will move EPA/ORD to where it needs to be.

Dr. William Pierson (Desert Research Institute) asked if there was a role that the BOSC could play in coordinating research among the various federal agencies that are involved in environmental issues to minimize overlap. Dr. Marilyn Brown (Oak Ridge National Laboratory) pointed out that many of the areas that are of interest to her are difficult to assess before completion of the strategic planning process that the BOSC recommended in the reviews. She suggested that the BOSC members identify what they would like to see included in the strategic plans and provide the Laboratories/Centers some guidance on what to include. Dr. Pierson agreed with this suggestion. He wants to follow up with the Laboratories/Centers to ensure that the plans are completed. Dr. Brown added that this is a window of opportunity for the BOSC—a chance to provide guidance that will ensure that the plans are comparable and more complete. Dr. Leaderer agreed that the BOSC would be remiss if it did not follow up on the strategic plans. He mentioned that he kept thinking about the particulates example used in the reports while Dr. Loehr was going through his thoughts for future activities. Dr. Leaderer suggested that the BOSC could tackle the PM (particulate matter) issue and look at how ORD coordinates and implements the research efforts among the Laboratories/Centers. Dr. Zimmerman agreed with this suggestion, but she did not like the idea of waiting until the strategic plans are completed to move forward. Dr. Small also agreed with Dr. Leaderer's suggestion and added that the BOSC could examine coherency, ORD's response to the research plan, what the STAR program is doing, what ORD Laboratories/Centers are doing, etc. The BOSC could evaluate the quality of the work and any contribution it has made to policy decisions and regulations. The BOSC also could evaluate how ORD is interacting with other agencies on this one issue.

Dr. Denson indicated that Dr. Brown had effectively identified a key task for the BOSC. He suggested that this could be accomplished in conjunction with other activities. Dr. Denson also reiterated Dr. Loehr's suggestion that the BOSC should look for central, critical questions to ask, such as: What is the research planning process? How does ORD implement a research plan/program? What is the target? What resources are needed to get there and what is the time frame? Dr. Denson asked the BOSC members how the Board could flesh out the research planning process. He suggested that the selection of a specific issue could serve as an appropriate focus. He has some concern about compartmentalization within ORD. He believes the key is integration and coordination. He noted that the Laboratories/Centers failed to address this in their self-study reports, which may be some indication of the difficulty of this task.

Dr. Zimmerman mentioned that the lack of integration and coordination is probably due to the fact that the Laboratories/Centers are often crisis driven, which limits the time available to focus on core research. Dr. Denson responded that a good research plan should include both problem-driven and core research. He also noted that spinoffs from problem driven-research can lead to core research. Dr. Burke added that science within EPA is under siege. He noted that the BOSC has a responsibility to weigh in on the issues. He suggested that the BOSC summary report recognize that there are numerous external pressures on EPA/ORD. He asked how the BOSC could protect the "science" in the face of these pressures. Dr. Loehr took exception to protecting research. He thinks that is absolutely the wrong way to proceed. Trying to protect a type of research is an indication that it has no value and requires protection to survive. He suggested that the BOSC clearly identify the value of that type of research—it is the only way to ensure that the Agency

will have the knowledge it needs to solve current and future problems. EPA needs to be able to bring core knowledge to bear on a particular problem. Dr. Burke agreed, but he added that Congress will not be as willing to recognize the value added.

Overview of April 30 Senate Hearing

Mr. Longest provided an overview of the Senate hearing that he had attended during the morning. He indicated that PM was the only R&D issue that was discussed; specifically, ORD's reaction to the National Academy of Science's (NAS) report. One of the concerns identified in this report is that EPA is spending more effort on ambient monitoring than on exposure and health effects. Mr. Longest explained EPA's proposed monitoring systems and indicated that the Agency plans to comply with the suggestion in the report regarding a better balance between monitoring and exposure and health effects. He also mentioned that EPA is organizing two meetings on June 22-23, 1998, in Research Triangle Park, NC. One meeting will focus on ORD's research plan for PM and the topic of the other meeting will be the Agency's proposed monitoring systems.

Mr. Longest expressed his interest in hearing the BOSC's discussion and recommendations on where the Board plans to go from here. He wants to know if EPA is doing good science and whether it is the right science. He also wants to know if the core science that ORD is doing is the right core science. Mr. Longest believes that ORD's weakest and most vulnerable point is that it does not know if exposure and effects (risk paradigm) really meet. Are they connecting or are they missing each other? This is what he means when he asks if ORD is doing the right science. He does not know if individual programs are lined up. He also wants input from the BOSC on the type of capability that the Laboratories/Centers will need (and do not currently have) to meet future needs. This is particularly important now that EPA has the authority to hire 50 postdoctorate researchers (through appointments). Mr. Longest recognizes that some of these researchers will stay at EPA and some will leave the Agency, but he wants to ensure that they select the right types of scientists to meet future needs, particularly as ORD's older scientists retire.

Mr. Longest wants the BOSC to examine ORD's overall research program to see if it is lined up/matched appropriately. He also wants the BOSC to identify where expertise is missing from ORD and whether the funding level in each research area is appropriate. Is ORD doing the right things at the right levels at the right time? Can ORD associate monitoring and health? Mr. Longest wants to know if ORD is heading in the right direction.

Dr. Zimmerman appreciated the framework that Mr. Longest provided regarding lining up the various elements of the program. She noted that EPA has made a substantial investment in the current system and that the BOSC may need to help ORD retrofit its research plans to avoid unnecessary waste. Mr. Longest added that ORD is currently doing a good job in replacing old equipment and buying new equipment. Now they are grappling with the problem of paying for the service agreements. He is trying to negotiate a good deal for the service agreements because many of the Laboratories/Centers purchase equipment from the same suppliers. Dr. Small noted that there is a need for integration and he reminded the BOSC members of the idea of awarding research integration grants—which would involve analyzing different parts of the various Requests for Applications (RFAs) and determining how they fit together.

Dr. Preuss mentioned that the Laboratory Directors also are concerned about the issue of research integration. How does ORD get to the integrated research program that everyone espouses, but does not implement? Mr. Longest mentioned that PM may be a good focus for the BOSC to study research integration because it includes all Laboratories/Centers and covers everything from monitoring to health effects. In addition, PM research must be integrated. Dr. Burke noted that the NRC Committee lacked diversity and he believes that they overlooked implementation feasibility research in their PM report. Where are the best opportunities for exposure research? Does the BOSC have a role in looking at this issue? Mr. Longest indicated that the BOSC may indeed have a role here because the Agency is changing its policy from just monitoring particles to trying to associate the particulates to health issues/exposure as well as specific sources.

Dr. Burke pointed out that state air quality directors have a different perspective on how to meet the air standards and the NRC did not take their perspective into consideration in the report.

EPA plans to implement an \$80 million research program on PM. Mr. Longest wants to be comfortable with what ORD is doing, and he would like some reassurance from the BOSC that these resources are being invested effectively. Dr. Preuss pointed out that it takes considerable effort and time to become familiar with the issues associated with PM. He noted that this familiarity is critical before reaching conclusions and making recommendations about PM. Without this familiarity, the report on PM would just be another superficial report that scratches at a different surface. Dr. Leaderer pointed out that if the BOSC wants to focus on PM then the members had better be ready to spend the time required to do so.

Dr. Denson tried to summarize some of the discussion regarding the research planning process. The BOSC could focus on PM as an example and then identify categories of research needed to resolve the issues. We need to answer the following questions: What is the value added? What is the endpoint? What happens next? Mr. Longest indicated that the PM issue is of substantial importance to ORD. He does not believe that the meeting with NAS in June will be enough to develop a plan. He wants the BOSC to “look over ORD’s shoulder” to make sure that the Laboratories/Centers are doing what should be done in order to address the needs and meet the stated goals.

Dr. Denson mentioned that the BOSC had initially struggled with the question of how research plans are developed. The members gained first-hand experience with the process through development of the arsenic plan. Is that the process used for all research plans? Is there someone in ORD who is working on developing a research plan on PM. Mr. Longest replied that ORD staff are currently working on developing a PM strategy. Dr. Preuss expressed some concern about the use of PM as a focus for the BOSC. He believes that NAS will study it for 2 years and answer all of the questions that have been raised in this discussion. Mr. Longest pointed out, however, that he is unsure how ORD will implement the PM strategy even after it is developed and agreed upon. He sees PM as a real opportunity for ORD to shine—ORD can take the lead on the PM issue (the Office of Air is the only other EPA Office looking at the PM issue).

Dr. Loehr indicated that it is easier to focus on a problem such as PM than to tackle the research integration issue in general. Is the planning effort adequate? Is the research plan being implemented appropriately/effectively? Is there a proper balance between the core research and the problem research? How will ORD ensure that it has the right people and resources now and later to address the problem? Dr. Loehr mentioned that he is not sure whether PM is the right issue on which to focus; however, he likes the PM issues because it is basically in ORD’s hands. It will provide the BOSC a good opportunity to see how ORD goes about its business. In addition, the knowledge gained from this case study would enable the BOSC to provide useful advice to the AA/ORD.

Dr. Denson tried to articulate a potential path forward for the BOSC. The Board could focus on one area (such as PM) and use this as an example around which to develop a process. The BOSC could identify a series of questions that need to be answered, such as: What kinds of resources (human) are needed? What type of extramural support (e.g., STAR program) is needed? These questions will create a road map and will enable the BOSC to advise the AA/ORD on shifting resources. He pointed out that special attention must be accorded identifying core research, because selection of the PM issue will tend to focus the study on problem-based research.

At the previous meeting, the BOSC asked for examples of activities that the subcommittees could undertake to assist ORD. Dr. Preuss provided the BOSC members with ORD’s response regarding future BOSC activities (see Attachment 1). This handout identified a number of functions outlined in the BOSC charter. Dr. Preuss reviewed this list of 12 potential activities that could be undertaken by the BOSC, which include:

- Review of the individual Laboratory/Center strategic plans.

- Advice on policies and plans related to the conduct of science in ORD (e.g., strategic hiring plans, grantee interactions, promotion criteria).
- Advice on scientific directions and priorities, including areas that will require major shifts or investments by ORD. The BOSC can serve as the “beginning of the pipeline” group to help point ORD in the right directions, and support the transition from “traditional” to “emerging” areas of research.
- Review of major initiatives in research and assessment such as the Multimedia Integrated Modeling System (MIMS) concept, or the revised Risk Management Research Framework.
- Review of Laboratory/Center overall programs, review of divisions within Laboratories and Centers, and review of problem-specific strategies.
- Advice on how ORD can move more quickly and effectively to become an integrated research organization (i.e., across media and disciplines and across ecological and health issues).
- Advice regarding the balance and integration between core research and problem-driven research, between intramural and extramural research, and between single medium and multimedia research.
- Aid search panels for senior positions within ORD.
- Advice to the Laboratories/Centers about staffing plans (e.g., NRMRL’s plans for transition to a stronger inhouse research program).
- Advice concerning the direction of communication efforts to bring the results of ORD research to people who can use that information both within and outside EPA.
- Providing information about ORD, not as an advocate, but as knowledgeable individuals and as a group, to stakeholders and other key individuals/institutions/organizations engaged in environmental issues.
- Advice on how to measure the success (i.e., the value added) of ORD research (both intramural and extramural).

Dr. Preuss mentioned that the BOSC may want to consider focusing on the Laboratories and divisions within the Laboratories (lower levels of the ORD organization). He pointed out that the Laboratory/Center Directors need advice as much as the AA/ORD. Dr. Preuss also stressed the importance of obtaining advice on how to measure success. The House, Senate, EPA Administrator, and many others are asking this question of EPA.

Mr. Longest noted that the BOSC could play a role in examining how the divisions within the Laboratories work on the selected issue. Dr. Brown pointed out that the efforts of the BOSC would be evaluative and prescriptive—look at the research integration to address the selected issue/problem and recommend enhancements to the program. The BOSC could make general recommendations to the AA/ORD based on the case study. However, Dr. Brown noted that there are several issues that cannot be tackled in one case study. Dr. Denson suggested that the BOSC could investigate questions about value added and whether the division is capable of handling the work. The BOSC also could identify problem areas/issues that need to be addressed. Dr. Brown responded that the BOSC members are already aware of a number of these issues. Dr. Denson noted that the BOSC could look for other issues. He added that he believes that the BOSC is fully capable of articulating the issues and the next step forward should be to develop a basic plan that outlines what the BOSC will do.

Dr. Robert Howarth (Cornell University) cautioned that Board about the selection of PM as a focus. He is concerned about losing the core research component. He suggested that the BOSC could look at how the

Agency deals with PM, and ensure that EPA is striking an appropriate balance between core research and problem-driven research. Dr. Denson suggested that the BOSC members identify other issue areas that could serve as the focus. Dr. Loehr mentioned that he likes the use of the term “issue area” in lieu of problem. PM is a large scientific issue, not just a problem. He pointed out that by focusing on one issue area, the BOSC could address all of the questions that have been raised by Board members during this discussion. The BOSC could assist ORD in thinking through the issue and how it acquires and uses information. Dr. Burke suggested that the BOSC select an issue and then look at the list of potential activities provided by Dr. Preuss. This effort could guide the BOSC in approaching the selected issue and allow the Board to help ORD to organizationally address the issue.

Dr. Denson suggested that the BOSC could establish a subcommittee, select an issue area, and identify questions that need to be answered including questions regarding value added. Dr. Brown believes that all of the BOSC members, not just a subcommittee, need to play a role in this effort. Dr. Denson responded that he suggested a subcommittee structure to ensure that something gets done and a product is developed. He agreed with Dr. Brown that all BOSC members should be involved. Dr. Loehr thinks the PM issue may be too large of a task for the BOSC, but he believes that the Board can make a difference. In responding to Dr. Zimmerman’s question regarding whether the BOSC should limit their focus to only one issue, Dr. Loehr pointed out that one issue is probably all the BOSC members can handle initially. Dr. Brown agreed, reminding the Board members that Dr. Preuss mentioned the need to get deeply involved in the issue. She pointed out that the self assessments were essential for the Laboratory/Center reviews and she suggested using a similar approach for the PM study. A series of questions could be developed by the BOSC and provided to the Laboratories/Centers. Dr. Leaderer agreed that this could be useful to the BOSC as well as the Laboratories/Centers.

Dr. Loehr noted that if the BOSC selects an issue area on which to focus, all of the Board’s resources will be consumed. He did not believe that the BOSC could do both in parallel. He pointed out that many of the items on the list provided by Dr. Preuss could be addressed when focusing on the one issue. There was considerable discussion on how closely the BOSC members should work with the Laboratories/Centers. Some members believe that some distance is necessary and others hold that increased familiarity will facilitate the Board’s ability to advise the AA/ORD and Laboratory/Center Directors concerning management issues. Dr. Preuss reminded the members that the BOSC was created to advise the AA/ORD. Therefore, distance from ORD is not necessary, and it might even be detrimental. Dr. Small responded that the BOSC would become more involved with the Laboratories/Centers if the issue study is undertaken. Dr. Burke agreed that the BOSC members should become more familiar with the Laboratories/Centers. Dr. Brown concurred and added that the BOSC will not be able to advise on management issues unless the members get closer to the Laboratories/Centers. Dr. Burke expressed some concern about how much the Board members could accomplish in 8 days/year. There was some discussion on whether subcommittees could be created to interact more closely with the Laboratories/Centers. At the last meeting, Dr. William Cooper (Michigan State University) and Dr. Zimmerman agreed to develop an issue paper on how the Executive Committee would function, the formation of standing committees, and how these committees would interact with the Executive Committee. Because Dr. Cooper was unable to attend the meeting, further discussion of this issue was postponed until the next meeting.

Before the meeting was adjourned for the day, Dr. Denson polled members concerning an appropriate date for the next meeting. The members agreed that the next meeting should be held on August 17-18, 1998, in the Washington, DC, area.

Friday, May 1, 1998

Dr. Denson called the meeting to order at 8:30 a.m., and quickly reviewed the items on the agenda that remained to be covered, including: review of the remaining Laboratory/Center review reports, review and approval of the minutes from the January meeting and teleconference calls, review of the new BOSC charter,

discussion of the path forward, and overview of Federal Advisory Committee Act (FACA) rules and requirements.

Final Review of the NHEERL Report

The vettors for the National Health and Environmental Effects Research Laboratory (NHEERL) report were Dr. Cooper and Dr. James Bus (The Dow Chemical Company). Dr. Bus indicated that Dr. Zimmerman had made the changes that he and Dr. Cooper had suggested. Dr. Howarth, who also read the NHEERL report carefully, mentioned that Dr. Zimmerman had done a good job incorporating the changes. The Board agreed that, with the following changes, the NHEERL report would be ready for submission to the AA/ORD:

- Deletion of Appendix D.
- Replace “A Draft Report . . .” with “Final Report . . .” on the cover.
- Change the date on the report cover to April 30, 1998.
- Delete the sentence on the bottom of the cover page.

Final Review of the NCEA Report

The vettors for the National Center for Environmental Assessment (NCEA) report were Dr. Leaderer and Dr. Small. Both vettors confirmed that their suggestions had been incorporated into the report. The Board agreed that, with the following changes, the NCEA report would be ready for submission to the AA/ORD:

- Deletion of Appendix D.
- Replace “A Draft Report . . .” with “Final Report . . .” on the cover.
- Change the date on the report cover to April 30, 1998.
- Delete the sentence on the bottom of the cover page.

Review and Approval of the January Meeting Minutes

Dr. Loehr identified several corrections that need to be made to the minutes for the January meeting, including:

- On page 3 in the first paragraph after the bullets, “FACAs” should be changed to “FACA committees.”
- On page 3, line 8 in the paragraph under “Purpose of BOSC/Interaction Between BOSC and SAB,” the “is are” should be replaced by “and is.”
- On page 10, the sentence after the three bullets toward the top half of the page, the word “Execute” should be changed to “Executive.” In the title for the next section, the word “Engineering” should be changed to “Environmental.”
- On page 11, at the end of line 4 of the paragraph under “Discussion of Proposal to BOSC,” the words “need to” should be inserted between “would” and “be.” Also in line 15 of that same paragraph, the word “there” should be changed to “their.”

The Board unanimously approved the January 27-28, 1998, meeting minutes with the changes listed above. The meeting minutes will be revised as necessary and included in the notebook for the next meeting.

Review and Approval of the January and February Teleconference Minutes

January 5 Conference Call. The following changes to the January 5, 1998, conference call minutes were suggested by the Board:

- On page 1, line 7 in the paragraph on recommendation 1, “Jack” should be replaced by “Joseph.”
- On page 1, line 3 in the paragraph on recommendation 2, “commitment in ORD” should be changed to “commitment to ORD.”
- On page 2, in the section title following recommendation 7, the word “Engineering” should be changed to “Effects.” The first sentence of that section should be changed to read “The National Health and Environmental Effects Research Laboratory (NHEERL) is the largest laboratory. The words “integration with the other national laboratories is critical.” should be deleted.

The Board unanimously approved the January 5, 1998, conference call minutes with the changes listed above.

January 12 Conference Call. The only change to the January 12, 1998, conference call minutes suggested by the Board was to insert the text defining the recommendations, as was done in the January 5, 1998, minutes. The Board unanimously approved the January 12, 1998, conference call minutes with this suggested change.

January 22 Conference Call. The following changes to the January 22, 1998, conference call minutes were suggested by the Board:

- Insert the text for the recommendations, as was done in the January 5, 1998, conference call minutes.
- In line 1 under recommendation 3, delete the words “and relevance.” From the second sentence, delete the words “, which taxes available resources.” Also in that paragraph, insert the sentence “He urged the use of the NSF model.” before the sentence that begins with “Mitch Small responded . . .”
- In line 2 under recommendation 16, insert the sentence “A distinction was drawn between core research and research in direct support of regulations.” before the sentence that begins “QA reporting requirements . . .” In line 3 of this paragraph, insert the word “core” after “perform” and before “research.”

The Board unanimously approved the January 22, 1998, conference call minutes with the changes listed above.

February 26 Conference Call. The Board unanimously approved the February conference call minutes with no revisions.

Dr. Denson requested that the conference call minutes be revised as necessary before the next meeting.

BOSC and ORD Research Program: Horizontal Integration and Coordination Around Issue Areas

After reviewing the minutes from the April 30th discussions, Dr. Denson outlined a course(s) of action (see Attachment 2) for the BOSC, which included the following:

- Advice and counsel would be provided to the AA/ORD on research programs and plans around identified “issue areas.”
- The issue area to be considered now is the “PM issue.”
- The focus of all work will be horizontal integration and coordination, cutting across Laboratories, Centers, and Divisions.
- *Ad hoc* subcommittees will be established to address the various elements of the issue area.
- The BOSC (acting as a committee of the whole) or a subcommittee of the BOSC, will identify the key elements to be considered in the PM issue area.
- Examples of elements to be considered in the PM issue area include:
 - ❖ The added value of a particular research program.
 - ❖ Human resource or skills distribution.
 - ❖ Integration/coordination between Divisions and/or Laboratories and Centers.
 - ❖ Integration/leveraging resources (i.e., extramural grants program).
 - ❖ Right science? Good science?
 - ❖ Identify core research areas/topics from the problem-driven research.

Dr. Loehr suggested adding the following items to Dr. Denson’s list of example elements:

- Paradigm line up—Do various activities come together at the right place and time? Does exposure research align with assessment research?
- Planning—How does planning enter the process? How does research planning facilitate the aligning process?

Dr. Loehr also suggested that the 12 points on the handout that Dr. Preuss provided could be included in the list of examples.

In response to a question concerning whether the BOSC should focus on the PM issue, Dr. Denson replied that the notes from the April 30th discussions showed clear direction from the AA/ORD to focus on this issue. Dr. Kavanaugh expressed his support for focusing on an issue of national importance and evaluating how EPA Laboratories/Centers are responding to that issue. He also suggested that the BOSC could make a significant contribution in the area of metrics and benchmarking. Dr. Denson responded that as they focused on the issue area, the Board members would identify spinoff issues that require their attention, such as human resources, metrics, measures of success, etc. All of these could be included in the issue study. Dr. Bus added that ORD wants to see its research used in environmental decisionmaking. This could be a benchmark against which the Laboratories could measure. If the Laboratories are asking the right questions and doing the right science, then the research should make a difference in the decisions being made on a particular issue. Dr. Preuss added that ORD would like to know to what degree its own research (versus research by other organizations) has impacted environmental decisions.

The Board agreed that by studying the PM issue, the BOSC could develop a template that could be used for future studies. Dr. Denson agreed to “flesh out” an action plan for examining the PM issue area. Dr. Burke suggested that the Board members may want to do some reading before they move forward with a plan. He requested that copies of the following documents be sent to the Board members: (1) research needs document prepared by EPA as a result of the SAB’s Clean Air Scientific Advisory Committee (CASAC), (2) ORD’s PM research plan, and (3) the NRC report. Dr. Preuss indicated that these documents are approximately 50 pages each and he agreed to provide copies of the reports to the BOSC. Dr. Small expressed some concern that reading these documents before identifying the subcommittees may bias the Board’s approach. He suggested that the following three *ad hoc* subcommittees be formed:

- Quality and Value of Core Science (longer term issues)
- Responsiveness to Policy and Decisionmaking
- Management and Integration Issues.

Dr. Denson believes that the Board members could do the research and form the subcommittees in parallel. Dr. Brown suggested that the study could begin with a set of questions that focus on the example elements included in Dr. Denson’s handout. Dr. Leaderer asked if the Board wants to present a list of questions to multiple Laboratories/Centers. Dr. Denson noted that the model the Board used for the Laboratory/Center reviews is a good model, but the BOSC now needs to do the process horizontally instead of vertically. Dr. Preuss indicated that integration for the PM program is the best that he has seen at EPA. He believes that the BOSC needs to be aware of all of the efforts that are underway. In response to Dr. Kavanaugh’s question regarding what the BOSC will produce, Dr. Denson replied that the outcome of the study may be reassurance to the AA/ORD that the Agency’s PM research program is well integrated and on target. Dr. Small added that the BOSC may identify areas in which integration could be improved. Dr. Preuss warned the Board that the PM issue is politically charged. He cautioned the BOSC members that there are many individuals trying to undermine the standard. Dr. Small responded that the BOSC will conduct an objective study that will not be concerned with the specific scientific aspects of the research, but with the process used by EPA in regards to addressing the PM issue. Dr. Leaderer asked that Dr. Denson remind members that all questions they receive should be deferred to the Chair. This procedure will be particularly important given the publicity and politics surrounding the PM issue. Dr. Denson indicated that the Board should develop a path forward. He suggested that a working group be formed to identify the questions to be sent to the Laboratories/Centers and scope out the self study. Dr. Denson asked for volunteers to serve on the scoping subcommittee. Dr. Zimmerman and Dr. Bus agreed to serve on this subcommittee. Dr. Denson agreed to identify a chair for this subcommittee. In response to a question concerning timeframe, Dr. Denson indicated that the subcommittee should complete the scoping effort before the next meeting in August. Dr. Leaderer agreed to provide some questions to the subcommittee. As soon as the scoping phase is completed, subcommittees will be established and the study will move forward. Dr. Denson asked members to fax or e-mail messages to him regarding how and at what level they would like to participate in the PM issue study.

Report from the Nominating Committee

The Nominating Committee developed a list of ecologists and a list of policy experts as potential candidates for the BOSC. The individuals on the two lists are prioritized in order of preference, which was based on the appropriateness of the individual’s qualifications to fulfill the BOSC’s needs. Dr. Pierson proposed that this list be submitted to the Administrator. Dr. Denson asked if the Committee had actively sought qualified minority and women candidates. Dr. Howarth responded that they were not successful in identifying minority candidates, but they did include some women candidates. A motion was made by Dr. Denson to submit the candidates to the AA/ORD. The motion was seconded and passed with unanimous approval.

Final Review of the NCERQA Report

The vettors for the NCERQA report, Dr. Michael Kavanaugh (Malcolm Pirnie, Inc.) and Dr. Pierson, confirmed that Dr. Brown and Dr. Small had incorporated their suggested changes and that the report was ready to be finalized. Dr. Brown mentioned that she had made several changes to eliminate some technical inaccuracies in the report, specifically with regard to the role of the Quality Assurance Division (QAD). One of the changes was necessary because the report implied that the QAD was responsible for reviewing every file in ORD to ensure the existence of a Quality Assurance Plan. In reality, the QAD develops systems and training programs, trains the trainers, and performs periodic checks of files (not all files). Another section required changes to clarify that QAD was not responsible for all of the QA training in the Laboratories/Centers. Another change involved the insertion of language to recognize that the QAD advocates a graded approach to QA—the level of documentation reflects the nature of QA required for the task. The vettors then reviewed and approved Dr. Brown’s additional changes to the report. The Board agreed that, with the following changes, the NCERQA report would be ready for submission to the AA/ORD:

- Deletion of Appendix D.
- Replace “A Draft Report . . .” with “Final Report . . .” on the cover.
- Change the date on the report cover to April 30, 1998.
- Delete the sentence on the bottom of the cover page.

New BOSC Charter

Ms. Hamilton provided BOSC members with a marked up copy of the old charter, indicating the items that had been revised in the new charter. She quickly reviewed the changes and noted that a copy of the new charter was provided under the “Miscellaneous” tab in the notebook. The new charter no longer includes a statement on the length of appointments. Ms. Hamilton indicated that EPA did not want to be bound to a specific term stated in the charter and the fact that FACA committees have to be rechartered every 2 years complicated this issue. She confirmed that EPA intends for BOSC members to serve a term of up to 4 years. Several of the Board members questioned the budget figure included in the new charter. Ms. Hamilton responded that the figure was based on the amount spent during the past year. She noted that the figure is an estimate and she did not anticipate a lack of funding for the BOSC. Ms. Hamilton reported that the new charter had been approved by EPA’s Deputy Administrator. It was subsequently sent to GSA and will be forwarded to OMB following GSA approval. Upon OMB approval, the announcement that EPA is renewing the charter will be posted in the Federal Register.

Discussion of Dr. Preuss’ Role in Regard to the BOSC

Dr. Preuss reminded the BOSC members that he fulfills two roles at the BOSC meetings. He comes to receive advice as a Center Director, but he also attends as the senior ORD official responsible for supporting and advising the BOSC about ORD’s needs and requirements from the Board. Dr. Preuss has been a key champion of the BOSC within ORD; he worked for 8 years for the creation of the BOSC. Because he believes in its importance, he volunteered to take responsibility for the BOSC. Dr. Preuss asked the Board members to let him know if they are uncomfortable with his role. He indicated that some of the awkwardness may arise from the fact that the standard operating procedure developed by ORD for the BOSC identifies Dr. Preuss as the senior ORD representative and specifies that all materials be forwarded through his Office and Ms. Hamilton, the DFO for the BOSC. In closing, Dr. Preuss asked Board members to let him know if they would prefer a different arrangement.

Overview of FACA for Advisory Committees

Hale Hawbecker (EPA's Office of General Counsel) provided an overview of the requirements of FACA advisory committees and the ethical requirements for FACA advisory committee members. Because the BOSC is involved in peer review, Mr. Hawbecker mentioned that EPA is currently in litigation about how the Agency conducts peer review. This litigation concerns the use of a contractor (instead of an advisory committee) to peer review a report on the cancer causing nature of benzene. The court determined that EPA could use a contractor to peer review the report. Mr. Hawbecker indicated that the basic requirements for FACA advisory committees are that the meetings must be open to the public, the membership of the committee must be balanced, and the committee must have a charter. Balance is usually determined by the EPA Administrator and, although EPA has been challenged regarding membership balance, the Agency has never lost a case. He pointed out that the area where most FACA advisory committees get into trouble concerns the openness of the meetings. The meetings must be announced in the Federal Register and open to the public. There are a few exemptions to this openness requirement, such as the personal privacy exemption and the confidential business information exemption. Mr. Hawbecker pointed out that working groups of FACA advisory committees can hold closed meetings if these meetings involve the preparation of materials or reports to be reviewed by the advisory committee at an open meeting. He also recommended that working group sessions, whenever possible, be open to the public. Mr. Hawbecker mentioned that the SAB, for example, never holds closed meetings. He also cautioned BOSC members about the use of e-mail. Messages and reports sent electronically by Board members can be subject to Freedom of Information Act (FOIA) requests.

Mr. Hawbecker noted that BOSC members receive invitational travel to come to the meetings, and he explained that EPA cannot pay travel expenses for an assistant to accompany a Board member. He also pointed out that if a subgroup of the BOSC wants to meet without EPA present, then the Agency cannot pay for the costs associated with those meetings. Mr. Hawbecker mentioned that Board members serve at the pleasure of the individual who appointed them, which means that the appointments can be terminated. He warned that EPA cannot use the Board to lobby Congress; however, BOSC members can testify before the Congress and the Senate. Mr. Hawbecker indicated that there are specific procedures for testifying; any BOSC member who is contacted concerning testifying should notify ORD immediately and work through ORD to prepare and deliver the testimony. Mr. Hawbecker noted that these procedures only apply if the individual is representing the BOSC or testifying because he/she is a member of the BOSC. These rules were established to ensure that the BOSC is not used as a legislative advisory committee. Mr. Hawbecker provided BOSC members with a copy of EPA Ethics Advisory 97-15, and he asked that each member read the advisory. He quickly reviewed the topics covered by the advisory—financial disclosure, conflict of interest issues, post-employment restrictions, and other issues. He also pointed out that special government employees (SGEs) cannot serve more than 60 days each year. Dr. Pierson asked if the 60 days is cumulative across all federal agencies. Mr. Hawbecker responded that he did not believe so.

Dr. Loehr asked to what extent the BOSC is required to consider comments from the meeting attendees. Mr. Hawbecker suggested that the BOSC request comments in writing and limit public comment periods during the meetings. Ms. Hamilton indicated that the BOSC currently uses such procedures and each speaker is limited to 3 minutes. This time limit is included in the Federal Register notice regarding the meeting.

Dr. Denson thanked Mr. Hawbecker for his overview and insights regarding FACA advisory committee requirements and made a motion to adjourn the meeting. The motion was seconded and the meeting was adjourned.

Action Items

The following action items were identified during the meeting:

- Dr. Denson asked BOSC members to review the copy of his testimony to determine if the BOSC could use it as the basis for preparing the executive summary for the AA/ORD on the Laboratories/Centers review.
- SCG will finalize the five review reports, based on comments from the vettors and Board members, and submit them to Dr. Preuss' Office.
- Dr. Denson will prepare the letter to the AA/ORD that will accompany the five review reports.
- SCG will revise the January meeting and teleconference call minutes based on comments provided by the Board members. The revised minutes will be included in the notebook for the next meeting.
- Dr. Cooper and Dr. Zimmerman will develop an issue paper on how the Executive Committee will function, the formation of standing committees, and how these committees will interact with the Executive Committee. This paper will be a topic of discussion at the next meeting.
- SCG will reserve meeting space for the next Executive Committee meeting scheduled for August 17-18, 1998.
- Dr. Denson will "flesh out" an action plan for examining the PM issue area. The plan will be a topic of discussion at the next meeting.
- Dr. Preuss will ask William Wilson (NCEA) to provide copies of the research needs document prepared by EPA as a result of the SAB's Clean Air Scientific Advisory Committee (CASAC) to the BOSC. He also will ask John Vandenberg (NHEERL) to provide copies of ORD's PM research plan to the BOSC. In addition, Dr. Preuss will provide copies of the NRC report to the BOSC.
- Dr. Zimmerman and Dr. Bus volunteered to serve on the subcommittee to scope out the self study for the PM issue. Dr. Denson will identify a chair for this scoping subcommittee as soon as possible. The deadline for completing the scoping efforts is mid-August 1998.
- Dr. Leaderer agreed to provide some questions to the scoping subcommittee.
- Dr. Denson asked BOSC members to send him a fax or e-mail message regarding how they want to be involved in the PM issue study and at what level they would like to be involved.

BOSC Executive Committee Members

Marilyn A. Brown, Ph.D.
Deputy Director
Energy Efficiency and Renewable Energy Program
Oak Ridge National Laboratory
P.O. Box 20008
Oak Ridge, TN 37831-6206
Tel: 423-576-8152
Fax: 423-241-0112
E-mail: brownma@ornl.gov

Thomas A. Burke, Ph.D.
Co-Director
Risk Sciences and Public Policy Institute
School of Hygiene and Public Health
The John Hopkins University
624 N. Broadway, Room 551
Baltimore, MD 21205
Tel: 410-955-1604
Fax: 410-614-2797
E-mail: tburke@phnet.sphjhu.edu

James S. Bus, Ph.D.
Technical Director, Health and Environmental
Sciences
The Dow Chemical Company
1803 Building
Midland, MI 48674
Tel: 517-636-4557
Fax: 517-638-9863
E-mail: jbus@dow.com

William E. Cooper, Ph.D.
Professor
Institute for Environmental Toxicology
Michigan State University
C231 Holden Hall
East Lansing, MI 48824-1206
Tel: 517-432-1159
Tel: 517-353-6469
Fax: 517-355-4603
E-mail: cooperw@pilot.msu.edu

Costel D. Denson, Ph.D.
Vice Provost for Research
University of Delaware
210 Hullahen Hall
Newark, DE 19716
Tel: 302-831-4007
Fax: 302-831-2828
E-mail: costel.denson@mvs.udel.edu

Robert W. Howarth, Ph.D.
David R. Atkinson, Professor of Ecology
and Environmental Biology
E311 Corson Hall
Cornell University
Ithaca, NY 14853
Tel: 607-255-6175
Fax: 607-254-4271
E-mail: rwh2@cornell.edu

Michael C. Kavanaugh, Ph.D.
Vice President
Malcolm Pirnie, Inc.
180 Grand Avenue, Suite 725
Oakland, CA 94612
Tel: 510-451 -8900
Fax: 510-451 -8904
E-mail: mkavavaugh@pirnie.com

Brian P. Leaderer, Ph.D.
Professor of Epidemiology
Yale University
The John B. Pierce Laboratory, Inc.
290 Congress Avenue
New Haven, CT 06519
Tel: 203-785-2880
Fax: 203-737-6023
E-mail: brian.leaderer@yale.edu

Raymond C. Loehr, Ph.D.
Professor of Civil Engineering
Environmental and Water Resources
Engineering Program
Civil Engineering Department
9.102 ECJ Hall
The University of Texas at Austin
Austin, TX 78712
Tel: 512-471 -4624
Fax: 512-471 -8449
E-mail: r.loehr@mail.utexas.edu

BOSC Executive Committee Members (Continued)

William R. Pierson, Ph.D.
Research Professor
Energy and Environmental Engineering Center
Desert Research Institute
P.O. Box 60220
5625 Fox Avenue
Reno, NV 89506
Tel: 702-677-3193
Fax: 702-677-3303
E-mail: billp@sage.dri.edu

Jerald L. Schnoor, Ph.D.
Professor of Civil and Environmental Engineering
University of Iowa
College of Civil and Environmental Engineering
116 Engineering Research Facility
202 IATL
Iowa City, IA 52242-1000
Tel: 319-335-5649
Fax: 319-335-5585
E-mail: jerald-schnoor@uiowa.edu

Mitchell J. Small, Ph.D.
Professor, Civil and Environmental Engineering
Department of Civil and Environmental
Engineering
Carnegie-Mellon University
Porter Hall 119, Frew Street
Pittsburgh, PA 15213-3890
Tel: 412-268-8782
Fax: 412-268-7813
E-mail: ms35@andrew.cmu.edu

Rae Zimmerman, Ph.D.
Professor of Planning and Public Administration
Robert F. Wagner Graduate School of Public
Service
New York University
4 Washington Square North
New York, NY 10003
Tel: 212-998-1212
Fax: 212-995-3890
E-mail: rae.zimmerman@nyu.edu

Additional Meeting Participants

Donald Barnes, Ph.D.
Executive Director, Science Advisory Board
U.S. Environmental Protection Agency
Office of Research and Development (1400)
Washington, DC 20460
Tel: 202-260-4126
Fax: 202-260-9232
E-mail: barnes.donald@epamail.epa.gov

Lisa Barrera
Barrera Associates

Beverly Campbell
SCG
656 Quince Orchard Road, Suite 210
Gaithersburg, MD 20878
Tel: 301-670-4990
Fax: 301-670-3815
E-mail: bcampbel@scgcorp.com

Tom Clark
Acting Deputy Assistant Administrator
Office of Research and Development (8101R)
U.S. Environmental Protection Agency
Washington, DC 20460
Tel: 202-564-6620
Fax: 202-565-2910
E-mail: clark.tom@epamail.epa.gov

Shirley R. Hamilton
Designated Federal Officer
U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Research
and Quality Assurance (8701R)
Washington, DC 20460
Tel: 202-564-6853
Fax: 202-565-2444
E-mail: hamilton.shirley@epamail.epa.gov

Hale W. Hawbecker
Attorney Advisor
Office of General Counsel (2322)
U.S. Environmental Protection Agency
Washington, DC 20460
Tel: 202-260-4555
Fax: 202-260-8392
E-mail: hawbecker.hale@epamail.epa.gov

Henry Longest II
Acting Assistant Administrator
Office of Research and Development (8101R)
U.S. Environmental Protection Agency
Washington, DC 20460
Tel: 202-260-7676
Fax: 202-260-9761
E-mail: longest.henry@epamail.epa.gov

Peter Preuss, Ph.D.
Director
National Center for Environmental Research
and Quality Assurance (8701R)
Office of Research and Development
U.S. Environmental Protection Agency
Washington, DC 20460
Tel: 202-564-6825
Fax: 202-565-2444
E-mail: preuss.peter@epamail.epa.gov

Tony Reichhardt
Nature Magazine

Michael W. Slimak
Associate Director
National Center for Environmental Assessment
(8601D)
Office of Research and Development
U.S. Environmental Protection Agency
Washington, DC 20460
Tel: 202-564-3322
Fax: 202-565-0057
E-mail: slimak.mike@epamail.epa.gov

Dee Udbinac
SCG
656 Quince Orchard Road, Suite 210
Gaithersburg, MD 20878
Tel: 301-670-4990
Fax: 301-670-3815
E-mail: dudbinac@scgcorp.com