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

BOARD OF SCIENTIFIC COUNSELORS EXECUTIVE COMMITTEE MEETING

Washington, DC
April 29 - 30, 1999

Thursday, April 29, 1999

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 9:00 a.m. He expressed his apologies that he would have to rearrange the agenda because he needed to leave at 10:15. He indicated that he would ask Dr. Jerry Schnoor (University of Iowa) when he arrives to serve as Chair in his absence. He welcomed the two new members of the BOSC—Dr. Ann Bostrom (Georgia Institute of Technology) and Dr. Bonnie McCay (Cook College, Rutgers University). He then asked the others present to introduce themselves for the benefit of the new members. Dr. Denson also mentioned that he had invited Dr. Ken Dickson (University of Texas) to be a member of the BOSC. He reminded the Board members that Dr. Dickson served as a member of Dr. Rae Zimmerman's (New York University) *Ad Hoc* Subcommittee to review the National Health and Environmental Effects Research Laboratory (NHEERL). Dr. Dickson has agreed to serve on the BOSC and his paperwork has been submitted for approval. Dr. Denson also noted that Dr. Mitchell Small (Carnegie-Mellon University) is working to identify more minorities to serve on *Ad Hoc* Subcommittees. He asked that BOSC members use this list to select members for the Subcommittees that will focus on the particulate matter (PM) issue. Dr. Denson then suggested that the first topic of discussion be the PM review.

Particulate Matter Review

Dr. Denson asked the BOSC members to review pages 15 and 16 of the minutes from the February 1999 meeting. These pages contain a summary of the discussion of the PM review that occurred during the last meeting. He noted that there is consensus on doing a horizontal review of the PM issue and that the study should be aligned with the 10 research priorities identified in the National Academy of Sciences (NAS) report. Dr. Denson asked the members to review the list of Subcommittees on page 16 of the minutes. He quickly identified the specific priorities that would be reviewed by each Subcommittee. He also noted that Dr. John Vandenberg (EPA/ORD) suggested that the BOSC consider forming a Risk Management Subcommittee. Dr. Denson concurred with this suggestion. Dr. Michael Kavanaugh (Malcolm Pirnie, Inc.) agreed and mentioned that he could contribute most to that Subcommittee. Dr. Denson indicated that he would like to identify Subcommittee Chairs and Co-Chairs before he left the meeting today. Although he had asked members to send him their preferences, only Dr. Small responded. For Dr. Bostrom's and Dr. McCay's benefit, Dr. Denson pointed out that there is only one standing committee of the BOSC—the nominations committee. The BOSC prefers to use *Ad Hoc* Subcommittees to ensure flexibility. A member of the BOSC serves as the Chair and a second BOSC member serves as the Co-Chair for each *Ad Hoc* Subcommittee. The remainder of each Subcommittee consists of consultants. Dr. Denson reminded the BOSC members that Dr. Small's list of potential Subcommittee members will facilitate the selection of consultants for the PM *Ad Hoc* Subcommittees.

Dr. Denson indicated that he would like the BOSC to draft a list of self-study questions to be submitted to appropriate ORD staff prior to the site visit. A written response to these questions will be requested by the BOSC. He mentioned that he already had received lists of questions from Dr. Bill Cooper (Michigan State University), Dr. Zimmerman, and Dr. Small (copies of these questions were distributed at the meeting). Prior to this meeting, Dr. Denson used the input from these Board members and a suggestion made by Dr. Ray Loehr (University of Texas at Austin) at the last meeting (i.e., Dr. Loehr suggested rephrasing the points in the charge to the BOSC as questions). Dr. Denson distributed copies of a list of five self-study questions that he had prepared for the meeting. Dr. Peter Preuss (EPA/NCERQA) indicated that the National Center for Environmental Research and Quality Assurance (NCERQA) probably should be included in each area because it has input in all six areas. Dr. Denson agreed that NCERQA should be listed under each area and the appropriate *Ad Hoc* Subcommittee Chair can determine if the Subcommittee would like input from NCERQA. He then asked the Board members to take a few minutes to review the list of self-study questions. Dr. Denson pointed out that if the BOSC obtains responses to these questions, the *Ad Hoc* Subcommittees will be able to respond to the charge concerning the PM review from the Assistant Administrator for Research and Development (AA/ORD).

Dr. Marilyn Brown (Oak Ridge National Laboratory) asked if there was a way to assess the process for assuring the quality of research. Could the BOSC examine the internal and external review processes? Dr. Bostrom asked if Dr. Denson wanted the Board members to combine the questions submitted by the members with those developed from the charge. Dr. Denson replied that the BOSC should be identifying questions to add to the list of five self-study questions. He also asked BOSC members to think about how to collect this information from ORD. Dr. Bostrom asked if the BOSC planned to follow the same procedure that was used for the Laboratory/Center reviews and if that process had been documented. Dr. Denson replied that the process was described in each of the final reports on the Laboratory/Center reviews. Dr. Bostrom and Dr. McCay asked if they could obtain copies of those final reports. Beverly Campbell (SCG) agreed to send them copies of the reports.

Dr. McCay mentioned that it might be useful to ask questions of partners who are collaborating with the Laboratories/Centers on the PM research effort to determine if the partners are aware of how their efforts fit into the overall PM research program. Dr. James Bus (The Dow Chemical Company) pointed out that the previous review indicated that the Laboratories/Centers had not developed plans that would enable them to integrate and interact with each other. He noted that the PM research effort must be integrated and that the integration must be fully appreciated across all Laboratories/Centers to meet PM goals. Dr. Thomas Burke (The Johns Hopkins University) suggested adding a question to the list that asks the Laboratories/Centers to describe how integration among the various Laboratories/Centers will occur. Dr. Denson noted that there is a sixth point in the charge and suggested that the BOSC may want to develop a sixth question to address this point. Dr. Bus mentioned that the BOSC could use this opportunity to determine if the Laboratories/Centers have acted on the BOSC's suggestion to develop a plan for integrating research across ORD and the Agency.

Dr. Denson suggested that the Board members may want to break up into small groups during the afternoon session to discuss the self-study questions. Dr. Kavanaugh asked if the Board was still on schedule to develop a draft report by September 1999. He also noted that this review is not Laboratory/Center focused, but functionally focused. Therefore, it may be necessary to collect the information in a different manner than that used for the Laboratory/Center reviews. Dr. Bostrom asked about using the NAS workshop paradigm to collect information. The Laboratory/Center Directors could come to the workshop and respond to the questions. However, she was not sure how often the Directors meet. Dr. Preuss responded that they meet weekly (by phone or face-to-face) with the staff in the Office of Air. He suggested that the BOSC could hold its next meeting in Research Triangle Park (RTP), NC, where most of the EPA staff working on the PM issue are located. These staff members could give the BOSC a presentation to bring the Board members up to speed on EPA's PM research program. Dr. Kavanaugh reminded the Board that they are running into a time crunch; however, he liked Dr. Bostrom's workshop suggestion. Could any of this be done through a Web site to accommodate the tight schedule? Could we hold the August BOSC meeting in RTP to talk with the EPA staff? Dr. Burke asked if there are other ongoing evaluation efforts. Is NAS meeting with the EPA staff

working on the PM issue? If so, could the BOSC participate in such a meeting? Dr. Preuss responded that there currently are no presentations scheduled during the next 3 months. The next NAS report on long-range research and implementation is expected to be available in the next 3 weeks. He also noted that there will be a PM meeting held in RTP in June. There is another meeting on PM in May in La Jolla, CA, sponsored by the Health Effects Institute (HEI).

Dr. Denson reminded the Board members that the BOSC charter focuses on ORD. Therefore, the members need to focus the PM review on ORD and not other organizations. The BOSC needs to determine if the PM research program is appropriate managed by ORD and then broaden the review to outside organizations. Dr. Bus suggested that the PM review focus on how ORD is managing this highly complex research program to ensure that it will deliver high quality products at the right time. Dr. Denson pointed out that Dr. Vandenberg indicated that the Laboratories/Centers would need 6 weeks to respond to the self-study questions. If a draft document must be prepared by September 1999, then the questions must be sent out by mid-May. Responses to the self-study questions should be received by mid-July. From mid-July to September 1, the BOSC will collect and review data/information and prepare a working draft.

Dr. Kavanaugh asked if the BOSC should prepare one document or several reports. Dr. Denson responded that each *Ad Hoc* Subcommittee should prepare a report. Dr. Kavanaugh suggested that only one document be prepared and that the BOSC develop an outline for that report. Dr. Zimmerman expressed her concern about multiple reports. How will we cut across the disciplines to integrate the review results into a single report? She thought it might be better to prepare one integrated report. Dr. Denson asked the Board members how this could be accomplished. Dr. Zimmerman replied that the BOSC should plan to prepare one report from the outset of the review. Dr. Brown suggested that a Coordination Subcommittee could focus on how to prepare one report. Dr. Bostrom pointed out that it might make more sense to organize the Subcommittees by management function instead of scientific disciplines. The Subcommittees should be aligned better with the charge. If the Subcommittees are organized by scientific discipline then there may be duplication and overlap in the review. Dr. Brown noted that a lot of time was spent discussing this issue at the last meeting. It was decided to organize the Subcommittees by scientific discipline because it aligns well with the Laboratories/Centers. This decision also supported the BOSC's interest in continuing a dialog and interaction with the Laboratories/Centers. Dr. Bus suggested that some thought be given to Dr. Bostrom's suggestion about a workshop. Maybe the BOSC should hold a 3-day workshop to deal with specific areas. This approach may fit better with the relatively tight timeframe. Dr. Vandenberg has offered to brief the BOSC members; information could be extracted from those sessions. Dr. Bus asked if there was any reason that the BOSC could not hold a workshop. Dr. Zimmerman supported the workshop format because it would allow the BOSC an opportunity to ask questions regarding integration.

Dr. Preuss noted that it will be very difficult for ORD staff to answer the self-study questions, particularly beyond a Laboratory/Center basis. He pointed out that the BOSC will get inconsistent information. It may be more appropriate to ask some of these questions orally. Dr. Kavanaugh expressed some confusion concerning the data collection process. Dr. Denson replied that the BOSC members must remain cognizant of the charge. He suggested that the BOSC pose both written and oral questions. Should the BOSC hold a general workshop? Should we conduct Laboratory/Center visits? Dr. Kavanaugh asked if a workshop was feasible. Dr. Denson replied that it would be feasible, but the BOSC would need to notify Dr. Vandenberg and the Laboratory/Center Directors as soon as possible. A letter should be sent to them no later than mid-May. Dr. Denson indicated that the BOSC needs to decide today whether to do site visits or a workshop. The BOSC members also need to work out the mechanics of how to get the information needed to prepare the review report. Shirley Hamilton (EPA/NCERQA) mentioned that she does not know how long it will take to get the *Ad Hoc* Subcommittee members on board. Dr. Denson suggested that the Chair and Co-Chair of each *Ad Hoc* Subcommittee send a list of potential Subcommittee members to Ms. Hamilton as soon as possible. If the individuals included on the lists have been used previously by the BOSC, the paperwork will be considerably reduced and the approval process should be accelerated. Dr. Denson pointed out that the BOSC has not used many minorities in the past. He asked BOSC members to contact Dr. Small to get the list of potential Subcommittee members. Dr. Zimmerman mentioned that in the past the BOSC has done a

full Board review of the list of Subcommittee members. Is there adequate time for that step in this review? Dr. Denson suggested that the full Board review be done by fax or e-mail.

Dr. Burke indicated that the BOSC did not want to put the Laboratories/Centers on the defensive during the review. Therefore, he supported a workshop format in lieu of site visits. Dr. Brown noted that the self-study questions posed during the last review were very helpful in informing the BOSC about the activities and responsibilities of each Laboratory/Center. Dr. Denson agreed and noted that distribution of self-study questions before the workshop or site visit will facilitate the collection of better information. He believes that a self-study document is necessary. Dr. Bostrom agreed and suggested that the questions may need to be reworded to make the Laboratories/Centers less defensive. For example, the BOSC could ask managers about incentives for integrating the research program. Dr. Preuss indicated that he is not concerned about the BOSC distributing self-study questions; however, he is concerned about the scope of the questions. He cautioned that the ORD staff responding to the questions will have to do so while they are engaged in other full-time efforts.

Dr. Denson selected the following BOSC members to serve as Chairs and Vice Chairs of the *Ad Hoc* Subcommittees:

- Exposure Subcommittee
  Chair: Jerry Schnoor
  Vice Chair: Ann Bostrom
- Atmospheric Subcommittee
  Chair: Mitchell Small
  Vice Chair: Ken Dickson
- Epidemiology Subcommittee
  Chair: Bill Cooper
  Vice Chair: Tom Burke
- Toxicology Subcommittee
  Chair: Jim Bus
  Vice Chair: Ray Loehr
- Assessment Subcommittee
  Chair: Rae Zimmerman
  Vice Chair: Marilyn Brown
- Risk Management Subcommittee
  Chair: Mike Kavanaugh
  Vice Chair: Bonnie McCay

Dr. Denson indicated that he had to leave and asked Dr. Bus to serve as the Acting Chair until Dr. Schnoor arrived. Before he left, Dr. Denson mentioned that he would like to serve on the Integrating Subcommittee.

Science Advisory Board (SAB) Update

Dr. Donald Barnes (EPA/SAB) provided an update on the activities of the SAB. He distributed a copy of a briefing that was presented by Dr. Genevieve Matanoski to the AA/ORD on the Integrated Risk Project (IRP). He quickly reviewed the charge and pointed out that the Senate and Fred Hanson (then EPA Deputy Administrator) asked the SAB to prepare this report. As part of this effort, the SAB updated the risk rankings that were listed in a previous publication entitled *Reducing Risk*. The Senate wanted to know if anything could be deleted from the list and Fred Hanson asked if there were tools that EPA could use to better rank risks. The Senate also was interested in EPA taking steps to involve social scientists in the decision-making process. Dr. Barnes mentioned the 1990 report that Dr. Cooper had helped prepare; this report indicated that EPA is not capable of placing an economic value on different kinds of risks. The SAB was charged with developing a better system to rank risks. The overall messages resulting from this SAB report are: (1) in the future, environmental protection must be viewed as an integrated system; (2) EPA is moving in that direction; and (3) there needs to be a more conscious and uniform commitment to development of tools for and practice of integrated environmental decision making. EPA has a number of efforts underway to support integrated decision making.

The SAB identified 10 recommendations during this study; a chapter on each recommendation is included in the SAB report. When the list of risk rankings was developed 10 years ago, a group of expert ecologists used their best professional judgement to rank the risks. For this recent effort, the experts developed a

methodology and then used it to generate a list of risk rankings. The current list is very similar to the list that was developed 10 years ago, even though two different methodologies were used in developing those lists. The methodology used by the SAB was described in the handout provided by Dr. Barnes. The SAB members hope that EPA will use this methodology to prepare a list of risk rankings that could be compared to the list developed by the SAB. Dr. Zimmerman asked if the group of expert ecologists included both marine and fresh water ecologists. Dr. Barnes responded that both types of experts were involved in the SAB effort. Each expert was asked to individually rank the environmental problems due to their health consequences via the Internet. They also were asked to justify their rankings. He pointed out that asking communities to rank risks would facilitate the integration of community values into environmental decision making. It also would allow EPA to compare risk rankings among different populations across the country.

Dr. Barnes indicated that the SAB report will be sent out for a 2-month peer review next week. The final report will be sent to the Administrator by the end of the year. He also noted that the report will be posted on the SAB Web Site. Dr. Bostrom asked if the report would be sent to the BOSC members. Dr. Barnes replied that a copy of the report will be provided to each of the BOSC members as soon as it is available. Dr. McCay asked if Table 2-3 of the handout identified the thinking that went into the development of Figure 2-7. Dr. Barnes replied that the table identified that weighting assigned to each factor. He also indicated that a sensitivity analysis was performed, which showed that weighting did not have much effect on the rankings.

Dr. Barnes mentioned that the SAB was very complimentary of the way EPA presented their case for science; the SAB noted that the budget related closely to the strategic plan. He also pointed out that although most of the science and research at EPA resides within ORD, there is a substantial amount of science performed outside of ORD. Those efforts need to be subjected to the same degree of peer review and quality control that currently is implemented by ORD. Dr. Dorothy Patton's Office is now dealing with this issue. She will make a presentation on this topic at the July SAB meeting. Dr. Barnes noted that this effort could have a significant impact on how EPA science is viewed on Capitol Hill.

The SAB is looking at new approaches for environmental protection, including community-based approaches, sector-based approaches, and geographic-based approaches. Where does the science fit into these new approaches? Is science negotiable? The Executive Committee is looking at how science fits into these new approaches and how it might be improved. The SAB would like to hold a workshop to explore this topic. Dr. Barnes noted that ORD also is looking into this issue. Dr. Patton is putting together an internal workshop series to examine science and these new environmental approaches. The SAB will be involved in some of those workshops. He indicated that the plans have not been finalized, but there will be a major effort focused on this issue next year. Dr. Barnes mentioned that he would like to talk to Dr. McCay over lunch about how to integrate social science expertise into the SAB, because the Economics Subcom-mittee did not integrate very well and the SAB wants to try a different approach.

On behalf of Dr. Joan Daisy, Chair of the SAB, Dr. Barnes expressed appreciation for Dr. Denson's participation in the SAB meetings. He has been very active at the meetings and is doing an excellent job of keeping the SAB informed about the activities of the BOSC. Dr. Zimmerman asked if the SAB had plans to establish a separate Social Sciences Committee. Dr. Barnes replied that the SAB preferred to integrate social science into existing Committees. Dr. Brown recognized the value of this approach. She also indicated that at Oak Ridge they hold caucuses to discuss social science needs to help support scientific activities. This approach gives the social scientists an opportunity to express their concerns and to share their experiences. She recommended that the SAB consider both approaches (i.e., form a separate Committee and integrate social science into existing Committees). Dr. Brown pointed out that if there is only one social scientist on each committee it will be difficult to obtain an adequate social science perspective. Dr. Barnes replied that the SAB probably will need to re-evaluate the need for a special Committee, because he recognized the value of bringing together numerous social science experts to discuss environmental issues and needs among themselves.

Dr. Kavanaugh asked Dr. Barnes about the SAB's role in the PM review. Dr. Barnes replied that the CASAC has been charged by Congress to look at EPA's criteria document every 5 years as well as EPA's PM research agenda. He pointed out that the CASAC has just completed the first cycle of review. Dr. Barnes also mentioned that Congress asked NAS to look at PM. Four members of the NAS panel examining the PM issue were on the CASAC. He noted that EPA is restructuring its plan based on input from NAS. The CASAC will review EPA's revised PM strategy. This review had been scheduled to begin next month, but the delay of the NAS report has postponed the review until NAS' comments can be incorporated into the revised draft. Dr. Barnes also pointed out that the PM research plan does not include control options. The Agency needs to begin thinking about what can be done about PM and its health effects.

Dr. Burke noted that the SAB is limited in the projects it can undertake because there is a finite budget for such efforts. He also mentioned that the Hill is taking the Government Performance and Results Act (GPRA) very seriously—if the goal is clean air then writing additional permits is not going to achieve that goal. Therefore, there is some willingness to try new approaches.

Dr. Brown mentioned that at the last meeting she had prepared some views on the Science to Achieve Results (STAR) Program review. She asked about the status of the review. Dr. Preuss responded that he will make a presentation regarding the STAR review later in the day.

Dr. Hugh McKinnon (EPA/ORD), Acting Deputy Assistant Administrator for Science, provided an update on the state of ORD. He pointed out that GPRA is affecting EPA as well as other federal agencies. There are a number of drivers of GPRA that are just now coming into play. ORD is starting to prepare for the first round of GPRA reporting, which is due March 2000. As part of this activity, EPA has set up teams relative to EPA's 10 goals. These teams are beginning to put together information that will go into the March 2000 report. ORD has the lead for Goal 8: Sound Science and Innovative Approaches. Because much research is problem driven, ORD also is involved in preparing responses for a number of the other goals. In May 1999, each goal team will make a presentation to the Deputy Administrator. There will be two items in each presentation: (1) accountability under GPRA, and (2) future directions, plans, and proposals. This will lead to the 2001 budget preparation.

ORD will make the Goal 8 presentation on May 14, 1999. It will be the first goal team presentation. The AA for Air will be responsible for presenting Goal 1 and the AA for Water will be responsible for presenting Goal 2. ORD currently is preparing for the Goal 8 presentation, compiling information (up to FY 1999) on GPRA goals and measures, and contributing similar information for the development of the presentations for the other goals. The budget preparation process for FY 2001 will begin at EPA's annual planning meeting to be held on June 2, 1999. ORD is in the process of gathering input from other offices, which will be integrated into their own 2001 plans. To obtain input on how well it is meeting the science needs of the Agency, ORD has held a number of program reviews. ORD also is looking at the core research it conducts and funds. The five Research Coordination Teams (RCTs) are working to develop a plan for FY 2001 and to prioritize the research efforts. Team Leaders have met to do a cross-ranking of the priorities outside the 80 percent level, assuming that 0-80 percent of the priority areas in the budget are high priority and most likely will be funded. This cross-ranking was submitted to the ORD Council; they reviewed it, made some changes, and submitted it to ORD's Deputy AAs. The AA/ORD soon will meet with the National Program Managers to go over the plan.

Dr. McKinnon indicated that the last appropriations hearing on the FY 2000 Presidential Budget Request is scheduled for today. Therefore, ORD has been engaged in numerous meetings on the Hill since the last BOSC meeting. Also since the last BOSC meeting, Dr. Norine Noonin (AA/ORD) met with the Research Strategy Advisory Committee of the SAB and described ORD's current efforts and future plans. In addition, senior managers from air, water, and toxic substances made presentations about what their Offices' were doing. Dr. McKinnon thought these presentations were very helpful and interesting. It also was evident that these other Offices are doing a considerable amount of science. At the House Appropriations Committee meetings, the Administrator was asked about science at EPA, the adequacy of peer review, whether science

should be recognized as a funded activity in the Agency, and whether ORD should be moved into the National Science Foundation (NSF). Dr. McKinnon noted that ORD continues to get similar challenges; therefore, ORD needs to communicate the importance of providing EPA with a strong science underpinning. All ORD research is mission related, supporting the efforts of the Agency. He expects that EPA will be asked how much science is being conducted within the Program Offices and these Offices will have to make a case to support their scientific activities. Dr. McKinnon noted that there is no plan to move this science from the Program Offices to ORD. He believes that this is just more evidence of the need for science at EPA. He mentioned that Dr. Noonin would have been at today's BOSC meeting, but she was attending the Senate Appropriations hearing.

Dr. Bus asked if this internal science review would be useful to the BOSC in conducting the PM review. Dr. McKinnon replied that there are experts within the Office of Air who must help develop the PM criteria document. He reminded the BOSC that PM is one of the National Ambient Air Quality Standards (NAAQS) pollutants. He noted that the air program relies on ORD to conduct relevant science and provide input to the Office. The science conducted by the Office of Air will take ORD's data and incorporate them into criteria documents. Dr. McKinnon thought that Dr. Vandenberg might include the relevant PM efforts from the Program Offices in his presentation to the BOSC; however, he noted that Dr. Noonan asked the BOSC to focus on ORD's efforts. The Office of Air will need data by a certain date. How can ORD ensure that this will happen? Dr. McKinnon replied that it will require good integration. Dr. Zimmerman asked how the PM research is coordinated with the National Institutes of Health (NIH). Dr. McKinnon replied that the PM team is looking at the research being conducted by the NIH, the Centers for Disease Control and Prevention (CDC), the National Institute of Environmental Health Sciences (NIEHS), and others. Dr. Preuss added that ORD had done an inventory of all federal efforts relative to PM as well as an inventory of all private sector (e.g., Electric Power Research Institute) PM work. He noted that the NIEHS and the National Institute of Allergy and Infectious Diseases (NIAID) are very involved in ORD's PM efforts. EPA is taking steps to ensure that the Agency is not duplicating efforts of other federal and private sector organizations. EPA has met with representatives of various organizations three or four times in the last 12 months.

Dr. McKinnon mentioned that ORD's strategic plan, which was developed in 1996, is being updated for 2000. The BOSC members will hear more about this tomorrow when Dr. Tim Oppelt makes his presentation. A large external stakeholder meeting will be held on June 3, 1999, to obtain input for the plan update. ORD has the lead for working with the National Science and Technology Council (the group that coordinates scientific activities of the federal government). ORD also has been involved in responding to Vice President Gore's call for a national environmental report card. The Heinz center has brought a number of government agencies and academic organizations together to develop a framework and template for the report card. The Committee on Environment and Natural Resources (CENR) has made presentations on the draft framework that looked at three types of ecosystems; this will be expanded to an additional three ecosystems. Dr. McKinnon agreed to provide copies of the CENR presentation to the BOSC. He noted that much of the information for the report card will be coming from the Environmental Monitoring and Assessment Program (EMAP). Therefore, EPA is contributing a significant amount of data for the national environmental report card. The Agency is starting to look at how to obtain outcome measures—how to determine if EPA's efforts are making a difference. Much work has to be done before excellent indicators are available. Dr. McKinnon also mentioned that ORD has developed an ecological research strategy and is currently preparing one for human health risk assessment. The human health risk assessment research plan will require input from traditional public health agencies because it will be difficult to determine the environmental influences on health. Dr. Zimmerman commented that it is interesting that we have made much more progress in identifying ecological indicators than in identifying human health indicators. Dr. McKinnon responded that this is indicative of the shift in thinking—EPA can no longer protect the environment simply by protecting human health.

Dr. Brown asked if it would be useful to have ORD share with the BOSC what progress has been made in terms of metrics for PM research. Dr. McKinnon replied that ORD has developed a set of metrics for the PM area and could share that information with the BOSC. Dr. Brown indicated that she would be interested in

the discussions that led up to the development of those metrics. Dr. Preuss pointed out that much of this information is included in the multi-year plan that he will provide to the BOSC. He agreed to distribute copies of this plan to the BOSC members as soon as it is completed. Dr. Zimmerman mentioned that the 1997 report included metrics. Dr. Preuss responded that the 1997 report did include some metrics, but it was not written within the GPRA framework.

Dr. Burke asked about the influence of junk science on indicators. Dr. McKinnon responded that the entire federal government has had some difficulty coordinating access to scientific data. He noted that federal agencies have been asked to provide feedback concerning this issue to the Office of Management and Budget (OMB). The NIH did an excellent job on its response to the OMB; therefore, the EPA and most other agencies, are reiterating the NIH response. Dr. McKinnon indicated that he has not yet seen OMB's report. Dr. Burke finds this entire issue troublesome because of the uncertainty in risk assessment methodology. Dr. Bostrom noted that the CDC makes an effort to coordinate government groups and have a better presence on the Web. She suggested that EPA needs to get more PM research information on the Web. Dr. McKinnon responded that the Agency has plans to expand information on the Web and to make PM research information more available through other means as well.

Science to Achieve Results (STAR) Program Review

Dr. Preuss reminded the BOSC members that at the last meeting there was some discussion about a review of the STAR Program. Dr. Brown and Dr. Cooper developed a one-pager describing the approach they think should be taken for this review. Shortly after the last BOSC meeting, the RASC of the SAB met and the STAR review was one of the topics of discussion at that meeting. Dr. Preuss shared with the RASC what the BOSC was planning to do and Dr. Denson agreed to formally submit the one-pager to the Committee members. Dr. Preuss indicated that it is up to the RASC and the BOSC to decide how to proceed. The RASC will contact Dr. Denson about how to coordinate this review. Dr. Preuss noted that there are some logistical problems associated with the STAR Program review—there are limited travel funds and the members' time is limited. Because the need for the STAR Program review is not urgent, the RASC will initiate the review when its schedule permits. Dr. Brown cautioned that the review should not be postponed too long because the EPA, the SAB, and/or the BOSC may be called on to provide answers about the STAR Program and the data collection mechanisms will not be in place to develop the response. Dr. Preuss agreed and mentioned that it would be better to do an evaluation that allows us to do the preliminary thinking at a measured pace. If the BOSC is willing, Dr. Preuss would be interested in working with the Board to initiate the STAR review. If several BOSC members have time to devote to this effort, then Dr. Preuss will make time to work with them. Dr. Barnes asked if he should schedule a conference call between the BOSC and the RASC to discuss the options and how to move forward. Dr. Brown indicated that she would be willing to participate in the conference call. She suggested that Dr. Cooper also may be willing to participate in the call with the RASC.

Dr. McKinnon pointed out that NCERQA has brought together STAR grantees to participate in workshops, each focused on a specific Request for Application (RFA) area. He also mentioned that NCERQA publishes abstracts of the papers presented at the workshops. A workshop on water and watersheds was just completed. It was attended by approximately 100 grantees and EPA staff. Dr. McKinnon noted that this is just one of the ways ORD is ensuring that the grantee's research is targeted and useful to decision makers. One BOSC member suggested that NCERQA prepare and disseminate the proceedings for this workshop as well as a handbook on the science of water and watershed management. Dr. Preuss thought this was a good suggestion and he agreed to discuss it soon with the Office of Water.

Dr. Preuss had explained at the last BOSC meeting that the Adopt-a-Grant Program had been discontinued. However, NCERQA is in the process of setting up personalized pages (such as those done by Excite) that will provide EPA staff with information on the subjects in which they are interested. To implement this, NCERQA will need to change the format of its Web Page to make it searchable in a different way.

Dr. Preuss also reported that NCERQA is planning to bring together everything that has been done on environmental indicators and publish it in a state-of-the-science report. This report will describe what has been accomplished and how the information could be useful. He would like to develop these reports in 6 to 10 different areas. Now that the grants program is well established, Dr. Preuss wants to focus on making information available and useful. Dr. Brown thought this was an excellent idea and wondered if the original idea for the state-of-the-science reports had come from the Laboratory/Center reviews. Dr. Preuss responded that the idea did originate from that review. With the mention of the reviews, Dr. Schnoor asked when the BOSC would be receiving copies of the Laboratory/Center responses. Dr. Preuss indicated that he had received four of the five responses. He agreed to send out those four reports to the BOSC within 1 week following the meeting. In closing this discussion, Dr. Schnoor reported that Dr. Denson had sent out thank-you letters to the *Ad Hoc* Subcommittee members who participated in the Laboratory/Center reviews, as was requested at the last meeting.

PM Self-Study Questions

Dr. Schnoor opened the afternoon session with a discussion of the self-study questions for the PM review. He asked the Board members to elaborate on the five questions distributed earlier by Dr. Denson. Should a question be included to address the sixth point in the charge? The group agreed that a question should be added to the list to address this point. Dr. Kavanaugh indicated that he would like the discussion to be broader. Will the goals of the PM project, given the current management structure and budget, be achieved within the proposed schedule? This is an overarching issue. If the answer to this question is yes, then the BOSC will prepare a report this supports what EPA is doing; the report also could include suggestions on how to improve the program. Dr. Brown did not think the BOSC would get much information asking the question posed by Dr. Kavanaugh. She thought the BOSC should ask EPA to identify the potential risks that might jeopardize achievement of the current goals. Dr. Kavanaugh's question is one that should be asked of the BOSC. Dr. Brown's question should be posed to the Laboratories/Centers. Dr. Schnoor pointed out that Dr. Denson's list of questions presupposes that the Subcommittees will visit the Laboratories/Centers. He asked the Board members for their opinions regarding site visits.

Dr. Schnoor indicated that he liked the idea of a workshop; he thought that independent Laboratory/Center site visits would make it difficult to integrate the information in the report. Dr. Schnoor also expressed his support of one report in lieu of multiple reports. Dr. Preuss noted that EPA has not given much thought to the number of reports. When he envisioned this review, Henry Longest was comfortable that the NAS was reviewing implementation and the SAB was reviewing science; therefore, he wanted the BOSC to focus on management and integration. However, EPA has not thought much about how to accomplish this. Dr. Bus pointed out that it will be much more efficient to conduct one large workshop than to attend numerous site visits with presentations by ORD staff.

Dr. Kavanaugh suggested that the BOSC develop a list of self-study questions and submit it to the Laboratories/Centers by mid-July. The workshop should be held at the end of July or in early August. Dr. Bus noted that the BOSC must define its expectations; otherwise, the Laboratories/Centers will not know how much effort to expend in answering the questions. Dr. Preuss asked if the BOSC planned on asking each of the five Laboratories/Centers how they are integrating PM efforts. He did not believe that the responses would be very useful to the BOSC. Dr. Bus suggested that the questions be provided to Dr. Vandenberg, who would work with the Laboratories/Centers to prepare the responses. Dr. Bostrom liked the idea of an integrated self-study; however, it may not reveal the integration problems (if any). Dr. Brown suggested that the integration could be by research topic or Subcommittee; the BOSC then would have to figure out how well the program is integrated with respect to exposure, etc. Dr. Zimmerman thought that the BOSC should ask each Laboratory/Center how it integrates its work with others. Dr. Schnoor suggested that the BOSC ask each Laboratory/Center its opinion on the effectiveness of the integration. Dr. Kavanaugh thought the questions should be directed to the Laboratories/Centers. Dr. Vandenberg also should receive the self-study questions. Dr. Schnoor asked who should be interviewed. It was suggested that the following staff be

interviewed: Laboratory/Center Directors, Assistant Laboratory Directors, Dr. Vandenberg, and staff working on the PM issue.

Dr. Kavanaugh suggested that the BOSC request background information on what EPA is doing with respect to PM, then develop more specific questions based on this information. Dr. Bostrom pointed out that much of that information is in the NAS report; however, the BOSC could request supplemental information. Dr. Bus asked if the individual Laboratories/Centers have their own plans for PM. Does each Laboratory/Center understand where critical flow elements come together? Do they know the critical hurdles in the plan that must be overcome? Do the individuals appreciate, know, and understand where their science fits into the overall scheme? The BOSC should ask each of the Laboratories/Centers to outline its strategy to see if the answers provided are the same as those submitted by Dr. Vandenberg. This will reveal whether or not the Laboratories/Centers are in accord with the PM Program Manager. The BOSC also should ascertain if the Laboratories/Centers are aware of the bottlenecks and potential hurdles. Dr. Bostrom pointed out that it is unlikely that the BOSC will receive independent responses from the Laboratories/Centers given the fact that those working on the PM issue talk weekly. Dr. Schnoor agreed that the independent responses are unlikely, but that may be evidence of good integration. Dr. Kavanaugh suggested that the PM effort might turn out to be a model for integrating other ORD programs.

Dr. Bus stressed the importance of understanding the critical points and how the research will converge. Dr. Schnoor indicated that the self-study questions will be presented to each Laboratory/Center responsible for a priority area (e.g., assessment) as well as Dr. Vandenberg. How does the assessment function, for example, get coordinated across the PM program? Will NHEERL get two sets of questions? The questions should be crafted in a way that would force cutting across Laboratories/Centers to prepare the answers. If that is the case, who should receive the questions? Dr. Brown suggested that the questions be submitted to Dr. Vandenberg. Dr. Zimmerman noted that it may be difficult to capture informal integration efforts. Dr. Preuss suggested that the BOSC ask how exposure is being integrated with toxicology. Are the efforts coming together at critical points? Dr. Brown responded that the BOSC could ask the toxicology staff how their research is feeding into other areas. Dr. Schnoor asked who would be in the best position to respond to integration questions concerning assessment. Dr. Preuss indicated that the most appropriate individual would be Dr. William Farland (EPA/ORD). One Board member asked Dr. Preuss if he could identify individuals for each area. He responded that he could not; the questions should be submitted to the Laboratory/Center Directors. Some areas will have to be addressed by more than one Laboratory/Center. (Drs. Vandenberg, Farland, and Preuss are the three individuals responsible for horizontal integration of the PM program.) Dr. Bus suggested that each Laboratory/Center receive a set of general questions (the same for all) as well as a set of more specific questions from the *Ad Hoc* Subcommittees. Dr. Bostrom suggested that a common set of questions be sent to the Laboratory/Center Directors and Dr. Vandenberg; the BOSC will ask them to answer the questions specifically with regard to the priority areas (e.g., toxicology, exposure). The questions would be answered for each of the areas. Dr. Brown asked if Dr. Preuss would be asked to answer the set of questions for all of the areas because of NCERQA's involvement in each area. Would the answers be common from topic to topic? Dr. Preuss responded that they would not be very common from one area to another. Dr. Bostrom suggested that there could be breakouts at the workshop to allow the Subcommittee members time to ask additional questions. Dr. Bus proposed that the responses be limited to 5 to 10 pages.

Dr. Schnoor tried to summarize the consensus of the Board as follows: the BOSC will develop a common set of questions; some questions may be tailored for specific Laboratories/Centers as necessary. Will the BOSC hold a workshop or conduct site visits? Dr. Bostrom suggested that the self-study questions be developed, followed by a workshop with plenary and breakout sessions. At the workshop, the Subcommittee members should be able to interview the Laboratory/Center Directors as well as staff involved in PM research. Part of the workshop should be devoted to developing the BOSC's report. The next BOSC meeting is scheduled for August 23-24, 1999. Should the workshop be held in August? Dr. Preuss pointed out that the final date for the workshop will be dependent on the availability of Drs. Vandenberg and Farland as well as the Laboratory/Center Directors. Dr. Brown suggested that the workshop be held in late July. Dr. Preuss mentioned that ORD will not be concerned if the BOSC cannot prepare a working draft report by September.

He asked that the BOSC consider holding a 3-day meeting (a 2-day workshop and a 1-day BOSC meeting). Dr. Schnoor suggested that the workshop be held in late July or early August. He asked the BOSC members to bring their calendars to the meeting tomorrow so that a date could be selected. The BOSC will need to provide Dr. Preuss with a couple of potential dates for the workshop so that he can determine what dates the appropriate EPA staff are available. Dr. Schnoor also suggested that the workshop be held in Research Triangle Park, NC, because many of the staff working on the PM issue are located in RTP. Of the 3 days, 1½ days could be devoted to plenary sessions, ½ day to a breakout session, and 1 day to a BOSC meeting. The 1-day BOSC meeting could be used for writing the report. Dr. Preuss indicated that he can make arrangements for presentations on the PM research program. Dr. Zimmerman asked if a professional facilitator could be brought in for the workshop to keep the discussions on target. Dr. Bus responded that the Chairs of the Subcommittees should be able to fulfill the role of facilitator. Dr. Zimmerman asked if the breakout sessions would be organized by the Subcommittee Chairs and she expressed some concern about not getting the information needed to write the report. Dr. Schnoor asked if the BOSC wanted to formally request a professional facilitator. Dr. Burke did not think professional facilitators were necessary. However, Dr. Zimmerman thought that a facilitator would improve the efficiency of the workshop. Dr. Bus thought the Subcommittee Chairs could facilitate the workshop discussions adequately. Therefore, the BOSC members agreed that professional facilitators were not necessary.

Dr. Bostrom mentioned that it would be useful to interview Laboratory/Center staff. Could they join the workshop by teleconference instead of traveling everyone to RTP? Dr. Preuss responded that many of the Principal Investigators are located in RTP; they will be able to attend the workshop and the Subcommittee members should be able to meet with staff without the Laboratory/Center Directors present. Dr. Preuss suggested that the Subcommittee may want to talk to several grantees (e.g., Petros Koutrakis at Harvard) who receive a considerable amount of PM funding from EPA and other organizations. Dr. Kavanaugh mentioned that it is important to cut through the hierarchy to talk to individuals at different levels. Dr. Preuss also pointed out that the Subcommittees may want to talk to Dr. Vandenberg separately. Dr. Schnoor summarized the discussion as follows: the BOSC will draft a list of self-study questions beyond the five distributed by Dr. Denson. The questions will be tailored to the six topics/Subcommittees and they will be sent to the Laboratory/Center Directors and Dr. Vandenberg in mid-May. The due date for the 5-10 page responses will be the end of June. The workshop will be held in late July or August (approximately 4 weeks after the responses are received). The Subcommittees will begin drafting the report at the workshop and will complete a working draft by September. The BOSC is in agreement that one report should be prepared. The workshop will by 2 days—½ day for plenary session, ½ day for breakout session, and 1 day for BOSC members to work on the report. If necessary, part of the second day could be used to conduct interviews.

Dr. Burke pointed out that it will be necessary to maintain the same level of specificity in the breakout sessions. Dr. Schnoor suggested that the BOSC members turn their attention to developing the self-study questions. Dr. Kavanaugh asked if the five questions distributed by Dr. Denson should be included in this list. He though some of the key questions were on the lists submitted by other BOSC members. Ms. Hamilton asked if the BOSC will be able to respond to Dr. Noonan's charge if these five questions are not included on the list of self-study questions. Dr. Schnoor responded that the five questions probably will be on the final list, but he wanted to broaden the discussion. The following list of 10 self-study questions was developed by the BOSC:

1. What are the risks, problems, and vulnerabilities that could prevent you from achieving the $PM_{2.5}$ program goals? What contingency plans are there? How are you monitoring progress toward goals? Assuring quality?

2. How could the following be improved to achieve the PM goals?
   - ✧ Organizational structure,
   - ✧ Strategic planning and prioritization,
   - ✧ Responsibilities/accountability,
   - ✧ Mechanisms of integration/coordination across Laboratories/Centers,

- ✧ Internal communication within ORD, and
- ✧ Budget.

3. What are the technical barriers to answering the scientific questions?

4. How is research from other organizations, agencies, and nations integrated into your program? For example, do you practice joint strategic planning with other organizations?

5. Provide examples of how scientific leadership in the area of $PM_{2.5}$ is demonstrated by EPA/ORD. Consider the uniqueness, innovation, coordination, and consensus building activities of your management operation. How is the research made accessible, in a timely fashion, and available to external researchers?

6. How do you integrate information from source to human receptor to health effects in the context of the risk assessment paradigm?

7. What adaptive management practices are in place to respond to changing research resources, needs, and unanticipated outcomes?

8. How have you considered potential abatement and control strategies for $PM_{2.5}$ in your research priorities? How will your research enable the Agency to enact the new $PM_{2.5}$ guidelines? How does uncertainty regarding the ability to meet the $PM_{2.5}$ guidelines affect your research program? (Note: Risk Management and Integration only.)

9. How do you manage your human resources and expertise to best achieve program goals (staff turnover, development, incentives, etc.)?

10. Describe the role of stakeholder participation (including peer review) in shaping your research program.

Dr. Schnoor asked BOSC members to identify specific questions for the Subcommittees. The following questions for the Exposure Subcommittee were suggested:

- ✧ How are indoor exposure questions served by the PM research program?
- ✧ How do the characterizations feed into the exposure model?
- ✧ How do relationships work?
- ✧ How do you manage research integration of this program with other areas?
- ✧ How is the indoor air effort dealing with the lack of epidemiology expertise?
- ✧ How are research priorities kept up to date?
- ✧ How does your research program address perceived gaps?
- ✧ How does the dissolution of the indoor air program affect your ability to do research in this area?

Dr. Schnoor suggested that the Subcommittees could be responsible for developing a list of additional questions for each topic. Dr. Bostrom suggested that some discussion be devoted to the format of the workshop. Dr. Schnoor asked if the BOSC members wanted to develop an agenda for the workshop during tomorrow's meeting. The members agreed that this would be a wise use of their time. The remainder of today's meeting was devoted to identifying specific questions for the Subcommittees.

For the Atmospheric Subcommittee, the key question is: How do you integrate strategic planning with other partnering organizations? Dr. Zimmerman asked which Subcommittee will deal with the nagging problem of background levels versus pollution. It should be the epidemiologists that tease out the difference between background and previous exposures. Dr. Bus indicated that, for the Toxicology Subcommittee, he would like to have the NHEERL Director and appropriate staff describe what they are doing to support the PM program. How confident are they that the animal models are being used appropriately? How is NHEERL addressing

the toxicology questions included in the NAS report? How are they relating to the epidemiology efforts? Dr. Bus believes that the Toxicology Subcommittee should examine how the toxicology efforts are being related to the exposure efforts. Dr. Bus reminded the BOSC members of the lack of integration between exposure and toxicology that was detected during the Laboratory/Center reviews. Dr. McCay asked if the NAS report mentioned risk communication. Dr. Bostrom replied that it did not; she also pointed out that the report did not address PM control. Dr. Bus mentioned that the expertise in the Laboratories/Centers does not always align with the problems that need to be addressed. The Subcommittees should look at this during the PM review. Dr. Bostrom noted that turnover also causes problems. How do the Laboratories/Centers manage turnover? Is there a coordinated strategy for staff management and replacement?

Dr. Burke pointed out that the Laboratories/Centers are not really set up to do epidemiological research; however, they are beginning to build some capacity in this area (approximately 5 staff). EPA funds a significant amount of extramural epidemiologic research. What is ORD's capacity to address epidemiologic issues? He noted that exposure research could redefine the validity of epidemiologic data. Dr. Zimmerman asked how the Laboratories/Centers differentiate between indoor and outdoor sources of PM. Dr. Burke pointed out that EPA is not looking at cumulative risk and individual exposure. Dr. Bus asked Dr. Burke if he thought the specific questions to be asked beyond the list of 10 self-study questions would evolve during workshop interviews and discussions. Dr. Burke replied that he thought the specific questions would come out in the discussion. The key question for epidemiology is: How is ORD partnering to get the epidemiological information needed to support the PM program? Dr. Zimmerman asked what EPA will do if the epidemiology studies support one conclusion and the toxicology studies support another. This is a coordination and management issue. Dr. Burke indicated that the Subcommittee should look at how EPA's epidemiology efforts are integrated with those of NIH, NIEHS, and CDC.

Dr. Zimmerman indicated that the key question for the Assessment Subcommittee is: What is the methodological approach to science? She noted that the risk paradigm is critical. What is the global framework for assessment? Dr. Brown mentioned that this Subcommittee should be determining if ORD is developing the fundamental tools needed to assess exposure. If not, are other groups developing these tools? How do the Laboratories/Centers determine what is needed by the groups that will be using the tools? Is the epidemiology sufficient? How was hazard identification performed? What about weight of evidence? Dr. Bus pointed out that the National Center of Environmental Assessment (NCEA) did not have adequate influence with ORD scientists to get them to use the tools. NCEA needs to figure out how to generate confidence in their tools. Dr. Bostrom noted that the Assessment Subcommittee should determine what sort of communication and delegation of responsibility is needed between NCEA and other Laboratories/Centers. Dr. Brown said that she needs to review the NCEA review report carefully before the workshop. Dr. Bus agreed that there is a substantial amount of relevant information in that report. The BOSC can use this PM review to determine if NCEA followed the advice provided in the review report. Dr. Brown did not think additional questions needed to be prepared before the workshop.

Dr. Kavanaugh asked how the results of ORD's PM research will be used to determine potential risk management strategies (e.g., emission control, source control). He noted that EPA should be examining options now. What is the role of risk management in directing the priorities of the PM research program? This is an appropriate question for the Subcommittee to present to the Laboratories/Centers.

Ms. Hamilton reminded the BOSC members to bring their calendars to the meeting tomorrow to facilitate scheduling the workshop and next BOSC meeting. Dr. Schnoor added that the final date could not be determined until EPA input is provided. He indicated that the BOSC would like Dr. Noonan to be present at the workshop. Ms. Hamilton reminded Dr. Schnoor that the BOSC needs to send a letter to Dr. Noonan requesting the workshop and any support that will be needed. The request will go to the AA through Dr. Preuss. Ms. Hamilton encouraged the BOSC to submit this letter as soon as possible. Dr. Schnoor agreed to deal with this issue during tomorrow's meeting. In closing the first day, Dr. Schnoor asked members to review the handouts regarding the self-study questions and the list of 10 questions developed today to make sure that everything is covered. He pointed out that a global question on human resources needs to be added

to the list. How do you manage human resources and expertise to address the needs of the PM research program (e.g., incentives, skill enhancement, and staff turnover)? How do you manage the resources and expertise to best achieve PM research goals? How do you conduct joint strategic planning? Describe the role of stakeholder participation in shaping your research agenda, role, and mechanisms. Do you have a process in place to determine if you are asking the right questions? Is the research agenda process open to views/input from stakeholders? Dr. Schnoor moved to adjourn the meeting for the day and Dr. Brown seconded the motion.

Friday, April 30, 1999

Dr. Schnoor called the meeting to order at 9:15 a.m. He indicated that today's meeting would include a presentation by Dr. Tim Oppelt (EPA/ORD) on stakeholder involvement in ORD's strategic plan development, followed by discussion of the workshop format and the self-study questions. Dr. Preuss introduced Dr. Oppelt and Ms. Debbie Dietrich (EPA/ORD) both of whom have been very involved in preparation of the ORD's revised strategic plan. They have been working on the plan since January 1999, and are in the process of soliciting input for the plan from within and outside of ORD.

ORD Strategic Plan 2000

Dr. Oppelt indicated that the purpose of the ORD Strategic Plan 2000 effort is to establish a plan to achieve ORD's vision by: setting long-term goals, describing what resources and strategies are needed to accomplish these goals, and establishing performance measures to track ORD's progress. He noted that the ORD Strategic Plan 2000 will influence the workforce development initiatives for FY 2000 as well as the FY 2002 budget process and beyond. Dr. Oppelt outlined the value of strategic planning and described the four-stage strategic planning process. The first stage is visioning, which describes ORD's purpose, values, and envisioned future. The second stage is strategic planning, which articulates how ORD achieves its vision through supporting the Agency's mission, setting research priorities and strategies, and developing the desired internal workplace and culture. The third stage of the process is assessing and aligning, which allows ORD to make business and scientific decisions that flow from its vision and strategic plan. The fourth stage is implementation, which ensures that ORD continues to apply its vision and strategy to make daily decisions and adjust to new realities. Dr. Oppelt indicated that the first stage—visioning—has just been completed. Through a year-long participatory process, ORD developed its vision for the future. The vision statement establishes ORD's core purpose, core values, strategic goal statement, and envisioned future. (Ms. Dietrich read the goals and core values from the vision statement. Dr. Oppelt agreed to provide the BOSC members a copy of "An Evolving Vision Statement for ORD and Strategic Plan 2000," which is the report of the ORD Vision Group.)

Dr. Oppelt then identified the key features of the process. ORD staff were responsible for the following: select and draft goals, develop means and strategies to achieve goals, conduct gap analysis, and develop performance measures and evaluation process. Other EPA staff (i.e., Program Offices, Regions, OCFO) provide input on the Agency's strategic and programmatic direction and needs as well as ORD's role in meeting those needs. Other federal agencies (i.e., NIH, NSF, INAE, USDA, CDC, DOI) provide input on the strategic direction and role of their organizations and their relationship to EPA as well as input on future trends and issues in science and technology related to protecting human health and the environment. The scientific/ research community (i.e., academia, grantees, SAB, NAS, nongovernmental organizations [NGOs], business community) provides input on future trends and issues in science and technology related to protecting human health and the environment as well as input on the relationship of their organizations to EPA. One of the current key action items is stakeholder involvement and soliciting input from these various stakeholder groups. On May 25, 1999, there will be a meeting in Washington, DC, to obtain input from EPA stakeholders (Program Offices, Regions, and others). On June 3, 1999, there will be a meeting to collect input from external stakeholders (other federal agencies, scientific/research community). The June meeting will be attended by approximately 50 representatives from professional associations and societies, industrial groups, NGOs, states, and other organizations. ORD also is seeking input from the BOSC because of this

Board's connection to the Laboratories/Centers and their strategic plans. Dr. Oppelt noted that each of the Laboratories/Centers is developing a strategic plan that is consistent with and supportive of the ORD strategic plan. He also mentioned that the BOSC reviewed a previous ORD Strategic Plan; the Strategic Plan 2000, however, will have a different structure and focus than the previous plan.

The preliminary goals for the Strategic Plan 2000 are to:

- ✧ Goal 1: Support the Agency's Mission—The value of ORD's research will be measured by its importance in helping EPA to do its work. Specifically, ORD's research must: (1) provide the scientific basis for the Agency's decision making; (2) use cutting-edge science that addresses the Agency's needs, and (3) address both core and problem-driven projects in a results-oriented, customer-focused way.

- ✧ Goal 2: Be a High-Performing Science Organization—ORD is striving to become one of the best managed organizations in EPA. It is envisioned that ORD will: (1) provide a stimulating research environment; (2) demonstrate open, clear, and concise communications; (3) recognize and reward achievement, customer service, and collaboration; and (4) have efficiently managed and administered operations.

- ✧ Goal 3: Be a Leader in the Environmental Community—ORD will provide leadership in environmental research. This will include: (1) helping develop a national environmental research agenda, (2) participating prominently in important scientific meetings and organizations, and (3) providing expertise on important environmental and science technology issues.

- ✧ Goal 4: Integrate All Facets of Risk-Based Environmental Protection—ORD strives to conduct a program of research that: (1) integrates human health and ecological risk; (2) addresses issues related to media, discipline, and scale in a holistic way; (3) helps to reduce the uncertainty associated with the complex nature of these interactions; and (4) provides integrated information to Agency decision makers.

- ✧ Goal 5: Anticipate Future Environmental Issues—ORD will conduct research that anticipates future environmental issues, before their effects adversely impact people and the environment. By identifying these issues, ORD's research will: (1) help prevent environmental damage and human injury before it occurs, (2) provide the scientific community with more time to study the issue, and (3) allow for cost-effective solutions with minimal disruption to existing social and economic systems.

Dr. Oppelt indicated that ORD needs to put "meat" on the statement about being a leader in the environmental community (Goal 3). ORD must develop a national environmental agenda if it is to take a leadership role in this area. He also noted that ORD needs to integrate all facets of environmental protection more effectively across the risk assessment/risk management paradigm (Goal 4). Future gains must be made in an integrated fashion—integrating health and ecological risk assessment with risk management. In addition, ORD needs to get ahead of the curve in terms of detecting future environmental problems (Goal 5). The SAB has recommended that the EPA sponsor panels to look forward and anticipate future environmental problems.

The schedule for completion of the Strategic Plan 2000 is as follows:

✧ March 1999: ✧ March-May 1999:	Definition of draft goals Gathering of stakeholder input
✧ Summer 1999:	Development of goals and strategies
✧ September 1999: ✧ October-December 1999: ✧ March 2000:	"Mature" working draft Review and refinement Strategic Plan "90%" completed

Dr. Oppelt closed his presentation by describing how the BOSC can participate in the process to develop the Strategic Plan 2000. He suggested that the BOSC could:

- ✧ Provide feedback on preliminary goals.
- ✧ Assist in developing and critiquing ORD's scenarios of the future.
- ✧ Contribute to development of means and strategies to realize ORD's goals.
- ✧ Contribute to development of meaningful performance measures and feedback processes.

He also asked the BOSC to identify ORD's weaknesses, make suggestions on how to improve the plan, and provide input on the following: Where will EPA be 5-10 years from now? What will EPA's efforts be focused on?

Dr. Schnoor asked if identifying Goal 1 of the strategy (i.e., meeting the Agency's mission) as the most important goal will help or hurt ORD. Dr. Oppelt responded that ORD understands the importance of meeting Agency goals and most ORD staff are beginning to understand the value of the grants program in accomplishing this goal. The grants are starting to provide information that the Agency can use; EPA staff are gaining confidence in the quality of the research being supported by involving ORD staff in meetings with grantees. Dr. Preuss pointed out that ORD has moved a significant percentage of Laboratory/Center funds into the STAR Program, which means that less funding has been available for use by the Laboratories/ Centers. In addition, ORD made the decision that it wanted to do R&D, not contractor management. Dr. Preuss believes that the Program Offices think this has been a wise decision, however, they are not getting everything that they used to receive from ORD. This has been particularly annoying because the budgets of the Program Offices have been cut. Dr. Kavanaugh pointed out that a number of the BOSC's concerns about the strategic planning process were highlighted in the Laboratory/Center review reports submitted to the AA/ORD.

Dr. Zimmerman asked how the Laboratories/Centers coordinate along the risk assessment/risk management paradigm. How do you communicate? How do you set standards? Dr. Oppelt responded that customer focus is a big challenge for ORD. In the past, the Program Offices have asked ORD to develop a model or generate a set of data; however, they can not do that now. Dr. Oppelt believes that the keys to improving the science behind the Agency's decisions are science integration and customer focus. ORD needs to produce a better package of science that can be provided to the Program Offices to enable them to make sound policy decisions.

Dr. Burke asked if the stakeholders could be used to broaden the focus of the Agency and help ORD identify emerging and future environmental problems. Dr. Oppelt replied that ORD is trying very hard to involve stakeholders in the strategic planning process; however, this creates tension with the Program Offices that have urgent problems that need to be addressed. Dr. Burke commented that EPA is becoming less of a regulatory agency and more of a resource or facilitator, and he believes this trend will continue in the future. Dr. Schnoor added that pollution prevention, for example, cannot be regulated, and that is where the future is heading. Dr. Preuss asked the BOSC members how EPA can build a constituency to lead ORD in that

direction. He noted that few constituencies have thought about the future of research. Everyone agrees that pollution prevention is the right answer, but the Program Offices do not do much in this area. Now that the Agency is operating under the GPRA umbrella, how does EPA account for pollution prevention? Fewer cases of cancer? What metric can be used? How can EPA's efforts be separated from what others did to prevent pollution?

Dr. Kavanaugh noted that Dr. Oppelt had raised some fundamental and important issues during his presentation. Is there a significant and practical shift from an Agency based on compliance and standard setting to a model of market-driven approaches for improving environmental quality that is less compliance driven? How does EPA play a role in this move toward pollution prevention? He pointed out that there needs to be a baseline for environmental issues and that there will be a continuing role for compliance and standard setting. If EPA had come up with a more proactive approach to $PM_{2.5}$ 5 years ago, the Agency would not be facing such a time crunch now.

Is ORD investing enough money in future/emerging problems? Dr. Oppelt replied that it depends on how the amount is calculated. The STAR Program has a component devoted to investigating future problems. He acknowledged, however, that ORD does not do this very well and improvement is needed in this area. Dr. Bostrom suggested that EPA could anticipate future issues by looking at emerging technologies and using technological forecasting (e.g., changes in behaviors, demographics, etc.). She noted that anthropologists could be helpful because they examine factors that drive behaviors that affect the environment. She thought that ORD should involve more social scientists in its efforts. In addition, ORD should do a trend analysis to predict cumulative problems ahead of time. Dr. Oppelt responded that ORD has done some thinking about where regulatory programs are going; it is likely that the future will be dominated by voluntary-based programs. What are the implications of EPA getting into community-based environmental protection? In the future, the quality of the environment will be more impacted by the behavior of individuals. EPA must develop metrics to measure implications of land use; a better understanding of the environmental consequences of our actions on the land also is needed.

Dr. Schnoor asked how the BOSC can help in ORD's efforts to address future environmental problems. Dr. Preuss responded that he has been very disappointed with the response from academia for the STAR RFA for future issues. Dr. Bostrom asked if this poor response could be due to the fact that EPA did not target institutions that do not traditionally receive funding from EPA. Dr. Preuss thought that could have been a factor in the poor response; he also pointed out that it may take time for the academic community to start thinking in terms of future and emerging issues. Dr. Preuss asked the BOSC to help stimulate interest in this RFA so that the Agency will receive better proposals from the academic community. Dr. Zimmerman suggested that EPA look at emerging species and new diseases. She commented that the Agency needs to go beyond extrapolating—EPA may need to look at totally different fields. Dr. Schnoor suggested that environmental terrorism be considered by ORD under emerging/future issues. Genetically modified organisms is another topic that should be investigated by EPA.

Dr. Zimmerman reminded the BOSC members that their focus should be on management issues. The important management questions is: How does ORD build flexibility and resource capacity into the system to address future/emerging issues? Dr. Oppelt indicated that EPA is in the process of a future planning effort that goes out to the year 2020. He also mentioned that 40-45 percent of ORD staff and 50 percent of the managers will be eligible to retire in the next 4 years. This turnover and loss of expertise is a potential threat, but it also is an opportunity to change staffing and prepare more for the future. Dr. Zimmerman mentioned that there will be a meeting in New York on May 19, 1999, of all educators associated with risk assessment/risk management. She suggested that it may be useful for EPA to make these educators aware of EPA's needs. Dr. Preuss pointed out that EPA also has a fellowship program to get doctoral students and post-docs working in the Laboratories/Centers. Dr. Oppelt added that the STAR Fellowship Program has been quite successful. Dr. Bus supported efforts to make academia aware of this shift and the impending need for ORD staff. Dr. McCay suggested that ORD consider the cooperative agreement between EPA and the Society for Applied Anthropology. This agreement would allow ORD to do more on community-based

approaches to environmental protection. Dr. Oppelt acknowledged the need for better integration of disciplines across ORD. There also is a need to broaden competence and get ORD staff to work holistically to address environmental problems. He mentioned that EPA has done a good job of planning across the risk paradigm but not a good job at implementing across the paradigm. The PM effort is a good example of an integrated program and he acknowledged that ORD needs to do more of this.

Dr. Bus referred to the proposal to establish a National Institute for the Environment (NIE). He is not certain that this would be the best approach to address future challenges. However, if EPA does not step forward and assume that type of thinking, then an institute will be created to do so. Dr. Schnoor asked about the political status of the NIE proposal. Dr. Preuss responded that there was language in last year's appropriations bill concerning the NIE, to determine if anything could be created under an NSF umbrella. However, NSF concluded that creation of the NIE under its umbrella would not be practicable. The committee is trying to get language in the next bill, along with $20-30 million for NSF to get the NIE started. Dr. Preuss mentioned that President Clinton is on record as opposing establishment of the NIE. The President believes there is a need for better planning, thinking, and coordination, not another independent group. Because many politicians are opposed to the NIE, a former Ambassador has been employed to lobby on behalf of the creation of the NIE.

Dr. Kavanaugh pointed out that risk management was not mentioned in the NAS report on PM. He asked Dr. Oppelt about the role of the National Risk Management Research Laboratory (NRMRL) in the PM issue. Dr. Oppelt responded that NRMRL's primary focus is source characterization (nature, size of particles, sources). NRMRL also will work on determining which particles are biologically important and the transfer of particulates between the indoor and ambient environment. There is some emphasis on emissions controls as well (e.g., improvements to electrostatic baghouses). Dr. Kavanaugh asked if controls are available. Dr. Oppelt responded that in some cases controls are available; it depends on the source and what has to be removed. Dr. Zimmerman asked about the breakdown of $PM_{2.5}$ by source category. Is it electric power generation? Mobile sources? Dr. Oppelt replied that most of the focus is on combustion sources (primary rather than secondary sources). He noted that the only mobile source that NRMRL is working on is diesel engines.

Dr. Oppelt asked the BOSC to review the draft Strategic Plan 2000 in September and provide feedback to ORD. Dr. Schnoor agreed to provide this request to Dr. Denson. Dr. Oppelt asked Jay Messer (EPA/ORD) to talk about the Delphi panels that are being established. Dr. Messer indicated that EPA is working with the National Academy of Public Administrators and the Keystone Center on this effort. The panelists will provide input by e-mail. Experts are still needed in the areas of genome advances in genetics and environmental protection, e-commerce and telecommuting, near-real-time and real-time monitoring, and remote sensing. He asked that BOSC members who have appropriate expertise or know of colleagues that do, contact Ms. Hamilton to let her know of your interest. Dr. Oppelt also asked BOSC members to send suggestions on goal statements to Ms. Hamilton.

Discussion of Self-Study Questions and PM Review Workshop

Dr. Schnoor suggested that the BOSC request a 5-10 page response to the self-study questions. Should the responses be due on June 30, 1999, or on July 15, 1999? A July conference call may be necessary to discuss the workshop and develop an agenda. After reviewing the calendars submitted by the BOSC members, Ms. Hamilton indicated that August 30-31, 1999, may be the best date for the workshop in RTP. The fallback date would be August 23-24, 1999. If the meeting is held on August 30-31, then the conference call could be held on August 23 or 24. Dr. Preuss agreed to check Dr. Noonin's calendar to determine if she would be available to attend if the workshop if it is held on August 30-31. He also pointed out that he will have to check with Dr. Vandenberg, Dr. Farland, and others to ensure their availability.

The BOSC members then discussed who should attend the workshop. It was agreed that the Laboratory/Center Directors, Assistant Laboratory Directors (ALDs), and some Principal Investigators should

attend. The BOSC members would like to receive written responses to the self-study questions as well as conduct interviews with these individuals during the workshop. Dr. Bostrom pointed out that the Laboratory/Center Directors should be asked to answer the questions relative to their specific areas. She suggested sending the questions to Dr. Vandenberg and let him figure out how to distribute the questions. Dr. Preuss agreed that the BOSC should send a letter and the questions to Dr. Vandenberg and let him coordinate the response. There was some reluctance to do this because the BOSC would prefer independent responses from the Laboratories/Centers. Dr. Preuss pointed out that it would be most efficient to ask Dr. Vandenberg and the Laboratory/Center Directors to work together to provide answers to the BOSC's questions. Dr. Schnoor responded that the BOSC would like responses from each Director as well as Dr. Vandenberg.

Dr. Bus indicated that he was interested in assessing the "buy-in" at the bench level. Are the individuals in the Laboratories/Centers willing to make commitments? Dr. Schnoor thought Dr. Vandenberg should reply to all of the questions, except the one on how human resources are managed. Dr. Preuss replied that Dr. Vandenberg would make arrangements for the appropriate individuals to write the responses. The only negative with this approach would be that the responses would not be from the individual Laboratory/Center perspective. Dr. Schnoor pointed out that the BOSC has some idea of how the PM Program is integrated across ORD based on the two presentations made by Dr. Vandenberg. Dr. Bus agreed and suggested that the BOSC needs to find out if the Laboratories/Centers are committed to doing the work required for the strategy. The BOSC also should look at accountability. Dr. Schnoor asked if the BOSC should send the questions to Dr. Gary Foley (EPA/ORD), Dr. Farland, and the other Laboratory/Center Directors and let them figure out who should prepare the responses. Dr. Bus thought this was a good approach, but noted the need to get input from staff at levels below the Laboratory/Center Directors.

Dr. Schnoor then turned the discussion toward the format and agenda of the workshop. The draft agenda developed by the BOSC members is presented in Exhibit 1. Dr. Schnoor will present the draft agenda in Exhibit 1 to Dr. Denson for review after the meeting. Dr. Bostrom asked if the BOSC members could get copies of the new NAS report. Dr. Preuss replied that copies will be provided as soon as the report is available. Dr. Schnoor suggested that the BOSC members read the two NAS reports prior to the workshop. Are there any other items the members should read? Dr. Preuss indicated that he will ask Dr. Vandenberg if there are any other materials that the BOSC members should read before the workshop. Dr. Preuss mentioned that the BOSC members might want to read the preamble to the regulation. Dr. Zimmerman requested a copy of the final regulation. Dr. Preuss agreed to send the BOSC members the regulation as well as a short bibliography from Dr. Vandenberg.

Dr. Preuss stressed the importance of focusing the review on the integration issue. Dr. Schnoor replied that the BOSC members expect to do this during the workshop. He mentioned that Dr. Vandenberg should identify the individuals who should make the Monday morning presentation on integration. Dr. Preuss

Exhibit 1. BOSC $PM_{2.5}$ Science Management Review Workshop, August 30-31, 1999

Monday 8:00 a.m. - 12:00 noon	$PM_{2.5}$ Science Management Review (response to integrated self-study questions, presentations with time for questions)	John Vandenberg, et al.
Monday 1:00 p.m. - 3:00 p.m.	4 Parallel Sessions ✧ Exposure/Atmospheric ✧ Epidemiology/Toxicology ✧ Assessment ✧ Risk Management	Gary Foley* Larry Reiter* William Farland* Tim Oppelt* *Peter Preuss
Monday 3:30 p.m. - 5:30 p.m.	Plenary Session on Integration Across the Risk Management Paradigm	BOSC Members and William Farland, Peter Preuss, and John Vandenberg
Monday Evening	BOSC Report Outline Writing Session	BOSC Subcommittees
Tuesday 8:00 a.m. - 10:00 a.m.	6 Breakout Sessions to Interview Science Managers ✧ Exposure ✧ Atmospheric ✧ Epidemiology ✧ Toxicology ✧ Assessment ✧ Risk Management	BOSC Subcommittees
Tuesday 10:30 a.m. - 12:00 noon	Plenary Session Interviews with Stakeholders and Partners	BOSC Subcommittees
Tuesday 1:00 p.m. - 5:00 p.m.	BOSC Writing Assignments and Writing	BOSC Subcommittees

reminded the BOSC members that they must be able to respond to the charge issued by the AA/ORD. He noted that the global questions developed by the BOSC do not really address the integration issue. Dr. Schnoor responded that the BOSC members intend to ask key management questions regarding integration at the workshop. He envisions that the opening session will include presentations by Dr. Vandenberg and others on the overall program and integration issues. The next session will cover the same self-study questions addressed by Dr. Vandenberg, but the questions will be addressed by major categories (e.g., exposure, epidemiology, atmospheric). The most qualified individuals from each Laboratory/Center will make short presentations during these parallel sessions that will focus on managing and implementing the science. Following the breakout session, everyone will come back together in a plenary session focused on integration that will be run by the BOSC. During the second day, the BOSC will obtain input from science managers, stakeholders, and partners. This day will be devoted primarily to interviews.

To clarify the proposed approach, Dr. Preuss asked if the BOSC plans to send the self-study questions to both Drs. Vandenberg and Farland, who will work with the Laboratory/Center Directors to answer these questions according to the six categories. Dr. Schnoor indicated that this was the approach he would propose to Dr.

Denson following the meeting. Dr. Preuss then asked if the BOSC members would prefer to receive one response or five responses to the questions. Dr. Kavanaugh indicated that he would prefer one response. There was no decisive answer to Dr. Preuss' question regarding the number of responses from the Laboratories/Centers. Dr. Schnoor did indicate, however, that Dr. Vandenberg should be extensively involved in preparing the response. In closing the meeting Dr. Schnoor quickly developed the following schedule for the $PM_{2.5}$ review:

Self-Study Questions to Norine Noonan, John Vandenberg
and Laboratory/Center Directors . . . . . May 15, 1999

Self-Study Responses Returned to BOSC . . . . . July 15, 1999

BOSC Conference Call . . . . . August 23, 1999?

BOSC $PM_{2.5}$ Workshop in RTP, NC . . . . . August 30-31, 1999

BOSC Draft Report . . . . . September 30, 1999

BOSC Final Report to Norine Noonan . . . . . December 1999

Action Items

The following action items were identified during the meeting discussions:

- ✧ Beverly Campbell (SCG) agreed to send Dr. Bostrom and Dr. McCay copies of the five final reports submitted to the AA/ORD following the Laboratory/Center reviews.

- ✧ BOSC members should contact Dr. Small to obtain his list of potential Subcommittee members before they identify consultants to serve on the *Ad Hoc* Subcommittees for the PM review. The goal is to minority participation in *Ad Hoc* Subcommittees.

- ✧ The Chair and Co-Chair of each *Ad Hoc* Subcommittee should send a list of potential Subcommittee members to Shirley Hamilton as soon as possible.

- ✧ Dr. McKinnon agreed to provide copies of the CENR presentation on the national environmental report card for distribution to the BOSC members.

- ✧ Dr. Preuss agreed to distribute copies of the multi-year PM plan to the BOSC members as soon as the report is completed.

- ✧ Dr. Preuss agreed to discuss with the Office of Water the suggestion that NCERQA prepare and disseminate the proceedings for the water and watersheds workshop as well as a handbook on the science of water and watershed management.

- ✧ Dr. Preuss agreed to send to the BOSC members (within 1 week of the meeting) the four reports that he has received in response to the Laboratory/Center reviews.

- ✧ Dr. Schnoor will work with Dr. Denson to prepare a letter that will be submitted to Dr. Noonin requesting the $PM_{2.5}$ Science Management Review Workshop and any required support.

- ✧ Dr. Oppelt asked the BOSC members to review ORD's draft Strategic Plan 2000 in September and provide feedback to ORD. Dr. Schnoor agreed to provide this request to Dr. Costel Denson.

- ✧ Dr. Oppelt asked the BOSC members to: (1) provide feedback on preliminary goals, (2) assist in developing and critiquing ORD's scenarios of the future, (3) contribute to development of means and strategies to realize ORD's goals, (4) contribute to development of meaningful performance measures and feedback processes, (5) identify weaknesses in the plan, and (6) make suggestions on how to improve the plan.

- ✧ BOSC members interested in participating in the Delphi panels described by Dr. Messer should notify Ms. Hamilton. Board members also should provide to Ms. Hamilton names of colleagues who might be interested in participating in these panels.

- ✧ Dr. Preuss agreed to send copies of the new NAS report to the BOSC members as soon as it is available.

- ✧ Dr. Preuss will check with Drs. Noonin, Vandenberg, and Farland as well as the other Laboratory/Center Directors to determine if they are available for the PM workshop if it is held August 30-31, 1999.

- ✧ The BOSC members should read the two NAS reports on PM and the preamble to the regulation prior to the August workshop.

- ✧ Dr. Preuss will ask Dr. Vandenberg if there are any other items that the BOSC members should read before the workshop.
- ✧ Dr. Preuss agreed to send the BOSC members the regulation as well as a short bibliography from Dr. Vandenberg.

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