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

BOARD OF SCIENTIFIC COUNSELORS EXECUTIVE COMMITTEE MEETING

Washington, DC
May 14, 2002

Tuesday—May 14, 2002

Welcome, Agenda Review, and Disclosures

Dr. Jerry Schnoor (University of Iowa), Chair of the Board of Scientific Counselors (BOSC), called the meeting to order at 8:40 a.m. He quickly reviewed the agenda and noted that Dr. Kevin Teichman, from ORD's Office of Science Policy, would be making the presentation on the multi-year planning process. Dr. Schnoor indicated that the next BOSC meeting was scheduled for September 23-24, 2002, and it would focus on the multi-year planning process and plans, the Communications Subcommittee report, measures of success, and discussion of future activities including referrals from Dr. Gilman and ideas from the BOSC members.

With regard to disclosures, Dr. Schnoor asked if the BOSC members had anything to declare that was not disclosed at the February 11-12, 2002 meeting. Dr. Donald Mattison (Columbia University) stated that he had accepted a position with the National Institute for Child Health and Human Development (NICHD). In July 2002, he will begin work at the NICHD as a Special Assistant to the Director. He will be working on the National Children's Study, which is examining the effects of environmental influences on the health and development of more than 100,000 children across the United States. Dr. Schnoor stated that as a government employee, Dr. Mattison will no longer be able to serve on the BOSC; however, he has agreed to vet the Laboratory/Center reports until he begins work at NICHD in July. Dr. Bill Chameides (Georgia Institute of Technology) mentioned that from July 2002 to January 2003, he will be serving as a visiting scientist at the Goddard Institute of Space Studies. He did not believe that this would be a conflict because he will be paid by a university rather than the government. There were no other updates to the disclosures.

Dr. Schnoor said that the Science Advisory Board (SAB) has been criticized for allowing the industrial perspective to dominate some of their reports. As the BOSC moves more toward reviewing the science, the members will have to be very careful about disclosing conflicts and balancing our reports. Ms. Shirley Hamilton (Designated Federal Officer) mentioned that biosketches of the BOSC members will be included in the meeting notebooks. She asked that those members who did not submit a biosketch prior to this meeting to submit one as soon as possible for inclusion in the September meeting notebook.

Approval of February Meeting and March Conference Call Minutes

Dr. Schnoor asked if there were any comments on the February meeting minutes. He said he had several small editorial changes to the minutes. On page 7, he asked that the last sentence in the second paragraph after the bullets be changed to read: "Dr. Schnoor agreed that EPA's rejection rate should exceed NSF's

rejection rate." On page 8, Dr. Schnoor asked that the first sentence in the last paragraph on the page be changed to read: "Dr. Schnoor indicated the need to make a list of nominees for spring 2002 new appointments." On page 10, he asked that the first sentence in the second paragraph after the table be deleted. Beverly Campbell (SCG) agreed to make the requested changes. The February minutes were approved unanimously on the condition that these changes would be incorporated. The March 26, 2002 conference call minutes were approved unanimously by the BOSC.

Success Measures Report

Dr. Schnoor asked the BOSC for input on how to divide the writing assignments for the success measures report. Dr. Jim Bus (Dow Chemical Company) suggested that the goals would be the headings of the outline. Under each goal, the quantitative and qualitative measures could be described. Dr. Chameides pointed out that the BOSC should provide direction to ORD regarding how to identify targets and measures rather than filling in all the details. Dr. Schnoor volunteered to write an introduction and to prepare an outline of the report. He will distribute the outline to the BOSC members along with designated writing assignments. Dr. Jim Johnson (Howard University) said that he would be interested in working on the benchmarks. Dr. Bus expressed interest in working on Goal 2 (high-performing organization). Drs. Johnson and Bus agreed to work together on Goal 2; it was noted that they bring a balanced perspective (industry and academia). Dr. Schnoor asked Dr. Mattison to vet the report and he agreed. Dr. Chameides said that he would be glad to work on a section. Dr. Schnoor suggested that the BOSC members send him an e-mail indicating which sections are of interest to them. Dr. Ann Bostrom (Georgia Institute of Technology) said that she would be interested in working on qualitative measures.

Communications Subcommittee Report Update

Dr. Bostrom reported that the Subcommittee had accomplished very little since the February meeting. There have been several e-mails exchanged regarding what the report should include. The Subcommittee has agreed on the list of self-study questions (which was included in the handout distributed by Dr. Bostrom at the meeting). She noted that the self-study responses from the Laboratory/Center reviews had not been distributed to the Communications Subcommittee members. She stated that the Subcommittee could not move forward until the members had an opportunity to review the self-study responses. Dr. Schnoor asked Dr. Bostrom to summarize the goals of the Communications Subcommittee review. Dr. Bostrom responded that the immediate goals are to help ORD more effectively disseminate its research products, to explain their significance, and to assist others inside and outside the Agency in applying them. She indicated that the Subcommittee plans to conduct the site visit this summer, probably the second or third week of August 2002. Dr. Bostrom asked if the site visit could be conducted August 12 or 13, and Shirley Hamilton (Designated Federal Officer) replied that she would have to check Dr. Peter Preuss' (ORD/NCER) schedule to see if he was available those dates. Dr. Bostrom expressed some concern about postponing the site visit beyond those dates because there would be very little time to write the report before the September meeting.

Dr. Mattision asked when the self-study questions will be distributed to the Laboratories/Centers, and Dr. Bostrom replied that she hoped to get them out in May 2002. She noted, however, that the Subcommittee members would like to review the self-study responses submitted for the Laboratory/Center reviews before distributing the questions developed by the Communications Subcommittee. Dr. Bostrom indicated that she only has hardcopy of several of the self-study responses. Dr. Mattison asked if the Laboratory/Center Directors should select the products for the case studies. Dr. Bostrom replied that the Directors could select the products, but she would prefer that the Subcommittee select them. She noted that the Subcommittee is using the self-study responses to identify products.

AA/ORD Remarks

Dr. Paul Gilman (AA/ORD) said that he would like the BOSC to receive regular briefings on new initiatives. He suggested that the BOSC be briefed on one new initiative at each meeting, followed by a discussion of the BOSC's potential role. Dr. Gilman said that it also may be useful for the BOSC to hear from other groups within EPA, particularly how their efforts relate to ORD.

Dr. Gilman indicated that the BOSC could provide some useful input with regard to the Integrated Risk Information System (IRIS). He reported that Congress provided the Agency $5 million to get IRIS up to date; however, the funding was distributed to the different programs that participate in the compound review process, and was not used in a systematic manner to achieve the desired update. Dr. Gilman explained that IRIS is managed by the National Center for Environmental Assessment (NCEA), but the Center could not instruct the programs how to use the money to accomplish the goal of updating IRIS. In an effort to speed up the process of updating IRIS, EPA has initiated a pilot in which industry has been asked to develop draft reports for three submissions. EPA will review these draft reports and subject them to rigorous review. Is there any way that this model would be acceptable? Should EPA use contractors to prepare the first drafts? Should EPA ask the grant-funded centers to develop the drafts? Could graduate students be used to develop first drafts? Dr. Gilman said that NCEA's report to Congress will specify the status of this effort and identify some options for accelerating IRIS updates. Although EPA has successfully relied on a consensus process for IRIS in the past, it is very slow and IRIS will loose its credibility if the process is not accelerated. Dr. Gilman indicated that he would like the BOSC to provide input on this issue.

Dr. Gilman reported that the May 1-2, 2002, ORD Science Forum was a great success. It included posters from the Regions, Program Offices, and Laboratories/Centers. There were three plenary sessions—air, water, and special subpopulations. The Forum was attended by approximately 1,000 individuals, and only 60% of the participants were from EPA. There were participants from associations, public health organizations, other federal agencies, states, etc. He mentioned that Sherwood Boehlert (R-NY), Chairman of the House Science Committee, attended the Forum. Gov. Whitman kicked off the Forum stressing the importance of science within EPA and mentioning the "State of the Environment Report" that is expected to be drafted by November 2002. Dr. Gilman mentioned that Dr. Preuss is the ORD lead for that report.

Another topic appropriate for BOSC input is how to address ORD's aging workforce. ORD is concerned about its inability to compete with industry and universities for quality scientists. He reported that recruitment and retention has been difficult. EPA needs to explore options to attract and retain high-quality scientists and Dr. Gilman would like the BOSC's views on this issue. One option is for EPA to be permitted to appoint scientists using Title 42, which allows an agency to set compensation outside the GS pay scale to recruit or retain an outstanding scientist. The EPA Administrator and Deputy Administrator support this approach, but it would be easier to convince Congress of the Agency's need for Title 42 if the BOSC supports it.

Dr. Mattison asked if EPA had contacted the National Library of Medicine (NLM) with regard to updating IRIS. He noted that both NLM and the National Academy of Sciences (NAS) have expressed interest in enhancing their toxicity resources. Dr. Gilman replied that the NLM probably could run the IRIS database, but he did not think they had the resources to expand and update its content. Dr. Gilman said that the National Institute of Environmental Health Sciences (NIEHS) may be more appropriate than NLM; however, NIEHS may not be able to address all of the compounds. Dr. Schnoor asked if the additional $5 million for IRIS was a one-time or a recurring add-on. Dr. Gilman replied that the additional $5 million was not requested in the 2003 budget. He pointed out that ORD needs to develop a plan for IRIS so that EPA can request funding to enhance IRIS in a planned, systematic way.

Dr. Daniel Acosta (University of Cincinnati) asked about the Bush Administration's view for environmental science. Dr. Gilman replied that Gov. Whitman speaks for the Bush Administration on issues involving EPA. The President's budget request provides some idea of the Administration's priorities. Dr. Gilman noted that EPA's research budget has been relatively flat for the past 20 years. He was amazed at the diversity of EPA's research, given its relatively small budget. Research resources are up slightly from last year, probably due to the funding for homeland security (i.e., focused on building decontamination, and pathogen and chemical detection). He reported that EPA is working aggressively to build on existing initiatives. In the 2004 budget, there will be a significant realignment of the work along the lines of computational toxicology (both ecology and health). Genomics and computational biology could play a role in both ecology and health research. Dr. Gilman noted that this realignment complements the arrangement of the laboratory system along the risk paradigm. He mentioned that a number of the Laboratory/Center Directors have expressed some concern about this shift toward computational toxicology. This concern is based on the fact that the funding may not continue past this Administration, and this research is on the leading edge—no one has ever done this before which means that EPA will have to reach out to work with individuals with whom they have never worked. Dr. Schnoor commented that computational biology fits well with the ORD strategy to increase integration among the Laboratories/Centers. He suggested that EPA develop a strategy for improving science integration.

Dr. Chameides stated that the BOSC has been discussing ORD's goals and success measures. He asked Dr. Gilman if there were any plans to change or revise the strategic goals. Dr. Chameides asked specifically about the third goal (i.e., being a leader in the environmental research community). He noted that being a leader requires the Agency to look beyond its internal efforts. What will ORD do to bring that about? Dr. Gilman replied that ORD is accomplishing this primarily through the Science to Achieve Results (STAR) Program; however, ORD also is seeking to form alliances with other federal agencies and to award collaborative grants to ensure that EPA is successful in leading the way and generating new ideas. Dr. Gilman also noted that the Agency is sponsoring workshops that allow grantees to share their research so that this knowledge is translated back into the mission of EPA.

Dr. Gilman urged the BOSC to prepare shorter letter reports rather than lengthy deliberative reports. He noted, however, that lengthy reports may be appropriate in some instances. He stressed the need for quick input; for example, EPA needs BOSC input on the Multi-Year Plans (MYPs) now rather than a year from now. He asked that the BOSC provide input to Dr. Preuss concerning future Requests for Applications (RFAs). Dr. Johnson asked what EPA is doing to ensure that there will be a crop of new young scientists who possess the right skills. Dr. Gilman replied that the fellowship program, which had been addressing that need, has been zeroed out in the 2003 budget. He asked if EPA should initiate a predoctoral fellowship program at the Laboratories/Centers. Dr. Gilman did not think the training grant approach used by the National Institutes of Health (NIH) would work for EPA. Dr. Mitch Small (Carnegie Mellon University) suggested that EPA could work with professional societies (e.g., Society of Environmental Toxicology and Chemistry, Society for Risk Analysis, International Society for Industrial Ecology) to define the future of environmental education. Dr. Gilman mentioned that EPA has considerable success in recruiting AAAS fellows into the Agency. Dr. Mattison pointed out that one of EPA's weaknesses is a lack of social scientists; he noted that this expertise is needed for building and testing models for computational toxicology.

Dr. Gilman thanked Dr. Mitch Small, Dr. Bonnie McCay (Rutgers University), and Dr. Don Mattison for their service on the BOSC. He expressed his hope that Drs. Small and McCay would be willing to serve on BOSC subcommittees in the future. Dr. Gilman presented plaques to the departing members and thanked them for their input, which came at a formative time for ORD. Dr. Schnoor said that he will be sending a list of eight candidates to Dr. Gilman so that he can choose four new members to fill the vacancies on the Board. Dr. Schnoor noted that there will be three or four new openings to fill next year. In closing, Dr. Gilman said that he is developing a "to do" list for the BOSC, which includes what he calls "care and feeding of computer models," as well as risk assessment. He mentioned that EPA has been

criticized for using models inappropriately so this issue needs to be addressed. Dr. Schnoor reported that the BOSC is working on benchmarking and measures of success for the September meeting and the Communications Subcommittee report should be available at the December meeting. The BOSC also wants to work on the multi-year planning process. Dr. Gilman replied that it is an excellent time to obtain BOSC input on the MYPs, while they are in the early stages. Dr. Gilman asked the BOSC members to identify additional efforts that they would like to undertake.

ORD Fiscal Year 2003 (FY03) Budget/Initiatives Process

Dr. William Farland (Acting AA for Science) provided an overview of the FY03 budget and initiatives. He said that he had given this presentation to the SAB's Research Strategies Advisory Committee (RSAC). He noted that EPA's commitment to strengthening science at ORD is evident in the FY03 budget growth and new investments. ORD's FY03 budget is up $92 million from the FY02 President's budget; and up $35 million compared to the FY02 enacted budget. ORD's FY03 budget is approximately 8% of the Agency's total budget. He mentioned that ORD's FY03 investments include efforts to enhance science-based decision making and innovation. The FY03 budget includes $4.9 million for the Central Basin Integrated Assessment (an extension of the EMAP Program), $1 million (and 5 FTEs) for Science to Support Regulatory Decisions, $3.4 million for Aggregate Cumulative Risk Research (relates to the Food Quality Protection Act and the Safe Drinking Water Act), $75 million for Homeland Security (building decontamination and detection of pathogens and chemicals), $9.8 million for the National Environmental Technology Competition, $4.9 million for Biotechnology Research (focus will be genetically engineered crops, gene transfer, and ecological impacts of biotechnology products), and $3.2 million for Computational Toxicology (to develop tests that will be more predictable with the goal of streamlining traditional biological and toxicological approaches).

Dr. Farland presented a pie chart that portioned ORD's FY03 President's budget by EPA goal—$93.3 million for Goal 1, $93.6 million for Goal 2, $10.8 million for Goal 3, $25.2 million for Goal 4, $119.7 million for Goal 5, $21.7 million for Goal 6, $5.6 million for Goal 7, and $257.1 million for Goal 8 (total ORD budget = $626.9 million). Dr. Farland noted that the largest increase is for Goal 5 because homeland security falls under that goal. Dr. Bostrom asked if ORD anticipated any changes in the enacted budget. Dr. Farland replied that Congress may add some items to the budget, perhaps without adding funding; if so, ORD would have to rearrange the funding to accommodate the unfunded add-ons. He pointed out that the earmarks were not included in his slide. Dr. Farland stated that ORD hopes these new initiatives will be supported and funded.

Dr. Farland explained that the ORD budget supports both problem-driven and core research activities. Problem-driven research is designed to address the environmental issues faced by our nation; core research is designed to advance the science. Dr. Farland pointed out that the core research falls under Goal 8, and the problem-driven research falls under the other seven goals supported by ORD. Dr. Johnson asked if ORD has achieved the right balance between core and problem-driven research. Dr. Farland responded that ORD is trying to maintain a 50-50 split between core and problem-driven research. Both the NAS and the SAB indicated that this was a reasonable split. Dr. Johnson asked about the balance between ecological and health research. He suggested that ORD may want to change the balance if they examine it from a global perspective, looking beyond the work of ORD.

Dr. Farland presented a chart that depicted the differences between the FY02 enacted budget and the FY03 President's budget by goal. He stated that ORD uses this chart to track the budgetary changes by goal. He noted that there was a decrease in mammalian research and an increase in biotechnology and computational toxicology in Goal 4. There was no significant change in global climate. Dr. Farland pointed out the $5 million decrease for IRIS, reminding the BOSC that the add-on was not supported in the FY03 President's budget. For Goal 8, there is an increase in ecosystem protection, human health, and improving environmental systems management. There was a $9.4 million decrease in responding to future environmental developments, which corresponded to the STAR Fellowship Program.

Dr. Farland highlighted some of ORD's accomplishments in particulate matter, drinking water, environmental technology verification, landscape characterization, endocrine disruptors, and risk assessments. ORD research indicated that increased levels of fine particulate matter were associated with decreased heart rate variability; one potential explanation for the association between increased PM levels and hospital admissions. ORD research also has resulted in the use of new methods to detect *Cryptosporidium* and *Giardia* in local water systems. ORD has verified 164 technologies through the Environmental Technology Verification (ETV) Program that provides shared EPA-vendor financed verification of technologies for protecting the environment. Twenty-seven states will use ETV verification as the primary source of information in permitting decisions for package drinking water equipment. ORD has completed the Mid-Atlantic Landscape Atlas that shows the impact of land cover changes on wetlands, drinking water, wildlife diversity, and human health; similar land use characterization efforts are ongoing in the western states. ORD developed a short-term reproductive test using minnows to identify endocrine disrupting chemicals. ORD research has shown that impaired neuro-behavioral development results from thyroid hormone disruption following exposure to polychlorinated biphenyls (PCBs). ORD's diesel assessment was used to support the recent diesel truck rulemaking. ORD's mercury assessment, which was included in EPA's Report to Congress, stimulated increased state and international attention to the risks associated with mercury in fish. ORD's integrated human health and ecological assessment enabled comparison of health and ecological risks associated with the West Nile Virus versus the application of pesticides for treatment of the virus. ORD is leading three regional assessments of global change—Mid-Atlantic States, Upper Great Lakes, and Gulf Coast.

Dr. Farland indicated that ORD is making a concerted effort to measure progress and to plan programs that lead to desired outputs and outcomes. ORD volunteered to participate in a pilot program conducted by the Office of Inspector General (OIG) to determine whether the program evaluation techniques are appropriate for: measuring progress in accomplishing EPA's GPRA goals, and evaluating environmental research in the GPRA framework. The pilot indicated that an increased focus on research outcomes, a more transparent planning system, and a consistent program design could enhance ORD's ability to meet clients' needs. Another finding of the pilot was that the Logic Model is a useful tool for visualizing design of the program to identify long-, intermediate-, and short-term outcomes, customers, resources, activities, and outputs. Dr. Farland stressed the importance of meeting the clients' needs. Using the particulate matter (PM) research program as an example, Dr. Farland noted that the outputs (e.g., identification of hazardous PM components, susceptible populations, and plausible biological mechanisms to explain PM health effects; databases and models that link ambient exposure, personal exposure, and human health effects) eventually flow to the customers to bring about the short-term (i.e., changes in customer knowledge, attitudes, skills, and aspirations followed by changes in customer actions), intermediate-term (i.e., environmental changes such as reduced emissions or reduced exposure to contaminants resulting from customer actions), and long-term (i.e., desired program impacts such as improved environmental health or restored ecosystems) outcomes.

Dr. Chameides commented that the ultimate long-term outcome is a reduction in mortality and morbidity. What is EPA doing to document this reduction? Dr. Farland replied that, for the PM research program, EPA is actually collecting some measurements in the Utah Valley Study, where a local smelter was shut down for repairs for about 1 year. During that time there was a documented reduction in air pollution and a decline in hospital emissions for respiratory illnesses. When the smelter resumed operation, the hospital emissions for respiratory illnesses increased. He mentioned that the National Children's Study also may provide useful data. Dr. Mattison pointed out that much of the data will be based on biomarkers. Dr. Farland acknowledged that EPA is making a huge step in moving toward human exposure rather than just focusing on emissions reduction. Dr. Chameides noted that the public will support even perceived reductions in risk. Dr. Farland said that EPA will be using the Logic Model, and will focus on its customers and how to measure outcomes.

Dr. Farland reported that EPA has hired 143 post-docs during the past 3 years, noting that the goal was to hire 150. Sixty-seven post-docs currently are on board, and 37 have accepted permanent jobs at EPA.

More than 60 universities are represented in EPA's post-doctoral research program, and Agency post-docs have authored or co-authored 247 publications. Dr. Farland highlighted a number of post-doc contributions, including development of improved technology for mercury removal from power plant emissions, a novel population model for predicting children's exposure and dose resulting from contact with pesticides applied in homes and lawns, and a landscape change assessment of watersheds that supply a major metropolitan area with drinking water.

Dr. Farland stated that hiring flexibility is becoming more critical in the Agency, given the aging workforce. Flexibility is needed to recruit and retain a select group of world-class principal investigators, and to compete for senior research managers with strong science and managerial skills. In addition, hiring flexibility is needed to establish a researcher career path and recruiting program modeled after NIH, which facilitates market-based compensation, term appointments, global recruitment, flexibility and speed in competitive hiring, and a pension and performance package. Dr. Farland noted that Title 42, which is used by NIH, would allow EPA to attract the mid- and high-level scientists needed to fill the gaps vacated by ORD's aging workforce.

ORD's Multi-Year Planning Process

Kevin Teichman (ORD/OSP) presented a figure that depicted the planning framework for ORD's research programs. This diagram illustrated how the MYPs are integrated with the ORD research strategies/plans, the Laboratory/Center research plans, and the GPRA Annual Performance Goals (APGs) and Annual Performance Measures (APMs). He also presented a chart that described the research planning process, relating the EPA Strategic Plan and ORD Strategic Plan to the MYPs and the Laboratory/Center research plans. He pointed out the National Environmental Research Plan, which is part of Goal 3. He said that EPA hopes to work with other federal agencies (e.g., U.S. Geological Survey [USGS], National Oceanic and Atmospheric Administration [NOAA], NIEHS, and CDC) to develop this national plan. Dr. Teichman identified the various inputs for the research strategies, MYPs, and annual plans, including the EPA Strategic Plan (GPRA goals), the ORD Strategic Plan (ORD's goals), customer/user needs (Program Offices, Regional Offices, and federal research partners), and outside peer advice (BOSC, SAB, National Research Council [NRC], and scientific peer reviews). He noted that ORD does not solicit as much public input as it could. Dr. Farland mentioned that the ORD Science Forum was a new mechanism designed to solicit input from outside the Agency.

The research strategies and plans frame the scientific questions associated with important environmental issues, and they delineate the research needs and relative priorities required to address those questions. Dr. Teichman pointed out that the research strategies and MYPs relate to the EPA Strategic Plan and ORD Strategic Plan, and they all are formally peer reviewed by external experts. The MYPs describe ORD's research direction over 5 or more years and identify Long-Term Goals (LTGs) and associated APGs and APMs. The MYPs are developed by writing teams that include Research Coordination Team (RCT) members from ORD and the Program and Regional Offices. Dr. Teichman noted that the MYPs assume level resources throughout the period covered, integrate in-house and STAR research capabilities, and are used to determine annual priorities.

Dr. Schnoor noted that the BOSC has been struggling with how the Laboratory/Center strategic plans and the MYPs fit into the Agency's strategic planning efforts. It appears that the research activities the Laboratories/Centers plan to do are integrated into the MYPs. Do the Laboratory/Center strategic plans feed in from the right in the diagram? Dr. Johnson said that he thought the Laboratory/Center strategic plans would fall under the ORD Strategic Plan. Dr. Farland commented that they really could appear in both places on the diagram. Dr. Schnoor asked how ORD determined which MYPs are assigned a National Program Director. Dr. Teichman replied that those programs that are very important within EPA, highly visible, and of interest to the public are assigned a National Program Director. Dr. Schnoor asked about the process for initiating a new MYP. Dr. Teichman responded that there currently are no plans to add or sunset any MYPs because they are based on GPRA goals. He mentioned that ORD

currently is preparing a research strategy for homeland security, and it is possible that ORD could initiate an MYP on homeland security if the Agency determines that this will be a long-term effort. Dr. Schnoor asked if the homeland security research strategy would undergo external peer review, and Dr. Teichman replied that it would.

Dr. Teichman described the process for MYP development. The first step is to determine the Agency's strategic direction based on GPRA goals, objectives, and outcomes, as well as Program and Regional science needs. The next step is to identify key scientific questions that need to be addressed by research, followed by the development of LTGs, which includes developing a timeframe for delivering the work and defining the role of ORD and others. The fourth step involves determining the APGs, which includes determining the sequence of results and integrating the research from other sources. The final step is to determine APMs, which includes identifying who will accomplish the work (in-house Laboratory/Center or STAR research). Dr. Teichman noted that the APMs feed back to the APGs, and the APGs feed back to the LTGs. In describing the MYP flow diagram, he noted that the APGs are dependent on each other. Because there is a sequencing of APGs, more funding does not necessarily mean that all APGs can be completed earlier.

Dr. Teichman presented a table that aligned the MYPs with the RCTs. For example, the PM, Tropospheric Ozone, Air Toxics, and Global Change MYPs aligned with the Air RCT. He then explained the annual budget planning process, describing how the MYPs lead the process. The MYPs, along with other inputs such as progress reviews and scientist-to-scientist meetings, provide input into prioritizing research within and across MYPs. This prioritization feeds into the ORD Executive Council Annual Proposal, which is reviewed by the Research Coordination Council and then finalized by the Executive Council before the budget is submitted to the Agency. Dr. Teichman pointed out that the MYPs make it much easier to see how budget cuts and additional funds will impact the research program, and it facilitates the assessment of funding moves across plans.

To illustrate how the planning process works, Dr. Teichman used PM as an example. The inputs for the PM MYP include the EPA Strategic Plan (GPRA goals, Goal 1 - Clean Air, and Goal 8: Sound Science), ORD Strategic Plan, customer/user needs (Office of Air and Radiation and EPA Regions, federal research partners [Committee on Environment and Natural Resources Air Quality Committee, Department of Energy, NIH, NOAA]), and outside peer advice (NRC, SAB's Clean Air Scientific Advisory Committee, BOSC, NARSTO, and Health Effects Institute). Dr. Teichman described the development of the PM research program. In 1993, EPA conducted a symposium on PM health issues that concluded more research was needed, and the Agency allocated an additional $5 million for PM research for a total of $20 million/year. In 1997, PM standards were promulagated, and EPA was charged by the President to establish an interagency research program. Congressional hearings strongly pointed to the need for additional research (at least $50 million/year), and in 1998, Congress appropriated a $23 million increase in PM funding ($50 million total), authorizing $8 million for five centers under the STAR Program. In 1999, the NRC developed research portfolio recommendations and identified 10 research priorities, and EPA implemented a research program designed to be consistent with the NRC recommendations. Dr. Teichman presented a table that identified the NRC research investment portfolio from 2000 through 2010.

Dr. Teichman stated that the PM Research Strategy corresponds to the dual responsibility of EPA to review the adequacy of the National Ambient Air Quality Standards (NAAQS) every 5 years and to achieve attainment of the NAAQS to protect public health and welfare. The health effects and exposure research supports NAAQS review by providing scientific methods, models, and data needed for assessment of health effects and PM exposures. The research to support implementation of PM standards is focused on improving the methods, models, and data for determining and achieving attainment. He indicated that the PM research program is scheduled for review by the SAB in the summer of 2002.

Dr. Teichman identified the LTGs for the PM research program. By 2008, describe exposure dose-response relationships, mechanisms of effects, and short-term exposures to PM, PM components, and co-pollutants from various sources. By 2009, identify subpopulations and susceptibility factors responsible for increased risk of adverse health outcomes from PM, PM components, and co-pollutants. By 2012, improve understanding of the links between emission, formation, transport, and deposition to support air quality modeling for SIP implementation and provide tools for compliance strategies that reduce risk to human health. By 2015, describe exposure-response relationships, mechanisms of effects, and associated long-term exposure to PM, PM components, and co-pollutants from various sources.

The PM MYP identifies the contributions of the ORD Laboratories/Centers and the STAR Program in characterizing exposures, exposure factors, and modeling; in describing the mechanism of health effects in subpoplations; in characterizing long-term effects; and in developing an updated set of tools, verifying field data, and combining controls. Dr. Teichman also presented a table identifying the APMs for the APG of characterizing combined effects of PM and gaseous co-pollutants on health animals and humans. For each APM, the date it is to be achieved and the responsible ORD organization are provided. For example, one APM is to define the role of PM constituents and gaseous co-pollutants in mediating cardiopulmonary injury in healthy humans and animals. This APM is to be achieved by the National Health and Ecological Effects Research Laboratory (NHEERL) by 2004.

In summarizing the multi-year planning process, Dr. Teichman explained that ORD's multi-year planning is intended to produce long-term research plans by GPRA research topic (e.g., PM, drinking water). The purpose of these plans is to enable ORD to plan on more than an annual basis. The plans are prepared by writing teams with RCT involvement and executive guidance. They are developed by drawing on the EPA Strategic Plan, the ORD Strategic Plan, and the ORD research strategies to identify long-term goals for ORD research and associated APGs and APMs. Dr. Teichman stated that the first versions of 15 of the 16 MYPs were completed in time to influence the FY04 annual planning.

The first versions of the MYPs demonstrated the proof of concept; however, the next versions will better reflect ORD consensus on the intended purpose and intended audience, and they will include a more appropriate level of detail. Dr. Teichman said that the initial LTGs were understandably broad and ambitious. Thus, reviewers questioned if the LTGs could be realistically met and if accomplishing the APGs (outcomes) would achieve the LTG. They also questioned whether accomplishing the APMs (outputs) would achieve the APG. The reviewers questioned if there was added value in projecting APMs beyond 5 years, and they were not certain that the most important research had been identified in the MYPs or if the plans were just a perpetuation of the status quo.

Dr. Teichman presented the following areas for improvement:

- ✧ Include quantitative (or at least qualitative) resource information on relative levels of effort among the different LTGs.

- ✧ Include trend information on which LTGs will have increasing, decreasing, or stable effort.

- ✧ Explicitly state links to other MYPs and how work in other plans contributes to accomplishing the APGs and LTGs.

- ✧ Explicitly state what related research is ongoing in EPA and elsewhere and how the combined results of EPA's research and that of others will impact environmental assessments and policies.

- ✧ Enhance the description of how the results of EPA research will be communicated and used, as well as provide for a periodic assessment of the state-of-the-science.

Dr. Schnoor asked why it is necessary to develop Laboratory/Center plans. The Laboratories/Centers could use the MYPs to plan their research. Dr. Farland replied that the Laboratory/Center plans specify what expertise is needed to perform the research. Dr. Preuss added that the Laboratory/Center plans describe the skills mix and resources needed to do the research, and they integrate the health and exposure research.

In closing, Dr. Tiechman said that it has taken a tremendous amount of effort to develop the first versions of the MYPs, but he believes it will take less effort to revise and update them. Dr. Schnoor asked if the National Program Director had been granted authority to rearrange funding within the program, and Dr. Teichman replied that only the Executive Council has that authority. However, the National Program Director can make a strong recommendation to the Council. Dr. Preuss pointed out that the Laboratory/Center Directors are responsible for meeting the APMs, and they can shift resources within their Laboratories/Centers to ensure that those measures are met.

National Exposure Research Laboratory (NERL) Review Report

Dr. McCay said that the report was discussed at length during the March conference call. Since the conference call, an executive summary has been added to the report, and it now identifies how NERL responded to the recommendations from the initial BOSC review. This version emphasizes NERL's efforts to become a high-performing organization, as well as its aging workforce and lack of workforce diversity. Dr. McCay indicated that she did not receive any comments on the report since the March conference call.

Dr. Mattison referred to the discussion of hiring in Section 2.3.1 on page 9 of the report. How has NERL addressed the lack of social scientists? How has NERL addressed diversity? If NERL did not address these issues through the hiring of post-docs, perhaps the BOSC should comment on this in the report. Dr. Schnoor replied that NERL has been hiring social scientists, but there are no senior scientists at the Laboratory to mentor them. He agreed, however, that the report should include a statement that NERL should use post-docs to address the lack of diversity. Dr. McCay responded that none of the 46 post-docs were social scientists. She agreed to add a sentence that highlights this missed opportunity.

Dr. Bus asked about the meaning of the first recommendation on page 8. The first sentence of the second paragraph states: "The current NERL strategic integration plan is based on a core research program and problem-driven research fixed by the basic science research areas and laboratory work-units." What is the meaning of this sentence? Should it be reworded to say that the science should ultimately have impact on outcomes?

Dr. Schnoor said the preface that he is preparing will replace Section 2.0 Laboratory Review in the NERL report. He also asked the Subcommittee to add some conclusions to the last section of the report. Dr. McCay agreed to add some conclusions to the last section. Dr. Schnoor suggested that the sentence beginning with "Added to this complexity is the fact that the ..." should be deleted, and Dr. McCay agreed. Dr. Schnoor asked why the second full paragraph on page 5, describing a high-performing organization, did not mention efficiency. Dr. Juarine Stewart (Clark Atlanta University) replied that efficiency was not discussed at the site visit. Dr. Chameides was concerned about use of the word "bottom" in the last sentence of the second paragraph in Section 2.1.1 (page 4). He suggested deleting "those at the 'bottom,' particularly" from that sentence. Dr. McCay agreed to make that change.

Dr. Schnoor noted that the table on page 13 illustrates the serious problem of NERL's aging workforce. If NERL plans to replace this expertise with post-docs, there will be a serious lack of senior scientists. Dr. Stewart said that NERL should exercise caution in bringing in mid-level scientists to ensure that existing staff are not negatively impacted. She reported that there was some concern in the Laboratory about hiring world-class scientists at higher salaries than those of the scientists already employed at

NERL. She suggested that NERL allow existing staff to apply for these new positions. Dr. Preuss replied that these positions will be open to EPA staff as well as outside scientists.

Dr. Schnoor called for a vote to approve the NERL report subject to the changes suggested today and the comments from vetting. The report was approved unanimously with these conditions. Dr. Mattison agreed to vet the report once the final changes have been incorporated. Dr. McCay will send the revised report to Ms. Hamilton, Dr. Mattison, Dr. Schnoor, and Ms. Campbell.

National Center for Environmental Research (NCER) Review Report

Dr. Johnson stated that there were some editorial changes made to the report since the March conference call. In addition, an executive summary and key findings section was added to the front of the report. He asked if there were any questions or comments on this version of the NCER report.

Dr. McCay suggested adding to the report the diagram that was included in the self-study response submitted by NCER. Dr. Bostrom said that she had suggested several changes during the March conference call that were not incorporated into this version of the report. Her comments pertained to RFAs and the RCTs. She was concerned about the recommendation to streamline involvement in the RCTs. Dr. Bostrom believes that the RCTs play a critical coordinating role in ORD. Dr. Schnoor said that the RCTs are beyond NCER's purview; however, a number of NCER staff have stepped down from participating in RCTs because of the high workload. Dr. Bostrom also expressed concern about the BOSC recommending a reduction in the number of RFAs. How many should the STAR Program issue each year? Dr. Bostrom pointed out that, given the broad objectives of the Agency, the number of RFAs is not that large. She noted that report focuses on comparing EPA's awards ratio to that of NSF. As she mentioned during the conference call, this is not an appropriate comparison. Using only NSF's environmental programs, the NSF funding rate is <10%. By that standard, NCER's funding rate is not low. She pointed out that investigators are not forced to apply for these grants and they will stop applying if the awards ratio is too low and the application process becomes too burdensome. Dr. Bostrom thought the recommendation of reducing the number of RFAs was inadvisable and politically dangerous. If anything, the number of RFAs should be increased along with increased funding.

Dr. Johnson asked Dr. Bostrom to identify an organization against which to benchmark NCER. If NCER's success rate is low, then the Center is processing and reviewing many more applications than can be funded, increasing the administrative burden. Dr. Schnoor pointed out that this is a significant recommendation in the report, and he thought the BOSC should discuss it. Dr. Small suggested that it was perhaps the size of the awards that was causing concern. Given a limited budget, perhaps NCER could award smaller grants. Dr. Bus warned that numerous small grants awarded under many RFAs may dilute the impact of the research. Dr. Johnson said that the Subcommittee is recommending that EPA award larger grants under fewer RFAs. Dr. Bostrom disagreed with that recommendation. She suggested rewording it to encourage EPA to aggressively seek additional funding for the STAR program to increase the award rates. Dr. Johnson replied that the Subcommittee avoided making statements about funding. The Subcommittee has recommended that NCER take steps to sharpen its use of existing funds. An alternative option would be to request additional funding for the grants program. Dr. Bostrom pointed out that EPA's RFAs are much more focused than those issued by NSF, and she is concerned that the existing wording insinuates that NCER is not doing a good job with their funding. Dr. Johnson asked Dr. Bostrom to provide some suggested wording to him, supporting the idea that increased resources would allow NCER to pursue greater opportunities. Dr. Bus cautioned that recommending an increase in funding for the grants program could result in a decrease in the intramural budget unless ORD receives additional funds. He did not want a BOSC recommendation to be used to punish the intramural program. Dr. Bostrom agreed to draft several sentences on this recommendation and send them to Dr. Johnson.

Dr. Schnoor questioned the wording of the recommendation at the top of page 6, beginning "Building on some successful efforts..." He asked if the Subcommittee can really comment on improving the focus of

the RFAs if they have not read them. Dr. Bostrom also was concerned about recommending that NCER issue new RFAs rather than repeating the same ones. She noted that new RFAs often do not receive quality proposals; NCER probably will receive better proposals by repeating RFA topics. Dr. Johnson asked Dr. Bostrom to rewrite that recommendation, and she agreed to send it to him. Dr. Johnson agreed to discuss these issues with Dr. Jim Clark (Exxon Mobil Research & Engineering Co.) and the other Subcommittee members.

Dr. Schnoor asked why the point made in the first sentence of the second paragraph on page 8 is not included in the recommendations. The report states that: "One area of caution, though, concerns the leveraging or commitment of funds to joint research programs. During the review process, the review team was unable to judge from available information whether the stated 35% increase in funded research equated to an equal increase in achieving EPA/NCER-specific goals...Better documentation of NCER partnerships, including research funded, dollars committed, and goals reached, would be a valuable undertaking." Dr. Schnoor suggested that the need for better documentation be highlighted as a recommendation. Dr. Johnson agreed to rework that section.

Dr. McCay noted that the second recommendation under Findings/Recommendations on page 7 was directed at ORD rather than NCER. Is that appropriate? Dr. Preuss replied that he believes that the Subcommittee relied too heavily on a single graphic that was distributed to the Subcommittee. The graphic was outdated and should not have been distributed. Dr. Bostrom pointed out that NCER should have an opportunity to conduct a review to ensure that the report is factually correct. Dr. Preuss stated that he has extensive comments on the report, and he noted that it contains a number of factual errors. Dr. Johnson said that the graphic was provided in the self-study response; however, if it is not used by ORD, then Dr. Preuss should point that out to the Subcommittee. Dr. Johnson agreed to correct any factual errors.

Dr. Bostrom asked that the word "sponsoring" be inserted after "...a leader in..." and before "environment research and..." in the recommendation on page 8. She also expressed concern about the first sentence in the second paragraph on page 8, beginning "One area of caution, though, concerns...". Dr. Bostrom said that she has seen documentation regarding joint-funded programs and how NCER has successfully used leveraging to achieve its goals. Dr. Johnson replied that the Subcommittee wanted to caution NCER against using leveraging merely for the sake of leveraging. The Subcommittee wanted to encourage NCER to use leveraging only where it helps them achieve their goals. He noted that is was just meant to be a caution, not a criticism. Dr. Bus suggested that NCER develop assessment mechanisms to determine if leveraging is working well to achieve NCER's as well as ORD's goals. Dr. Bostrom pointed out that ORD has problems measuring outcomes and impacts. Dr. McCay suggested deleting three sentences in the second paragraph on page 8, beginning with "Because many of the partnering ..., and ending with ...and not dilute its limited resources to other areas." Dr. Johnson agreed to rework that section of the report.

Dr. Schnoor said that many readers of the report will react to the words "transparency," "credibility," and "serious deficiencies." He noted that these words are used several times in the NCER report. This wording is pejorative. For example, on page 4, in the second paragraph under Panel Review, the words "sufficiently transparent" should be replaced by "documented and communicated." On page 5, the words "credibility and transparency" in the recommendation should be replaced. Another example appears on page 14, where the recommendation under Question 12 mentions "serious deficiency." Dr. Schnoor had identified similar editorial changes throughout the report, and he agreed to provide his comments to Dr. Johnson.

Dr. Bostrom pointed out that factual corrections are important and should be incorporated. Dr. Johnson agreed and asked Dr. Preuss to submit his comments. Dr. Preuss stated that the Subcommittee did not look at the RFAs, and he did not think they had made the case for reducing the number of RFAs. He

noted that some of NCER's best successes have resulted from small grants awarded under small RFAs. Dr. Preuss agreed to provide his written comments to Dr. Johnson.

Dr. Johnson agreed to revise the report based on the comments received at this meeting and those to be sent via e-mail following the meeting. Drs. Bostrom and Johnson both agreed that a follow-up telephone call may be needed to discuss the Subcommittee's position concerning reducing the number of RFAs. Dr. Bostrom noted that this is a tricky issue and it is pervasive in the report. It was agreed that the report would be revised and circulated once more before the BOSC votes on it.

State of the Environment Report and Indicators Initiative

Dr. Preuss reported that the EPA Administrator has directed EPA to prepare a "state of the environment report" and implement an "indicators initiative." He noted that the report was mentioned by Dr. Gilman in his presentation this morning. The Administrator envisions this report as a means of reporting to the American public EPA's progress in achieving the goals that the Agency has set for itself. The Office of Environmental Information (OEI) and ORD have been tasked with leading the effort to prepare this report, which will bring together national, regional, and program indicator efforts to describe the conditions of critical environmental areas and human health concerns. Due in November 2002, the "state of the environment report" is to provide an inventory of EPA indicators, identify promising indicators that allow the Agency to report on the environment, and identify data gaps and discuss the challenges faced in filling these gaps.

Dr. Preuss noted that ORD has taken the lead for developing the technical support document that will accompany the public report and serve as its foundation. The technical support document will be organized around ecological and human health condition. The chapters on ecological and human health set the framework for the report, identifying why things are important and how they are connected. All of the other chapters (i.e., air, water, land) relate back to these two chapters. The technical support document also will provide indicator descriptions and documentation for each indicator, as well as an analysis of how and when these indicators are useful.

In addition to the public report and the technical support document, EPA will prepare a strategic plan that identifies the gaps and the indicators for which we need data, and presents a 10-year roadmap for where the Agency wants to go. By the September BOSC meeting, the technical support document will have been drafted (it is expected to be completed in July). By November 2002, a draft of the public report will be available for review and discussion.

Dr. Preuss noted that the indicators will be national, but because there are only three or four national indicators, the report will include a number of regional examples. The goal is to move toward a finer geographic scale with each subsequent report. He stated that data are being collected for several thousand indicators; however, few of them have been assessed. The SAB, NRC, and Heinz Center have each published documents on indicators. EPA is using the information in these reports and making an effort to learn from their experiences. The Agency is trying to determine what is known about health effects, exposures, and environmentally related diseases. He reported that EPA is in the process of examining numerous data sets to assess their quality. He mentioned that approximately 50% of the indicators come from data sources outside of the Agency.

Wrap-Up/Next Meeting

Dr. Chameides suggested that a report on measures of success may not be necessary. Perhaps the BOSC should prepare a letter report that applauds the Agency's efforts in this area. Dr. Johnson commented that a letter report would be consistent with Dr. Gilman's request for quick, timely input rather than a longer, formal report. Dr. Schnoor agreed to draft a letter report on measures of success, and said he will try to

circulate a draft letter to the BOSC members by June. Dr. Schnoor reminded the BOSC members that the next meeting was scheduled for September 23-24, 2002. He thanked the members for their participation and asked for a motion to adjourn. Dr. McCay moved to adjourn the meeting, and Dr. Stewart seconded the motion. Dr. Schnoor adjourned the meeting at 2:45 p.m.

Action Items

The following action items were identified during the meeting discussions:

- Ms. Hamilton asked those BOSC members who did not submit a biosketch prior to this meeting to submit one as soon as possible for inclusion in the September meeting notebook.

- Ms. Campbell agreed to make the changes to the February meeting minutes that were requested by Dr. Schnoor.

- Ms. Hamilton agreed to check Dr. Preuss' schedule to determine if he is available on August 12 or 13 for the Communications Subcommittee site visit. She will provide this information to Dr. Bostrom as soon as possible.

- Dr. Bostrom will try to distribute the self-study questions developed by the Communication Subcommittee to the Laboratories/Centers in May 2002.

- Dr. McCay agreed to revise the NERL report to highlight the opportunity that the Laboatory has missed by not using the post-docs to address the lack of social scientists and diversity.

- Dr. McCay agreed to add some conclusions to the recommendations in the last section of the NERL report.

- Dr. McCay agreed to delete the sentence beginning with "Added to this complexity is the fact that the ..." from the report.

- Dr. McCay agreed to delete the words "those at the 'bottom,' particularly" from the last sentence of the second paragraph in Section 2.1.1 (page 4).

- Dr. Mattison agreed to vet the NERL report once the final changes had been incorporated. Dr. McCay agreed to send the revised report to Dr. Mattison, Dr. Schnoor, Ms. Hamilton, and Ms. Campbell.

- Dr. Johnson asked Dr. Bostrom to provide some suggested wording to him, supporting the idea that increased resources would allow NCER to pursue greater opportunities. Dr. Bostrom agreed to draft several sentences on this recommendation and send them to Dr. Johnson.

- Dr. Bostrom agreed to rewrite the recommendation in the NCER report that concerned issuing new RFAs rather than repeating the same ones. She will send it to Dr. Johnson as soon as possible.

- Dr. Johnson agreed to discuss the changes suggested by the BOSC with Dr. Jim Clark (Exxon Mobil Research & Engineering Co.) and the other Subcommittee members.

- Dr. Schnoor suggested that the need for better documentation (mentioned on page 8) be highlighted as a recommendation. Dr. Johnson agreed to rework that section.

- ✧ Dr. Johnson agreed to insert the word “sponsoring” after “...a leader in...” and before “environment research and...” in the recommendation on page 8.

- ✧ Dr. McCay suggested deleting three sentences in the second paragraph on page 8, beginning with “Because many of the partnering ..., and ending with ...and not dilute its limited resources to other areas.” Dr. Johnson agreed to rework that section of the report.

- ✧ Dr. Schnoor identified a number of editorial changes for the NCER report and he agreed to provide his comments to Dr. Johnson.

- ✧ Dr. Johnson asked Dr. Preuss to submit his comments on the NCER report to correct any factual errors. Dr. Preuss agreed to provide his written comments to Dr. Johnson.

- ✧ Dr. Johnson agreed to revise the report based on the comments received at this meeting and those to be sent via e-mail following the meeting.

- ✧ Drs. Bostrom and Johnson both agreed that a follow-up telephone call may be needed to discuss the Subcommittee’s position concerning reducing the number of RFAs before the BOSC votes on this report.

- ✧ Dr. Schnoor volunteered to draft a letter report on success measures. He will try to distribute the draft to the BOSC members by June.

Board of Scientific Counselors Executive Committee

Chair:

Jerald L. Schnoor, Ph.D.
Professor of Civil and Environmental Engineering
Engineering Research Facility
University of Iowa
330 South Madison Street, Room 116
Iowa City, IA 52242
Phone: 319-335-5649
Fax: 319-335-5585
E-mail: jschnoor@cgrer.uiowa.edu

Members:

Daniel Acosta, Jr., Ph.D.
Dean, College of Pharmacy
University of Cincinnati
3223 Eden Avenue, Room 136HPB
Cincinnati, OH 45267-0004
Phone: 513-558-3326
Fax: 513-558-4372
E-mail: daniel.acosta@uc.edu

Ann Bostrom, Ph.D.
Associate Professor
Georgia Institute of Technology
School of Public Policy
685 Cherry Street
Atlanta, GA 30332-0345
Receptionist: 404-894-3196
Fax: 404-894-0535
E-mail: ann.bostrom@pubpolicy.gatech.edu

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

William L. Chameides, Ph.D.
Smithgall Chair and Regents Professor
School of Earth and Atmospheric Sciences
Georgia Institute of Technology
221 Bobby Dodd Way, OCE Building
Atlanta, GA 30332-0340
Temp. Phone: 404-385-1548
Phone: 404-894-1749
Fax: 404-894-5638 Fax
E-mail: wcham@eas.gatech.edu

James R. Clark, Ph.D.
Exxon Mobil Research & Engineering Co.
3225 Gallows Road, Room 3A412
Fairfax, VA 22037
Phone: 703-846-3565
Fax: 703-846-6001
E-mail: jim.r.clark@exxonmobil.com

Elaine J. Dorward-King, Ph.D.
Global Executive, Environment, Health and Safety
Rio Tinto Borax
26877 Tourney Road
Valencia, CA 91355-1847
Phone: 661-287-5779
Fax: 661-287-5566
E-mail: elaine.dorward-king@borax.com

James H. Johnson, Jr., Ph.D.
Dean, College of Engineering, Architecture, and Computer Sciences
Howard University
2366 6th Street, NW, Room 100
Washington, DC 20059
Phone: 202-806-6565
Fax: 202-462-1810
E-mail: jj@scs.howard.edu

Donald R. Mattison, M.D.
Clinical Professor of Public Health
Mailman School of Public Health
Columbia University
112 David's Way
Bedford Hills, NY
Phone: 914-715-1571
E-mail: dmattison@prodigy.net

Bonnie J. McCay, Ph.D.
Professor of Anthropology and Ecology
Department of Human Ecology
Cook College, Rutgers The State University of New Jersey
55 Dudley Road
New Brunswick, NJ 08901
Phone: 732-932-9168
Fax: 732-932-6667
E-mail: mccay@aesop.rutgers.edu

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

Juarine Stewart, Ph.D.
Professor
Department of Biological Sciences
Clark Atlanta University
223 James P. Brawley Drive, SW
Atlanta, GA 30314
Phone: 404-880-6764
Fax: 404-880-6756
E-mail: jstewart@cau.edu

Herbert L. Windom, Ph.D.
Skidaway Institute of Oceanography
10 Ocean Science Circle
Savannah, GA 31411
Phone: 912-598-2490
Fax: 912-598-2310
E-mail: herb@skio.peachnet.edu

Rae Zimmerman, Ph.D.
Professor
Robert F. Wagner Graduate School of Public Service
New York University
4 Washington Square North
New York, NY 10003
Phone: 212-998-7432
Fax: 212-995-3890
E-mail: rae.zimmerman@nyu.edu

Committee Staff:

Peter W. Preuss, Ph.D.
ORD BOSC Liaison
U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Research (8701R)
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Phone: 202-564-6825
Fax: 202-565-2444
E-mail: preuss.peter@epa.gov

Shirley R. Hamilton
Designated Federal Officer
U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Research (8701R)
Ariel Rios Building
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Phone: 202-564-6853
Fax: 202-565-2444
E-mail: hamilton.shirley@epa.gov

Betty J. Overton
Alternate Designated Federal Officer
U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Research (8701R)
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Phone: 202-564-6848
Fax: 202-565-2444
E-mail: overton.bettyjo@epa.gov

Additional Meeting Participants

Ms. Beverly Campbell
The Scientific Consulting Group, Inc.
656 Quince Orchard Road, Suite 210
Gaithersburg, MD 20878
Phone: 301-670-4990
Fax: 301-670-3815
E-mail: bcampbel@scgcorp.com

Mr. Gary Kayajanian
Consultant
Phone: 703-920-0623

Dr. William Farland
Acting Deputy Assistant Administrator for Science
U.S. Environmental Protection Agency
Office of Research and Development
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Phone: 202-564-3322
E-mail: farland.william@epa.gov

Dr. Paul Gilman
Assistant Administrator for Research and Development
U.S. Environmental Protection Agency
Office of Research and Development
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Washington, DC 20460
Phone: 202-564-6620

Dr. Kevin Teichman
U.S. Environmental Protection Agency
Office of Research and Development
Office of Science Policy
1200 Pennsylvania Avenue, NW
Washington, DC 20460
E-mail: teichman.kevin@epa.gov

Ms. Susie Warner
The Scientific Consulting Group, Inc.
656 Quince Orchard Road, Suite 210
Gaithersburg, MD 20878
Phone: 301-670-4990
Fax: 301-670-3815
E-mail: swarner@scgcorp.com