



BOARD OF SCIENTIFIC COUNSELORS

## **EXECUTIVE COMMITTEE MEETING SUMMARY**

**Washington, DC  
February 13-14, 2006**

**Monday, February 13, 2006**

### **Welcome and Introductions**

Dr. James Johnson, Jr. (Howard University), Chair of the Board of Scientific Counselors (BOSC), called the 31st face-to-face meeting of the BOSC Executive Committee to order at 8:30 a.m. He thanked the members for coming and welcomed Dr. George Gray, the Assistant Administrator for Research and Development (AA/ORD), the Designated Federal Officers (DFOs) for several of the BOSC Subcommittee, and the others present. Dr. Johnson asked the members and other attendees to introduce themselves.

### **Remarks of the Assistant Administrator, ORD**

Dr. Gray (EPA/ORD) said he was pleased to be able to attend the meeting and apologized that both he and Dr. William Farland (EPA/ORD) would have to leave soon after his remarks to attend the ORD Executive Council meeting, which was ongoing at the Ronald Reagan Building. He planned to return to the BOSC meet tomorrow along with the members of the ORD Executive Council, which includes the Laboratory/Center Directors (Larry Reiter, Sally Gutierrez, Hal Zenick, Peter Preuss, Gary Foley, Robert Kavlock, Andy Avel, National Program Directors, the Directors of the Office of Science Policy (Kevin Teichman), Office of Resources Management Administration (Jack Puzak), the Acting Deputy Assistant Administrator for Science (William Farland), and the Deputy Assistant Administrator for Administration (Lek Kadeli).

Dr. Gray stated that he has been serving as the AA since November 1, 2005 and it has been a terrific experience. He has visited the ORD laboratories in Narragansett, Corvallis, Athens, Cincinnati, Research Triangle Park, and Ada. His next visit will be to the laboratory in Duluth. Dr. Gray thanked the BOSC for all of the work they have done to provide ORD with sound advice, ideas, and feedback. ORD takes this input seriously and is acting on the Board's recommendations. Dr. Gray said that he read the minutes from the September meeting; they were very detailed and gave him an idea of how hard the Board works to provide advice to ORD.

Dr. Gray highlighted a number of items that might be of interest to the Board. He reported that ORD is working hard to fill the vacant positions on the BOSC Executive Committee. The names suggested by the BOSC, along with some additional candidates, are moving forward for consideration. He hopes that the new members will be on the Board and able to participate in the June meeting. Another area of interest to the BOSC is ORD's budget. The President's budget for FY2007 was just released. There is a 2 percent reduction in the ORD budget compared to the FY2006 budget when the earmarks are removed. Several initiatives have received funding, including \$7 million for research on how to develop sustainable methods for water infrastructure. The existing infrastructure is aging and the cost of replacing it is staggering so there is considerable incentive to identify economically viable options. The National Risk

Management Research Laboratory (NRMRL) has a number of experts in water infrastructure and water quality.

The FY2007 President's budget also includes an increase in funding for research to investigate applications and implications of nanotechnology. ORD has been funding some work in this area through the Science To Achieve Results (STAR) Program. The increase in nanotechnology funding will be used to develop an in-house nanotechnology research program. The budget also includes \$3 million for computational toxicology research; Dr. Gray attributed this funding increase to recognition of the value of using cutting-edge techniques to learn more at a faster rate and reduce animal testing. The idea is to bring "omics" technologies and computational toxicology to bear on environmental issues. Also included in the FY2007 budget is \$9 million to support the Integrated Risk Information System (IRIS), including a \$500K increase to improve IRIS. Dr. Gray mentioned that IRIS has been around for about 20 years and it is used all over the world. Approximately one-third of the hits to the IRIS Web Site are from outside the United States. ORD wants to ensure that it is doing the best job possible to ensure that the IRIS profiles are based on the best science, data, and expertise. ORD also wants the process for IRIS to be open and transparent. The STAR Program budget was up about \$2 million from the FY2006 budget. Although this is a modest expansion, ORD recognizes the importance of this grants program and its value to EPA and the academic community. Dr. Gray indicated that he had some time for a few questions.

Dr. Anna Harding (Oregon State University) asked if the additional funding for water infrastructure was linked to water security issues. Will there be collaboration between the two programs? Dr. Gray responded that the two efforts will be linked, but the infrastructure effort also will be looking at the adequacy of the water supply, water reuse, and water quality for its intended use. There is an effort by the National Science and Technology Council (NSTC) to look at this across all federal agencies. The program will build on the National Homeland Security Research Center (NHSRC) water expertise and the two programs will be working together and sharing information and ideas.

Dr. Harding asked if the in-house nanotechnology research efforts will focus on applications or implications. Dr. Gray replied that some of the work to date funded through the STAR Program has focused on applications, but there also has been some work on implications (ecological and health effects). As ORD builds its in-house program, it will focus on where ORD can make a contribution; ecological effects may be that area. Another opportunity for ORD may be exposure to assess the health effects of nanoparticles. This exposure research will be very different from the exposure research conducted by the National Exposure Research Laboratory (NERL) in the past.

Dr. Herb Windom (Skidaway Institute of Oceanography) asked about the earmarks and if they involved cooperation with other institutes. Dr. Gray replied that there are useful projects that come out of earmarks. Dr. Farland added that each earmark is assigned an ORD laboratory or center to oversee the research and ORD requires that the projects be subjected to peer review to ensure the quality of the science. He noted that many earmark efforts are closely aligned with EPA's work. Nevertheless, ORD understands that earmarks come at the expense of other ORD programs because the resources are finite.

Dr. Gray identified the areas that he planned to emphasize during his tenure as the AA/ORD. He specified five areas of focus:

- (1) Support ORD's people and partners—thinking about human capital and the pipeline of skills, expertise, and tools needed in the next 20 to 30 years. Title 42 authority will allow the Agency to bring in world-class scientists, and ORD is in the process of initiating the first two searches. Dr. Gray wants to ensure that ORD has the equipment that it needs to effectively do its job. In addition, he wants to ensure that the staff members have the travel funds they need to participate in conferences, workshops, and symposia so that they can be recognized as leaders in their fields. This area also includes a focus on providing the support needed by the program offices, tribes, and regions.

- (2) IRIS content and process—Dr. Gray wants to ensure that the IRIS profiles are based on the best science available. These profiles are widely used for screening and for decision making so they must support a variety of uses of the data. He plans to emphasize quantitative uncertainty analysis and help users better understand decision making under uncertainty so that this tool can be used better.
- (3) Outcomes—Dr. Gray is emphasizing the identification of measures to assess outcomes (e.g., acres of wetlands protected, reduction in the number of cases of certain diseases). The Agency has done a great deal of good for the public; for example, despite a doubling of the economy, there has been a reduction in certain air emissions. EPA needs to monitor how well it is doing its job of protecting human health and the environment and communicate this to the public. The Agency needs to identify what needs to be monitored and measured to provide reliable, robust measures that indicate outcomes. What will EPA need to monitor in the future? Many of the indicators identified in the State of the Environment Report were not reliable.
- (4) Communicating the news of ORD's good work—ORD now has a communications staff and strategy and this staff is working to get the word out about ORD's research and its many successes. Dr. Gray wants to make an effort to communicate ORD research internationally so that it can be used to solve problems in other parts of the world. Because pollution does not respect international boundaries, assisting other countries in solving their pollution problems will benefit the United States.
- (5) Looking to the future—ORD needs to anticipate problem areas and opportunities. Nanotechnology is one of these areas, as is environmental stewardship (helping many people to make small decisions that benefit the environment). The most significant source of dioxin now is backyard burning. Can EPA design a drum to do cleaner combustion in backyards to help reduce dioxin emissions? Little changes implemented by a large number of people can help EPA achieve its goals.

Dr. Gray thanked the BOSC members for their attention, stating that he will return tomorrow to continue the discussion with the Board.

Dr. Rogene Henderson (Lovelace Respiratory Research Institute) asked Dr. Gray if ORD was concerned how world-class scientists will react to the OMB Program Assessment Rating Tool (PART) evaluation process. Dr. Gray responded that he is still learning about the PART process. He plans to meet with OMB to discuss the process and help them understand that it is particularly challenging for a research organization. He stated that the BOSC program reviews have been very helpful in getting ORD through the PART reviews. Dr. Henderson expressed her concern about subjecting the work of a Nobel prize-winning scientist to a bureaucratic PART review; this may become problematic for ORD.

Dr. Johnson mentioned that the BOSC is involved in a number of the five focus areas highlighted by Dr. Gray, including ORD's people and partners, outcomes and program reviews, and futuristic thinking (trying to stay ahead so that the Agency does not merely react to environmental consequences). Dr. Johnson stated that the BOSC wants to be a full partner with ORD. Dr. Gray replied that he looks forward to reading the summary of this meeting.

### **Review of the September Meeting Minutes**

Dr. Johnson summarized the sections covered in the September meeting minutes and then asked for specific comments. Dr. Windom noted that the location of the meeting on page 1 should be Cincinnati, Ohio, rather than Washington, DC. Dr. Henderson indicated that the statement concerning the publication of the abstracts from the Risk Assessment workshop on pages 2 and 10 is incorrect. She noted that the extended abstracts were published in the journal *Human and Ecological Risk Assessment* in November and asked that the minutes be corrected. Dr. Johnson suggested that a parenthetical correction be added

to the minutes. Dr. Henderson also questioned the use of the word “leadership” in the fifth line of the second to the last paragraph on page 4. She suggested replacing it with the word “management.” Dr. Johnson suggested checking with Dr. Farland about this change because it involved a change in Mr. Oppelt’s comments. Dr. Johnson suggested adding the words “process for” before “prioritization” in item (4) in the first paragraph under Subcommittee Reports on page 6.

When no additional comments were received, Dr. Johnson asked for a motion to approve the September meeting minutes. Dr. George Daston (Proctor & Gamble) moved that the September minutes be approved with the requested changes, and Dr. John Giesy (Michigan State University) seconded the motion. Dr. Johnson called for a vote, and the September minutes were unanimously approved by the BOSC.

### **Overview of the Agenda**

Dr. Johnson noted that there are two program review reports on the agenda—the Global Change Program Review Report and the Land Restoration and Preservation Program Review Report. Also, there will be reports on the status of additional reviews (Management Multi-Year Plan [MYP], Water Quality, STAR/Greater Research Opportunities [GRO] Fellowships, Computational Toxicology, and Technology for Sustainability Research). He reminded the Subcommittee Chairs that they will be asked to draft a letter in response to the ORD response received for each program review report.

Dr. Johnson said that he wanted to add an item to the agenda—the Standard Operating Procedures (SOP) Manual for the BOSC program reviews. He reviewed the agenda and suggested that the SOP discussion be inserted in the 5:00 p.m. slot because Dr. George Lambert (University of Medicine and Dentistry of New Jersey), the Science Advisory Board (SAB) liaison to the BOSC, was unable to attend the meeting.

Dr. Johnson stated that all Board members should have completed their required ethics training, updated their biographical sketch and curricula vitae for the BOSC Web Site, and submitted their confidential disclosure forms.

### **BOSC DFO Remarks**

Ms. Lori Kowalski (EPA/ORD), DFO for the BOSC Executive Committee, stated that the BOSC is chartered as a Federal Advisory Committee and subject to the rules and regulations of the Federal Advisory Committee Act (FACA). Therefore, this meeting was open to the public, and time was designated for public comment. A contractor, Beverly Campbell from SCG, was present to take notes to capture the presentations and discussions, and the meeting minutes will be made available to the public on the BOSC Web Site after approval by the Executive Committee and certification by the BOSC Chair, Dr. Johnson. Notice of this meeting was published in the *Federal Register*. Ms. Kowalski established an electronic public docket for the meeting. EPA’s EDOCKET system is transitioning to a new system, the Federal Docket Management System (FDMS), which can be accessed at <http://www.regulations.gov>. The number to search for this docket is EPA-HQ-ORD-2006-0031. Ms. Kowalski mentioned that she had not received any requests for public comment prior to the meeting but there is time set aside at 3:30 p.m. today for public comment. As DFO, she worked with EPA’s ethics officials to ensure that all appropriate ethics requirements were satisfied for this meeting. Nevertheless, she asked the members to notify her during the meeting if they have any potential conflicts of interest. Ms. Kowalski mentioned that there will be participants by telephone during the Tuesday morning session. She also introduced Peter Fargo (EPA/ORD), who will be filling in for Heather Drumm (EPA/ORD), while she is out on maternity leave.

Ms. Kowalski noted that the new BOSC logo is being used on all materials and she is working with Dr. Johnson to standardize the format for the program review reports. The format of the summary to be used

for the report is provided in the SOP manual. She reported that the BOSC members were receiving a pay raise to be consistent with the SAB rate of pay.

Ms. Kowalski distributed a handout that compared the BOSC's output to that of other FACA committees. In September of each year, all FACA committees are required to enter data about their activities into a database. She used this information to generate the handout. There are 24 FACAs (Tier 1) providing advice to EPA. As the table indicates, the BOSC's contribution is substantial in terms of number of reports, meetings, and recommendations. She noted that 37 percent of the recommendations to EPA come from the BOSC. Fifty-seven percent of the recommendations of FACA committees are implemented by EPA, but ORD has implemented 91 percent of the BOSC's recommendations, which is considerably higher than the average for all FACAs. A number of the program review reports have been posted on the BOSC Web Site.

Ms. Kowalski pointed out that the Subcommittee meetings for the program reviews are public meetings and subject to FACA requirements. She explained that there is a difference between a workgroup session and a Subcommittee working session. A workgroup session is when less than half of the Subcommittee members meet as a workgroup; the meeting is not subject to FACA and does not have to be announced in the *Federal Register*. That workgroup, however, brings its work to the Subcommittee in a public forum. A Subcommittee working session is a discussion of the full Subcommittee; the session must be noted in the *Federal Register* and open to the public. If a Subcommittee Chair would like some workgroup time at the Subcommittee meeting, he/she should notify the DFO so that it can be scheduled. Ms. Kowalski encouraged the Chairs to schedule any needed workgroup sessions early in the day, at lunch, or late in the day so that the public meeting can break at a convenient time. She emphasized the importance of reporting a summary of the poster session during the Subcommittee meeting for the public record. This is necessary because the highlights of the poster session must be captured in the minutes.

A Gallup survey asking for opinions about the members' experiences on the BOSC FACA will be conducted in 2006. Information will be collected about how the committee is run, the effectiveness of Agency staff, etc. Ms. Kowalski encouraged each of the members to respond to the survey. EPA needs this feedback to improve the process. She expects the survey to be fielded in the spring. Ms. Kowalski hopes that several new members of the BOSC will be able to attend the June 2006 meeting in Las Vegas, Nevada. She hopes to provide some training on FACA the evening before the first day of the meeting. That training will be mandatory for new members and optional for existing members.

Ms. Kowalski asked all attendees to sign in at the registration desk. She also asked the members to submit their timesheets and travel vouchers before departing the meeting. She distributed a handout that identified the status of the BOSC program reviews.

Dr. Johnson asked the members if they wanted to prepare a letter recognizing Mr. Oppelt's contribution during his tenure as AA/ORD. Dr. Giesy and other members thought a letter would be appropriate. Dr. Johnson agreed to prepare the letter to recognize Mr. Oppelt's contributions and the Board's appreciation.

### **Global Change Program Review**

Dr. Milton Russell, Chair of the Global Change Subcommittee, complimented Janet Gamble, the DFO for the Subcommittee, for keeping the Subcommittee on track and in compliance with FACA rules. He also thanked Dr. Clifford Duke (Ecological Society of America), who served as the Vice-Chair of the Subcommittee, for his assistance in guiding the Subcommittee and developing the report. Dr. Russell said that his presentation was designed to provide background for the review, some general comments, and help in interpreting the report prepared by the Global Change Subcommittee.

He explained that this program has a unique institutional setting in that it serves two “masters.” It is part of a larger interagency effort to address global change, and part of ORD’s effort to serve EPA’s needs in accomplishing its mission. Resources for the program come from across ORD and outside the Agency as well, making it a management challenge to obtain the resources when they are needed. The program has a limited ability to define its mission because the role was determined by the larger interagency effort. ORD’s role is limited to the consequences of, and adaptation to, potential global change, but it is not restricted to climate change. The mission of the program has shifted. It started out as a program to assess global change across the United States and now the mission has changed to adaptation to potential global change, which is appropriate for EPA. Because of this shift, the goals of the program were changing during the period covered by this review.

The Global Change Research Program is not a traditional ORD or science program. It is both problem and opportunity driven but not driven by regulations. Therefore, the program requires a great deal of coordination with clients. Dr. Russell commented that the program was too diverse for the Subcommittee to have conducted a serious “peer review” of the science elements of the program. The time and resources available for the review were inadequate to conduct such a review so the Subcommittee concentrated on the gestalt of the program.

The report follows the organization used by previous program reviews. The chapters were drafted by teams and then discussed by the entire Subcommittee. The review was guided by the following questions: (1) Has the program done its work well? (2) Has the program done the right work? The short answers to these questions that was reached by the Subcommittee were: (1) Yes, to the extent that it can be determined; and (2) Yes, but needs to evolve further. Dr. Russell commented that much of the research that was reviewed was responsive to these initial goals and mission of the program, which complicated the review.

Dr. Russell highlighted the following summary conclusions and recommendations from the report:

- ✧ The program has provided substantial national benefits and should be continued.
- ✧ Substantial findings have been properly disseminated and, to some extent, used.
- ✧ Internal and external resources have been used effectively.
- ✧ The program is well recognized for its leadership in the “global climate world.”
- ✧ The initial regional assessments produced social learning and localized benefits. To be useful, the results of the assessments must be “harvested” and disseminated.
- ✧ The present focus of the program on adaptation is appropriate for EPA. Other agencies are focused on other areas (e.g., mitigation).
- ✧ Decision support is the correct operational target to foster adaptation and to leverage resources.
- ✧ Decision support is an intermediate good, not an outcome. The program is not dealing with outcomes; it is helping decision makers to make better decisions that will **lead** to better outcomes. Because user actions are required to achieve the outcomes, there is no direct linkage between the program and the outcomes. Therefore, the research must be useful (demand driven).
- ✧ Stakeholder involvement is necessary and its importance is recognized by the program.

- ✧ The program needs to expand the definition of stakeholders in setting priorities and selecting research activities. The program needs to move beyond parochial interests to national interest; beyond short-term to intergenerational; and beyond incremental change to nonlinear shifts, tilt points, and concern for episodic events. External advisors with a national perspective are needed.
- ✧ A clearly articulated/disseminated priority-setting framework is needed to define future “right work.”
  - ◆ The explicit goal is to improve expected national welfare.
  - ◆ Criteria for what would and would not be done should be clarified.
  - ◆ A rationale for selecting/rejecting activities should be provided.
  - ◆ A basis to choose among acceptable tasks should be provided.
  - ◆ The Subcommittee suggested principles for creating such a framework.
- ✧ A more proactive and explicit systemic and integrated approach is needed.
  - ◆ Integration of water quality and water quantity.
  - ◆ Fuller integration of ecosystem and water efforts.
  - ◆ Consider and take credit for intra-program and external synergies.
  - ◆ Consider ancillary benefits and costs in selecting, designing, evaluating, and communicating program activities.
- ✧ The program should continue to reassess regional/place-based activities and make needed changes.
  - ◆ Assure they have large-scale or national significance (not parochial or local).
  - ◆ Assure that activities will resonate with target decision makers.
  - ◆ Assure, upfront, that results can/will be disseminated to potential adaptation users.
- ✧ The Subcommittee was impressed with the high quality, energy level, dedication, and skill of program leadership and staff, both internal and external.
- ✧ The Subcommittee concluded that the preconditions exist for continued major contributions to national welfare from the program.
- ✧ The Subcommittee concluded that the program must continue to evolve to achieve maximum benefits.

Dr. Russell concluded his remarks by stating that, given the breadth of this program, the Subcommittee would have benefited from an additional face-to-face meeting. He then asked Dr. Duke if he had any comments to add.

Dr. Duke said that Dr. Russell captured the major points in the report and the essence of the Subcommittee’s discussions. He thought the Subcommittee accomplished a great deal in a short amount of time.

### **Global Change Program Review Report Discussion**

Drs. Jim Clark and Gary Sayler served as the vettors for the Global Change Program Review Report drafted by the Global Change Subcommittee. Dr. Clark appreciated the breadth of topics that the Subcommittee had to tackle in the review; the report made a distinction between climate change and global change and addressed both. The Subcommittee did a good job of referencing its comments to the charge questions and the EPA strategic plans and long-term goals (LTGs). Dr. Clark also liked the focused approach used in the report.

The report includes a good discussion of outputs and outcomes, specifically how to relate activities of outputs to achieve the organizational outcomes. Although Dr. Russell’s presentation acknowledged that

the program serves two “masters”—EPA’s role in the interagency Global Change Program and ORD’s role in serving its stakeholders—which creates some tension, Dr. Clark said that he did not understand that conflict when reading the report, referring to the following sentence on page 11: “The success of the Program despite the inevitable tensions that this situation necessarily brings speaks well for both its leadership and the leadership of ORD.” Dr. Clark was confused about the tension and why it was relevant; he thought this was not explained adequately in the report.

Dr. Clark suggested that the Subcommittee may have become too involved in solving the problem rather than looking at the process. He was referring to the different areas identified in the report where program data could be applied. Elimination of that discussion could shorten the report. These may or may not be appropriate measures so it would be better to include them as examples of how ORD might want to organize the research. Dr. Clark struggled with the section on the quality of the work. Peer reviewed publications appears to be the main indicator of quality. There are other ways to ensure quality and those were not mentioned in the report. On the top of page 36, there is an example that is associated with a specific individual. Dr. Clark recommended removing specific references to individuals as was done with the other reports.

Dr. Saylor thought that the report may be too prescriptive in some instances. He suggested offering examples rather than prescribe how ORD should do the work. For example, the report recommends that ORD require more interaction between the STAR grantees and the stakeholders. Most STAR researchers would have difficulty accomplishing this interaction, so the Subcommittee report may be too prescriptive. Dr. Saylor thought the summary section could be improved. He had to wade deep into the report before he got some understanding of the program’s clients and stakeholders and before some comments made sense. He suggested that the clients and stakeholders be identified up front, as well as the two “masters” served by the program. Dr. Saylor commented that the outcomes need to be stated clearly and earlier in the report, preferably the summary section.

Dr. Saylor agreed that the names of individuals used in the examples should be removed from the report. He thought that some sections of the report were redundant. For example, the second complete paragraph on page 6 is a repeat of the material on page 1. Those sections are too close together in the report for that level of redundancy. Dr. Saylor said he had some additional comments about improving the structure of the report. He agreed to provide those comments to Drs. Cliff Duke or Milton Russell. For example, some chapters of the report list the recommendations in a separate section at the end, and other chapters do not. The structure should be consistent from chapter to chapter. Dr. Saylor recommended listing the recommendations in a section at the end of each chapter.

Dr. Herb Windom stated that there is an increasing focus on the social applications of the science in ORD research programs. More and more, ORD is involving and interacting with social scientists. Is there an effort to integrate more social scientists into this program? Dr. Russell responded that there is an effort to integrate more social science into the regional-based efforts, particularly decision support and adaptation processes.

Dr. George Daston noted that global climate change has been the subject of “bad press” for EPA, particularly when it was excluded from a document released by the Agency a few years ago. He suggested that the Subcommittee consider including a recommendation that EPA develop a plan to do a better job of communicating what it is doing in this area to the public. He thought that EPA should take some credit for its positive actions in this research area. Dr. Russell agreed that this is an important point. He noted that bringing about the desired outcomes requires a linkage between the research and the actions taken by stakeholders and local communities.

Dr. Anna Harding asked if the report comments on the adequacy of the full-time equivalents (FTEs) devoted to the program. Does the program have an adequate number of staff to move it forward? Dr.



Russell responded that the report recognizes that there are more opportunities for research than currently are being addressed. Therefore, additional resources would allow the Agency to do more. The Subcommittee, however, did not state specifically in the report that the program needs additional staff and dollars because this is true for many ORD programs.

Dr. Duke reminded the BOSC members that this ORD program is just a small piece of a broader national integrated program, which makes the issue of resources more complex. EPA's part of the national program is relatively small compared to those of other agencies; therefore, the Subcommittee would have to look at the budget for the entire program to determine if the resources were adequate. Dr. Jim Johnson added that it is more important for the Subcommittee to focus its recommendations on the process rather than the program's resources. Dr. Windom noted that EPA personnel are changing and the expertise within the Agency is becoming more diverse. As the older staff members retire, what types of expertise are needed to replace them? Social science may be an area that should be covered by new staff. He pointed out that none of the charge questions deal with future needs in the workforce, but perhaps it should be added for future reviews. Dr. Sayler commented that ORD was not encouraged to pursue decision science because it is established in other agencies involved in the national program. He asked about the extent to which the water quality and global change programs are driven by regulations. Dr. Russell replied that the problem lies with EPA's mission. In the real world, water quality issues are related to water quantity issues and should not be separated. If they are separated it can lead to poor decisions and mistakes. For example, one option may improve water quality but not water quantity, and another option may benefit both water quality and quantity. Also because of EPA's mission, there is a separation between ecosystems and global change; these two programs need to be more integrated and the Agency needs to think more broadly.

Dr. Sayler suggested that the LTGs be stated in the front of the report to give the reader a better idea of what the program is trying to achieve. The report mentions that there was a lack of information that did not allow the Subcommittee to answer some of the charge questions. Dr. Sayler asked what additional information was needed by the Subcommittee to answer the questions. Dr. Russell explained that the report was not referring to information that EPA refused to provide to the Subcommittee, rather there was no opportunity to obtain the additional information. For example, there was limited time to review and discuss the posters and only certain posters could be displayed. Therefore, the Subcommittee did not have adequate time to review the entire program in the detail needed to thoroughly answer some of the charge questions.

Dr. Duke added that there had been a mission shift within the program in the last few years. The past research was great and the results were published in peer reviewed journals, but that work was applicable to the old mission. New work is moving through the pipeline and it looks solid but it is not to the point of publication. He clarified that the references made to better coordination in the report refer to better coordination within the program (the four focus areas of the program). There are some overlaps and there could be better coordination. Dr. Sayler asked if the water quality issues were clear, discernible. Dr. Russell responded that the water quality efforts of the program were focused on adaptations to alterations to future regimes (e.g., coral reefs, everglades). Potential regimes change to influence water quality, which is intimately connected to global change. That is an appropriate focus for the program.

Dr. Johnson summarized the comments of the two voters and the other BOSC members: several items should be moved forward in the report, including the two "masters" served by the program, the clients and stakeholders, the LTGs, the outcomes, and an explanation of the program's mission change; the names of the individuals in the examples should be removed from the report; the presentation of the recommendations within the different chapters of the report should be made consistent; and the Subcommittee will consider adding a recommendation about communication to the program's stakeholders and the public. Dr. Johnson stated that because there are no substantive changes to the report, the Executive Committee could vote on approval of the report pending sign-off of the final

changes by the two vectors. He called for a motion on the report. Dr. Harding made a motion to accept the report with the suggested changes and final approval of the vectors, and Dr. Windom seconded the motion. Dr. Johnson called for a vote and the report was approved by unanimous vote of the Executive Committee.

Just before the morning break, Dr. Jim Clark (Exxon Mobil) stated that a journal article by Dr. Jerry Schnoor, former Chair of the BOSC, was recognized as paper of the year by the journal *Human and Ecological Risk Assessment*. Dr. Johnson agreed to distribute copies of the paper to the BOSC members or provide a URL for accessing the paper on the Web.

### **Land Restoration and Preservation Research Program Review**

Dr. Charlie Menzie, Chair of the Land Restoration and Preservation Subcommittee, commended EPA for the outstanding effort in presenting materials to the Subcommittee. The posters were well organized and the Subcommittee found them to be very helpful. The materials provided, along with the posters and discussions, made it easier for the Subcommittee members to understand the work being done by the program. He thanked Heather Drumm (EPA/ORD), who served as the DFO for the Subcommittee, as well as Dr. Clark, who served as the Vice Chair and helped to guide the Subcommittee. Dr. Menzie also expressed his gratitude to Dr. Randy Wentsel, the National Program Director for the program, for the tremendous job that he did in organizing the materials, presentations, and posters. The Subcommittee included representatives from the U.S. Army Corps of Engineers, consulting groups, academia, and a state agency. The members worked well together and had a good deal of interaction.

Dr. Menzie stated that the Land Research Program is meeting its stated goals and the Land MYP provides an adequate roadmap for achieving those goals in the future. The Subcommittee was impressed with the relevance, quality, performance, and leadership demonstrated by the personnel and projects that constitute the Land Research Program.

The Land MYP achieves its stated purpose of providing a roadmap and framework. Information could be communicated more clearly with emphasis placed on anticipating future conditions, pursuing collaborative efforts, and how certain historical program needs are addressed as programs are sunset or terminated. The Land MYP is a key communication document. The readability of the MYP could be improved, however, by highlighting essential features and by minimizing jargon and acronyms. The Subcommittee suggested that EPA consider rephrasing the two LTGs to reflect technical or scientific themes.

The Land Research Program does a good job of focusing on near-term needs but there is a lack of emphasis on emerging issues. The Subcommittee suggested that EPA consider including periodic forecasting of emerging problems that could be examined in a preliminary way to judge their importance.

In a time of shrinking resources, collaboration and leveraging are critically important. Therefore, EPA should consider additional opportunities for collaboration and leveraging at the national and international levels.

New scientists will be needed to replace those who are retiring and to provide expertise in emerging areas. EPA should identify current and future processes for replacing retiring expertise and on developing new scientists with emphasis on emerging areas. This could include increased support of university-based research.

There may be gaps and impacts resulting from sunseting or terminating particular research initiatives. If there are recognized gaps associated with sunseting or terminating a program, these could be prioritized for collaborative research efforts.

A balance needs to be maintained between the benefits of performance metrics and the costs and potential constraints that these metrics sometimes place on programs. The Subcommittee acknowledged that the interplay of forces regarding performance metrics and endorsed their continued use, but suggested that the need for balance be borne in mind.

Little information was presented on the connection between short-term outcomes (use of advice and guidance documents) and long-term outcomes (faster, cheaper, better cleanups or waste minimization). EPA should consider how the linkages could be made more clear or enhanced in the Land MYP.

The Subcommittee determined that the Land Research Program is clearly relevant. Several areas for improvement were identified in the report:

- ✧ Goals and objectives should be stated in tactical or strategic terms.
- ✧ Benefits of the Land Research Program should be articulated.
- ✧ Gaps not being covered by existing projects should be identified.
- ✧ Mechanisms and incentives for encouraging collaboration should be identified.
- ✧ How outputs and products will be transferred to the field should be emphasized.
- ✧ The capability to characterize uncertainty in the assessment techniques and models developed by the Land Research Program should be enhanced and these techniques and models should be integrated into Agency guidance and rules.

The quality of the program's products is being assured but the Subcommittee offered several suggestions for improvement, including:

- ✧ Provide more description of how criteria were used to prioritize needs and projects for both LTGs but specifically for LTG 2.
- ✧ Incorporate input from outside groups for future Land MYPs and insuring that all valid scientific advice is considered.
- ✧ Articulate the mechanisms for ensuring periodic quality reviews and mid-course corrections during the conduct of projects.

The design of the program is logical and comprehensive. To improve the program, the Subcommittee suggested that ORD:

- ✧ Recast goals in terms of two major environmental challenges with problems and the scientific advancements to aid their resolution described as subgoals. Projects and outputs could be organized by major problems (e.g., assessment and cleanup of DNAPLs in groundwater, design and operation of landfill bioreactors) along with the planned workflow.
- ✧ Review potential needs related to current issues that cross-cut multiple programs (e.g., biosolids and animal waste application to land, mining and megasites, oil and gas operations, infectious disease agents, beneficial reuse of waste materials, uncertainty in risk assessments, and communication of risk results).

- ✧ Clarify in the Land MYP the sequence of research questions along a timeline and the activities that fall out from it.
- ✧ Identify the opportunities for staff scientists or engineers to initiate ideas, for example through a seed funding program.
- ✧ The schedule of the program is on target for LTG 1 but less progress has been made on LTG 2. The Subcommittee suggested that ORD:
- ✧ Consider leveraging and collaborating to ensure timely progress for LTG 2.
- ✧ Improve the process for updating IRIS values for chemicals currently in the database and for developing values for potentially important chemicals not in IRIS.
- ✧ Identify and direct longer-term and emerging research needs to allow ORD to ramp up and meet the future demands in a timely manner.
- ✧ Articulate how planned and future research programs support decision making on sustainability issues and on using life cycle assessment (LCA).
- ✧ Update key technology documents related to landfill design.
- ✧ Identify within the Land MYP the mechanisms for tracking progress for specific projects with respect to the LTGs.

EPA is a recognized leader in the land restoration and preservation community, but work is needed to maintain this position. The Subcommittee recommended that ORD:

- ✧ Identify a process for acquiring or developing key leaders for those programs where clear leadership may be lacking. Such leadership should be reflected in personnel as well as programs. Particular emphasis should be given to leadership in emerging fields.
- ✧ Describe or develop mechanisms for identifying mature research fields, emerging issues, and/or ensuring that the ORD-planned research is not duplicating efforts.
- ✧ Enhance ORD's position as a global leader by encouraging continued participation in international panels and meetings.
- ✧ Insure that funding is directed toward areas where large gains in understanding can be made through research.

### **Land Restoration and Preservation Program Review Report Discussion**

Dr. Johnson asked the two authors of the Land Restoration and Preservation Program Review Report to provide their comments.

Dr. Harding pointed out that there are approximately 100 recommendations in the report. Although the report provides some positive praise of the program, she was concerned that the large number of recommendations may give the impression that the program was riddled with problems. She also expressed some concern about the time it will take ORD staff to prepare a response to every one of the recommendations. Dr. Harding noted that the positive comments in the report are not balanced by the number of recommendations for improvement.

Dr. Clark responded that the Subcommittee members had many different opinions and suggestions for this program that were captured in the report. He stated that this program is one in which EPA sets cleanup criteria and provides guidance for those at the local level who are responsible for implementing the cleanup activities. There were many different opinions from the Subcommittee members with respect to how EPA could help those responsible for implementing the cleanups. Dr. Menzie worked very hard to ensure that the Subcommittee reached consensus on these recommendations. Dr. Harding thought it was important to reiterate the SAB recommendations because it adds clout to the recommendations when they are endorsed by two external advisory boards. In reading the report, she was uncertain as to whether the program had LTGs, Annual Performance Measures (APMs), and Annual Performance Goals (APGs). Those should be stated clearly and moved to the front of the report. It appears that the LTGs were reviewed only with respect to issues of quality. If that is incorrect, it needs to be made clearer where the LTGs fit into the review.

Dr. Harding mentioned that there are many acronyms used in the report so a list would be helpful. She suggested that uncertainty analysis be included as one of the overarching comments, and she was not sure that she liked using a table to present the overarching comments. The report left her confused about where the different elements fit into the overall program. For example, she did not figure out that LTG 1 covered the Office of Solid Waste, Superfund, and oil spills and that LTG 2 covered Resource Conservation and Recovery Act (RCRA) and other things until she was well into the report. It might be helpful to add a chart that identifies the LTG supported by each program component.

The report uses the terms “tactical” and “strategic” and she was not sure if these were the same as long-term and short-term. The report needs to explain what is meant by these terms. Dr. Harding had a number of structural and editorial comments and she agreed to provide them to Dr. Menzie.

Dr. Michael Clegg said that he did not know anything about the program before he read the report and he did not learn much about it by reading the report. The report clearly was written for an audience that is very familiar with the program and not a naïve audience. He complimented the Subcommittee on a well organized report. He found the table on the overarching issues to be helpful. Because of his lack of expertise and unfamiliarity with this program, Dr. Clegg was unable to comment on the accuracy of the substantive comments in the document but had several comments on its structure. There were many acronyms used in the report that were unfamiliar to him and made it difficult to follow. The LTGs should be stated in the front of the report to provide a better framework for the review. Also the stakeholder community should be identified early in the report. He was struck by the evident need to review leadership. Is there a pending crisis? Is there a more serious set of issues beneath the surface? The report did not provide him with a clear understanding of the issues that are addressed by EPA.

Dr. Johnson thanked the vettors for their comments and asked if there were any additional comments on the report. Dr. Saylor agreed with the comments provided by Drs. Harding and Clegg. He thought the program’s LTGs were obtuse. He had no idea what the LTGs were after reading the report. Also, there is an interesting comment in the report about lacking leadership in emerging fields. This is an area that is heavily dominated by the Department of Energy (DOE) and Department of Defense (DOD). EPA cannot be a leader in this area until it gets the funding required to regain the leadership role. The report should state that EPA is not leading in this field and will not be able to unless it gets the required funding. He reminded the BOSC that OMB is an audience for these reports and OMB has investment criteria. Perhaps the report should address these criteria.

Dr. Johnson asked if the Executive Committee members thought the number of recommendations should be reduced. The first three program review reports contained 114 recommendations, so this report contains a much larger than the previous reports. Dr. Clark mentioned that ORD is about to rewrite the MYP for this program and the program managers requested ideas and more detailed input; the more

advice provided by the BOSC, the better the updated MYP. The Subcommittee members had many ideas because of their relevant experience in this area and they thought they might be helpful to ORD in rewriting the MYP. Dr. Menzie mentioned that the Subcommittee was deliberate in repeating a number of the recommendations in the report; the members thought it would give them additional weight. He thought the actual number of unique recommendations was substantially less than the count mentioned by Dr. Harding. Dr. Johnson agreed that the context of a recommendation is important, but he did not think that the reader would benefit from the redundancy in the recommendations. Because the Subcommittee did not attempt to prioritize the recommendations, repeating certain recommendations without explaining the significance of that redundancy does not make sense. Dr. Menzie suggested that they should identify the major recommendations in the summary and repeat them in the document. Dr. Sayler suggested identifying some of the recommendations as guidance or opportunities for improvement so that the list of recommendations is more manageable. Dr. Johnson agreed that the number of recommendations in the summary should be reduced. He also thought the number of pages of the summary should be reduced because that section is out of proportion to the entire report.

Referring to Dr. Clegg's comment about learning little about the program, Dr. Menzie asked if the report should include more information on the program. He indicated that a considerable amount of this information was removed from the draft to decrease its length. That material could be restored to the report if the BOSC thinks it is necessary. Dr. Johnson thought it might be helpful to include a short (about 4 pages) description of the program so that the report can stand alone. Dr. Sayler suggested lifting that information from existing materials rather than spend time writing a description of the program. Dr. Windom suggested using the same approach as that used in the MYPs. In each MYP, the program is discussed in context of EPA's Strategic Plan and the other programs with which the program interfaces are identified. He agreed that the Subcommittee's report would benefit from a description of the program. It also needs to clearly identify the LTGs. Dr. Clark responded that the Subcommittee struggled with the LTGs because they are too simplistic (i.e., produce reports and provide advice to the program office). Dr. Windom suggested that perhaps the Subcommittee should recommend that the program's LTGs be improved.

Dr. Harding got the impression that the goals and other measures were not clearly articulated in the MYP. She noted that it will be difficult to measure the success of the program if the goals and measures are not clearly identified in the MYP.

Dr. Johnson stated that the Subcommittee's response to Dr. Harding's suggestion that uncertainty analysis be included as an overarching comment should be decided by the Subcommittee members. He asked that they consider this suggestion. In response to the comment about the aging of the program staff and the need for leadership, Dr. Menzie stated that the Subcommittee members got this impression after talking with the program staff. The Technical Assistance staff is called upon by program and regional offices to answer many questions. Many of these staff members are eligible or will be eligible to retire in the next 5 years. Dr. Clark noted that the program and regional offices use the technical support centers as the bridge to the research. Therefore, they are critical to achieving desired outcomes but their contributions are not being valued adequately.

Dr. Johnson summarized the comments for the report: the LTGs, APMs, and APGs should be identified in the summary; a brief description of the program should be added to the report; the Subcommittee will consider adding uncertainty analysis to the overarching comments; the summary will be shortened so that it is proportional to the length of the report. Because there were a number of changes to be made to the report, Dr. Johnson asked if the Executive Committee members wanted to vote on approving the report. Dr. Daston and other Executive Committee members recommended taking a vote. Dr. Johnson then called for a motion. Dr. Henderson made a motion to approve the report with the suggested revisions and the final approval of the two vectors, and Dr. Sayler seconded the motion. The program review report was approved by the unanimous vote of the BOSC Executive Committee with the suggested revisions.

### **Management MYP Workgroup Review**

Dr. Johnson and Dr. Daston drafted a letter report on the findings of the review of the ORD Management MYP. Dr. Johnson commented on the importance of this MYP in that it is a way to redefine how ORD manages its programs. The Management MYP delineates the following strategic goals: (1) provide exceptional administrative services; (2) attract, develop, and retain a talented and diverse workforce; and (3) evaluate and communicate ORD's programs effectively. The three strategic goals of the Management MYP should be linked directly to the 10 drivers of organization climate (from the Office of Personnel Management's biannual Human Capital Survey) or surrogates that shadow the drivers. In addition, performance measures should be identified to allow tracking of progress made in achieving the goals identified for each driver or surrogate driver. With regard to the strategic goals, it is not apparent how some of the activities, specifically Activities 1.2 and 1.3, delineated under Goal 1 will lead to the achievement of that goal. The workgroup recommended providing the Management Council with authority and resources for implementation of systemic changes that will propel ORD into the top 100 of "The Best Places to Work in the Federal Government." Currently, the Management Council must depend on the goodwill of the ORD Executive Council, Science Council, and NPDs for implementation of the activities identified in the MYP.

Dr. Johnson commented that because the MYP is only six pages in length, a one-page response from the BOSC is appropriate. He asked if any of the BOSC members would like to comment. Dr. Duke noted that the 10 drivers identified on page 5 of the MYP appear to be process-oriented; they are not outcomes. It was not clear to him how meeting the criteria would contribute to ORD being managed more effectively. Dr. Johnson agreed, stating that the MYP must identify clear targets so that ORD can measure progress toward those targets. Dr. Harding asked if the STAR Fellowship program was receiving the same reductions as experienced by the STAR grants component of the program. Dr. Duke responded that he did not think the fellowship budget was part of the STAR budget. Dr. Johnson said that Dr. Farland should be able to answer that question. Dr. Giesy thought it was problematic to focus on being in the top 100. It would be better to identify goals and determine if personnel are satisfied with how well ORD is achieving those goals. Dr. Johnson concurred, stating that there is not indication whether moving into the top 100 is an incremental move or a large jump. He also noted that being a good place to work does not necessarily mean that it is a high-performing organization. It is important to strive for both.

Dr. Henderson suggested adding some more words to the next to the last paragraph in the letter to explain why Activities 1.2 and 1.3 do not relate to the goal. Dr. Daston commented that although being a good place to work is admirable, it should not be the goal. Dr. Johnson thanked the members for their comments and agreed to circulate a revised draft of the letter to the Executive Committee on Tuesday.

### **Water Quality Research Program Review**

Dr. Windom reported that the Subcommittee began working on the review in December 2005. The first public conference call was held December 21, 2005, and the second public conference call was held January 12, 2006. The charge questions were similar to those used for the other program reviews, including questions on relevance, leadership, communication, and cooperation/collaboration. The public meeting was held January 25-27, 2006, in Cincinnati, Ohio. Dr. Windom mentioned that Chuck Noss, had been serving in the NPD position for only a few months.

The Subcommittee members were provided 20 documents for the review, and 10 of these were selected by the Subcommittee to review. The MYP was one of the 10 documents reviewed. The Subcommittee members received writing assignments prior to the face-to-face meeting and were charged with bringing a draft of their assigned sections to the meeting. Dr. Windom mentioned that it was difficult to assess the

level of collaboration from the documents; the posters were much more helpful in assessing this issue. There were about 30 posters presented at the meeting in two 1-hour sessions. The posters focused on the four LTGs of the program. The Subcommittee members found the poster sessions to be very helpful for the review. The posters demonstrated how EPA is active in setting the agenda and collaborating with other agencies.

Dr. Windom said that the Subcommittee members reached consensus on the recommendations at the meeting. The next draft of the report will be completed by mid-February and it will be circulated to the Subcommittee on March 1. There will be a conference call on March 6, 2006, to discuss any final comments and to approve the report for submission to the BOSC Executive Committee. He mentioned that the report is on a fast track because the PART review of the Water Quality Research Program is scheduled for April. Dr. Johnson said that he would like to schedule a conference call to review the report sometime between March 6 and the June 1-2, 2006, Executive Committee meeting in Las Vegas. Dr. Johnson asked members interested in vetting the Water Quality Program Review Report to notify him of their interest. He asked those members who served as vettors for the Global Change and Land Restoration and Preservation Program Review Reports to send their specific comments to Ms. Kowalski so that they can be incorporated into the reports. Ms. Kowalski explained that ORD can use the draft report that will be vetted by the Executive Committee for the PART review because once the report is discussed in a public meeting the draft is made public. The Agency must explain to OMB that the document is not final. The Subcommittee cannot transmit the report directly to EPA, it must go through the Executive Committee. She stressed that there can be no revisions to the report before it is sent to EPA unless that revised report is discussed in a public meeting. Therefore, the document that EPA submits to OMB will be the same one that is reviewed on the March 6, conference call. The DFO will make that draft available to EPA for the conference call. The final version will be submitted to OMB once it has been transmitted to the Agency from the Executive Committee.

Dr. Windom said that he would incorporate any changes requested during the March 6 conference call before the report is submitted to the Executive Committee for review.

### **STAR/GRO Fellowships Program Review**

Dr. Duke, who agreed to serve as the Chair of the STAR/GRO Fellowship following Dr. Juarine Stewart's departure from the Executive Committee, reported that the Subcommittee had its first public conference call on January 26, 2006. This call focused on overviews of ORD and the FACA process. Also on this call, the Subcommittee was briefed on the documentation that was available for the review. The next call is scheduled for February 16, 2006.

He explained that the review actually covers three fellowship programs—STAR fellowships, GRO undergraduate fellowships, and GRO graduate fellowships. During the next conference call they will discuss writing assignments for the review. The face-to-face meeting will be held March 2-3, 2006, in Washington, DC. He hopes to submit the report to the Executive Committee for review by the June meeting.

Given that there is no MYP for the program, Dr. Harding asked what materials the Subcommittee would be reviewing. Dr. Duke replied that they will be reviewing a series of materials about the program, information about awards and the publications coming out of the program. There will be a number of posters from former fellows. Dr. Harding suggested that the Subcommittee also peruse the BOSC review of the National Center for Environmental Research (NCER), which addressed STAR, as well as the National Academy of Science (NAS) report on the STAR Program. Ms. Kowalski stated that all announcements for the fellowship programs are posted on the NCER Web Site as are summaries of the fellows projects. One BOSC member asked how the program determined the topics of the fellowship announcements. Dr. Duke responded that one of the Subcommittee members has posed that same



question. Dr. Harding asked if the Human Capital Strategy is being reviewed as part of enhancing the future work force of EPA. Dr. Duke replied that the Subcommittee has not been tasked to do that and the members have not discussed the issue. Ms. Kowalski suggested that this question be posed to Dr. Farland. Dr. Johnson thought that this might be an idea worth pursuing. Perhaps the question about the future workforce should permeate all future program reviews.

Dr. Clark mentioned that there was considerable discussion about the STAR Program in both the Human Health and the Land Program Reviews. The process for identifying areas of emphasis in STAR should be a focus of the review. Dr. Duke pointed out that this review only covers the fellowships and not the grants under STAR.

### **Computational Toxicology Subcommittee**

Dr. Daston indicated that the Computation Toxicology Subcommittee is the only standing subcommittee of the BOSC. This Subcommittee is providing advice about a fledgling program within EPA. Dr. Giesy asked Ms. Kowalski if he needed to leave the room because he has STAR grants and contracts affiliated with computational toxicology. Ms. Kowalski replied that he did not have to leave the room, but he could not participate in the discussion.

The Subcommittee met about 1 year ago and reviewed the plans for the program. The Subcommittee provided a number of recommendations in a letter report to ORD, and received a response from Dr. Bob Kavlock, the Center Director. To provide the level of advice needed by the Center, it was necessary to augment the expertise of the Subcommittee to match that of the computational toxicology program. A number of new members have been added to the Subcommittee. The next meeting will be held in Research Triangle Park, North Carolina, in June 2006. At this meeting, the Subcommittee will review specific programs and evaluate how they are progressing against the long-term strategy. Dr. Daston mentioned that the Center staff is a small group of individuals with specialized computer skills. They must partner with other laboratories/centers and program offices that need high-powered modeling. In June, the Subcommittee will look at the partnerships that the Center has established.

Dr. Johnson commented that tomorrow's agenda includes a discussion of using the standing subcommittee model to provide advice for the laboratories/centers. This would allow one group to follow the progress of a particular laboratory/center over time to provide more targeted and timely advice than the periodic reviews conducted by the BOSC in the past. The Laboratory/Center Directors will provide feedback on this issue during tomorrow's meeting.

### **Handbook for BOSC Subcommittee Chairs**

Dr. Johnson asked the BOSC members to review the draft handbook provided in the meeting notebook and provide their comments. He explained that it is an attempt to pull together advice for the Subcommittee Chairs to assist them in coordinating future program reviews. The first chapter focuses on the basics of FACA. The second chapter addresses the origin and mission of the BOSC, FACA compliance, and the formation of subcommittees. The third chapter describes how the subcommittees get started and operate, including how the BOSC forms subcommittees, the DFO, key decisions to be made, organizing and conducting the task, and Executive Committee review. The fourth chapter addressed the roles and responsibilities of the BOSC Subcommittee and Chair, the DFO, EPA staff, and the contractor. The fifth chapter includes guidelines for the summary section of BOSC reports. The three appendices of the handbook include: common charge questions for BOSC program reviews, program review lessons learned, and an introduction to ORD.

Dr. Henderson asked if both health and environment should be included on page 13 of Appendix B. Dr. Johnson stated that the appendices will be changed to become stand-alone documents. The material there

now was taken directly from the meeting minutes. He thought this was a good start to providing guidance for the chairs of the new subcommittees. Ms. Kowalski said that approximately 99 percent of the material in the handbook had been discussed in a public forum at meetings. This is not new material; it is just an attempt to pull everything relevant into one reference source. Feedback is need on the generic charge questions to ensure that they are generic across all programs. Dr. Henderson stated that she would have found this to be very helpful when she was undertaking her first review. Dr. Windom agreed and volunteered to review Appendix B and provide comments during the discussion period at 5:00 p.m. Dr. Clegg commented that some of the programs reviewed are very large. He did not think a 2-day meeting was adequate to cover such large programs. He suggested guidance on determining the length of the face-to-face meeting based on the complexity and size of the program. Dr. Saylor asked if the handbook included any rationale for PART and the ORD investment criteria. Dr. Johnson responded that the presentation on PART could be added as an appendix.

### **Technology for Sustainability Research Program Review**

Dr. Giesy, Chair of the Technology for Sustainability Subcommittee, introduced Dr. Alan Hecht, Director of the Sustainability Research Program.

Dr. Hecht provided an overview of the Sustainability Research Strategy. A December 2003 ORD Policy Guidance memorandum from Dr. Farland stated that ORD will develop a crosscutting sustainability research plan that will serve two related purposes: (1) tie together the ORD MYPs that are component parts of sustainability, and (2) be the science (research) chapter of an Agency Action Plan for Sustainability. The memo also called for ORD to develop a revised MYP for pollution prevention (P2) entitled "P2 and Innovative Technology for Sustainability," which will identify new long-term and annual goals to better focus pollution prevention and innovative technology outcomes on sustainability, with associated APMs. The core elements of the strategy include: system research, decision support tools, technology and industrial design/materials, future scenarios, and sustainability indicators.

ORD currently conducts systems research that supports the goal of sustainability, including a multidisciplinary project entitled "Investigations into Sustainable Environmental Systems," as well as the Collaborative Network for Sustainability Grants. With respect to current decision support tools research, ORD's efforts focus on life cycle modeling, SMARTe (Brownfields Redevelopment and Sustainable Land Use), TRACI (Environmental Impact Assessment Model and Sustainability), and economics and decision science grants.

ORD's future scenarios research is evaluating sustainability across energy scenarios (MARKAL Model). ORD also is supporting sustainability education through the People, Prosperity, and the Planet (P3) student competition; and the sustainability curriculum benchmarking study. With respect to technology and industrial design/materials, ORD is funding Technology for a Sustainable Environment grants, Small Business Innovation Research (SBIR) Program projects, Green Chemistry for a Sustainable Economy, Environmental Technology Verification (ETV) and Environmental and Sustainable Technology Evaluations (ESTE), and the Green Buildings Program.

The December 2005 EPA Innovation Action Council (IAC) report on sustainability entitled, "Everyday Choices," identified the following components of a sustainable outcome:

- ✧ Air: Sustain clear and healthy air.
- ✧ Ecosystems: Protect and restore ecosystem functions, goods, and services.
- ✧ Energy: Generate clean energy and use it efficiently.
- ✧ Land: Support ecologically sensitive land management and development.
- ✧ Materials: Use materials efficiently and shift to environmentally preferable materials.
- ✧ Water: Sustain water resources of quality and quantity required for particular use.

Dr. Hecht explained that the members of the IAC include the Deputy Regional Administrators and the Deputy Assistant Administrators in the Agency. IAC has been looking at the concept of stewardship and how that could help EPA achieve its mission. The IAC report is available on the Web at [www.epa.gov/innovation](http://www.epa.gov/innovation).

Dr. Hecht reviewed the schedule for the Sustainability Research Strategy and the MYP. In November 2005, there was a briefing for the Science Policy Council. In January 2006, the first draft of the MYP was completed. In February 2006, this briefing of the BOSC Executive Committee occurred. In April 2006, the Strategy and MYP will be sent to the SAB for review, and in June 2006, the SAB review will be completed and comments will be provided to ORD. The Federal Sustainability Research Summit will be held in November 2006, and the BOSC will review the new MYP in January 2007.

Dr. Hecht highlighted the Terrestrial Habitats Project, an ongoing project conducted by the Western Ecology Division of the National Health and Environmental Research Laboratory (NHEERL) to develop a multi-model ecosystem simulator for assessing future risks to watershed services. A number of program office clients are engaged working with ORD on the application of the model, including:

- ✧ The Office of Prevention, Pesticides and Toxic Substances (OPPTS)—to improve habitat and wildlife modeling for pesticide registration and endangered species consultations.
- ✧ The Office of Water (OW)—to improve watershed and water quality modeling and to assess best management practices (BMPs) strategies to achieve total maximum daily load (TMDL) criteria.
- ✧ Office of Air and Radiation (OAR)—to improve modeling for effects of air pollutants deposition on watersheds and water quality.
- ✧ Office of Solid Waste and Emergency Response (OSWER)—to improve diagnostics for contaminated sites and predictions for clean-up and restoration.

ORD also is working with Region 7 to identify grassland BMPs that achieve ecological and air quality objectives associated with prescribed burning in the Central Great Plains, and with Region 10 to forecast and diagnose human impacts on regional water quality and quantity in Oregon's Willamette and Deschutes River Basins (each approximately 28,000 km<sup>2</sup>).

Dr. Hecht then introduced Mr. Gordan Evans, Acting Division Director of the Sustainable Technology Division at NRMRL, who described the transition of the program from P2 to sustainability. The 2003 P2 and New Technologies MYP was organized around five goal areas: (1) develop tools and methods to reduce or eliminate emissions, effluents, or waste for use in all economic sectors (P2 Tools); (2) develop P2 technologies for the manufacturing and consumer products sectors of the economy (Green Chemistry); (3) conduct verifications of P2 technologies (ETV Program); (4) build a knowledge base to enable the environmental systems management approach at the watershed scale (Systems); and (5) assist in the commercialization of environmental technologies (SBIR Program). By design, the program was linear; each research track was independent of the other tracks. As mentioned by Dr. Hecht, in December 2003, Dr. Farland, ORD's Senior Science Advisor, charged ORD to develop a new, crosscutting sustainability-focused research plan.

EPA's proposed Strategic Plan 2006-2011 includes Objective 5.4, which is to enhance society's capacity for sustainability through science and research. Achieving this objective involves conducting leading-edge, sound scientific research on P2, new technology development, socioeconomic, sustainable systems, and decision-making tools. By 2011, the products of this research will be independently recognized as

providing critical and key evidence in informing Agency policies and decision and solving problems for EPA and its partners and stakeholders.

The new MYP builds on the lessons learned in the P2 and New Technology PART review. The program did not do well in the PART review, probably because ORD did not understand the process and had no experience with it. Based on the PART review, ORD revisited the program goals, which needed to change to reflect an integrated program. Three new LTGs were created, which reflect ORD's vision of an integrated sustainability research program. The program ties together various research efforts into an effective whole. The three goals, which are built around the end users of ORD research products and services, are to: (1) enhance the knowledge base in the research and educational communities and catalyze innovation to improve environmental awareness; (2) implement more efficient, sustainable, and productive practices, materials, and technologies resulting in improved environmental performance in the regulated community; and (3) implement improved and scientifically sound environmental management decisions among policy and decision makers as well as policies for improved environmental stewardship.

Mr. Evans provided some examples of the types of Agency problems that would be addressed by the new MYP:

- ✧ Pollution Prevention (Office of Pollution Prevention and Toxics)—develop decision support tools set in a systems context to set priorities and determine effective environmental policies in support of sustainable development.
- ✧ Ecosystems and Water Quality (OW)—improve the ability to measure, model, and maintain/restore ecosystem sustainability and address the growing challenge of quality and quantity in the context of ecosystems and communities.
- ✧ Global Change (OAR)—understand how today's decisions have long-term ramifications for ecosystems, human health, and socioeconomic interests.
- ✧ Green Technologies (OSWER/OPPT)—promote systems that use benign materials and efficient processes to reduce and eliminate the impact of environmental stressors.

Mr. Evans compared the research tracks of the old P2 and New Technology MYP with those of the new Science and Technology for Sustainability MYP. The old MYP focused on decision support tools, systems research, green chemistry, ETV, and SBIR. The new MYP focuses on decision support tools, systems research, technologies, metrics and indicators, and education.

The new MYP will provide: (1) world-class capabilities in environmental systems understanding and modeling; (2) scientifically based decision tools that support and encourage programs and policies that promote environmental stewardship; (3) an expanded knowledge base that supports the research and educational communities in their creation of new tools, technologies, and system for enhanced environmental protection; (4) assistance to the public and private sectors with research products that provide for more efficient and sustainable practices, materials, and technologies; and (5) a suite of scientifically defensible measures of sustainability. This will be accomplished by supporting national and regional sustainability policies and initiatives through collaborative projects with EPA program and regional offices, state and local governments, and university and industrial partners.

Mr. Evans identified the disciplines and topical areas of expertise needed for the BOSC review of the Sustainability Research Program: chemistry and chemical engineering (green chemistry—theoretical and applied), engineering (mechanical and industrial—green design), environmental engineers and decision theorists (life cycle assessment/industrial ecology, environmental impact modeling), hydrologists and

ecologists (ecosystem and watershed-scale issues), and environmental economists (natural resource valuation, experimental auction markets, and incentive and human behavior).

Dr. Giesy thanked Dr. Hecht and Mr. Evans for their succinct briefing on the Sustainability Research Program. He then asked if the BOSC members had any questions for the presenters. Dr. Clegg commented that there may be future opportunities to develop commercially successful ventures in Asia. To what extent do these private sector development ideas figure into EPA's program? Dr. Hecht replied that much of the sustainability research has been done in the private sector, particularly in Asia. EPA is looking for opportunities to partner with the private sector. For example, ORD is working with Dow to apply new LCA tools to assess a new line of potential products. ORD also is trying to stimulate new innovation in the SBIR Program. The EPA Administrator will be visiting China soon and will be taking a look at some of that country's examples of green design and new technology.

Dr. Windom noticed the references to economics (selling credits) in the presentation. Is that the same work that was presented in a poster at the Water Quality Review meeting? Mr. Evans responded in the affirmative. Dr. Windom then asked which program was credited with that work. Dr. Hecht replied that that there is sustainable research in many of the MYPs; the program is working with the NPDs to incorporate sustainability into other programs. Dr. Windom asked about the number of social scientists in ORD. Are there plans to hire more? Mr. Evans answered that ORD does plan to add more social scientists. ORD is struggling with the increasing need to address issues from a multimedia perspective; however, the MYPs partition staff among programs. Dr. Sally Gutierrez, the Director of NRMRL, has made a commitment to break down those barriers.

### **Public Comment**

Dr. Johnson interrupted the discussion to call for public comment at 3:30 p.m. as indicated on the agenda. He asked if anyone present would like to make a comment. No comments were offered.

### **Technology for Sustainability Program Review (Continued)**

Dr. Sayler stated that sustainability is well integrated at many universities and EPA has played an important role in achieving that integration. He thought the Sustainability Program may help EPA keep its edge and facilitate partnering across disciplines. Dr. Hecht said that program staff is in the process of touring the facilities of systems-oriented centers (e.g., Ohio State University) that are being funded by the National Science Foundation (NSF), private organizations, or endowments. He noted that the funding level for the Sustainability Program is far less than that needed to achieve its aims and affect society to obtain the desired benefits. Dr. Duke asked to what degree the program addresses the inherent dynamism of ecosystems; that which is sustainable in 2006 may not be sustainable in 2026. How do you address the fact that ecosystems change? Dr. Hecht replied that there is an Ecosystem MYP, and an NPD supported by a good research team; they would be more qualified to answer that question. He added that systems research is needed to better understand the threats to ecosystems. Dr. Daston responded that the problems and solutions are complicated and require actions from many stakeholders. Everyone agrees that something needs to be done, but is there a strategy to identify the top 10 issues? Dr. Hecht answered that the program has to work within the system by supporting the needs of the program and regional offices; therefore, ORD looks to them to determine environmental criticality of issues. The regions have identified sustainability as a high priority.

Dr. Hecht noted that ORD has been involved with the Millennium Ecosystem Assessment, the largest assessment ever undertaken of the health of the natural world, involving some 1,360 experts from 95 countries. In addition, ORD is conducting some futures work to identify critical issues facing society. How this will be reflected in EPA's assessment of priorities is not clear. The strategy presents criteria for

identifying priorities but the Agency has not yet conceptualized the five most serious problems for which ORD can provide sustainable solutions; Energy, however, is one of the priorities.

Dr. Daston asked if there is a difference between the SAB and BOSC reviews of the new MYP. Dr. Johnson replied that the SAB review will be a formative review of the plan and the BOSC review will be a review of the final product. He suggested that it may make sense for the BOSC to work with the SAB on the initial review. Ms. Kowalski said that she thought that the SAB was reviewing the strategy and not the MYP. Dr. Hecht responded that the SAB is doing a consultation on the research strategy and a review of the MYP. He will discuss with the SAB how the review could be coordinated with the BOSC. Dr. Giesy said that he thought the BOSC was to review the research program and not just the MYP. Ms. Kowalski confirmed Dr. Giesy's understanding that the BOSC was to conduct a program review, which includes the MYP. Dr. Johnson asked if this was the best use of BOSC resources and Dr. Hecht responded that Dr. Farland would have to respond to that question. He noted that the BOSC looks at the past, present, and future of the program and this input would be very valuable for the program's next PART review.

Dr. Johnson asked Dr. Giesy to examine the list of disciplines and areas of expertise identified on Mr. Evans' last slide. Dr. Saylor thought more diverse expertise was needed on the Subcommittee; for example, he suggested adding experts in architecture and urban planning.

Dr. Giesy mentioned that Dr. Henderson has agreed to serve as the Vice-Chair of the Technology for Sustainability Subcommittee. A tentative timeline for the review has been developed, a DFO has been identified, and a list of the expertise needed on the Subcommittee is being prepared. He plans to provide Ms. Kowalski with that list but he asked the BOSC members to provide their input on expertise to him as well as any suggestions for potential Subcommittee members.

### **Discussion of the Handbook for BOSC Subcommittee Chairs**

Before opening the discussion on the draft Handbook for the BOSC Subcommittee Chairs, Dr. Johnson distributed a copy of the revised letter report to ORD on the Management MYP. He asked the members to review it overnight and be prepared to vote on it in the morning.

Dr. Clegg asked why the term "Executive Committee" is used for the BOSC. Dr. Johnson replied that it is used to distinguish the Board from the subcommittees and workgroups. Ms. Kowalski added that all Tier 1 advisory committees or parent committees are referred to as executive committees, Tier 2 committees are referred to as subcommittees because they are a subset of the Tier 1 committee. She added that it is EPA and not FACA that requires the subcommittees to be subject to FACA requirements. Dr. Clark thought it might be worthwhile to include that information in the Handbook. He mentioned that several of the subcommittee members have challenged the subcommittee chair when he/she stated that the subcommittee was subject to FACA rules. Dr. Johnson suggested adding this information to the Handbook; he also proposed that the Handbook include a footnote on page 3 for the fifth bullet (regarding e-mail exchange) stating that other FACAs may operate differently. Dr. Daston cautioned against adding too much information that would confuse the reader. The Handbook should be clear that all communications (in person, phone, e-mail, or other means) that involve more than half of the subcommittee members are subject to FACA rules. Ms. Kowalski commented that EPA has generated a handbook for all federal advisory committees operating within EPA, so the rules for all EPA FACA committees are consistent.

Dr. Giesy thought the Handbook should include only a summary of the FACA rules and provide the URL for the longer document that will include all the details. Dr. Johnson agreed that the 2-page summary of FACA (and a Web site reference) should be included as an appendix in the Handbook. The explanation about Tier 1 and Tier 2 FACA committees also should be added to the Handbook. Dr. Saylor suggested

amending the first line on page 4 to exempt administrative meetings. The Handbook should explain that administrative issues can be discussed at public meetings, but meetings limited to administrative issues do not have to be open to the public. Dr. Sayler had a question about Section 1.4. Do the subcommittees submit reports to the DFO or the BOSC Chair? Ms. Kowalski replied that the report is formally transmitted to the BOSC Chair with a copy to the DFO. Dr. Sayler asked if subcommittee members are considered Special Government Employees (SGEs). Ms. Kowalski responded that executive committee and subcommittee members as well as consultants are SGEs and subject to the same rules. Dr. Giesy suggested adding a statement to Section 1.3 about the DFO briefing the subcommittee on FACA requirements. Ms. Kowalski stated that the purpose of the administrative call is to brief the subcommittee on FACA and other administrative issues. She is working to develop a model so that all DFOs cover the same material in the administrative calls. Dr. Windom asked that Section 1.2 make it clear that a report out is needed following each poster session. Dr. Harding suggested including that on page 8 rather than in Section 1.2.

Dr. Windom asked if it is a requirement that each subcommittee include at least one Executive Committee member. Ms. Kowalski replied that it is good practice but it is not a formal requirement. Dr. Johnson thought it was important to have an Executive Committee member on each subcommittee to ensure that the review is carried out in the spirit intended by the BOSC. He noted that it is not necessary that the subcommittee chair be a member of the Executive Committee. Dr. Clegg asked if there is a term for subcommittee members, and Ms. Kowalski replied that subcommittee members usually are appointed for a period of 1 year. She noted that the terms for members of standing subcommittees can be longer; she does not determine the length of the term. Dr. Johnson suggested adding that the minimum term for a subcommittee member is 1 year. Dr. Daston thought the Handbook should state that subcommittee members are appointed to the subcommittee for a period of time required to complete the specific work of the subcommittee, unless the subcommittee is a standing subcommittee.

Dr. Clark suggested adding government and nongovernmental organizations (NGOs) to Section 2.3 on page 5.

Dr. Henderson asked that the last bullet on page 7 be clarified. Referring to the chair's briefing at the conclusion of the face-to-face meeting, she thought it should state clearly that the subcommittee chair should transmit only information that will not change in the written report. Dr. Clegg recommended using the word "debriefing" rather than "a review of the subcommittee." Dr. Johnson explained that the chair should not say anything in the debriefing that would have to be retracted later in the report.

Dr. Duke asked that the fourth bullet on page 7 be changed from "executive summary" to "summary." Dr. Clegg asked why it takes so long to complete the approval process. Ms. Kowalski responded that there are many approvals and reviews that are required within the Agency. Dr. Clegg suggested adding to the Handbook that this is the standard EPA process for approvals. Dr. Sayler recommended that the parenthetical note at the end of Section 3.3 about the length of the process be in bold type because it is very important. He also suggested bolding the words "it is up to the Chair to decide if the question is appropriate" in Section 4.1, second bullet on page 8. Dr. Johnson proposed changing the wording of the first bullet in Section 4.1 from "handle this" to "manage the required changes." Ms. Kowalski stressed the fact that it is the DFO who works with the contractor. She agreed to reword that bullet so the statement is clear. She also pointed out that the chair controls the meeting. It is the subcommittee chair who recognizes members of the subcommittee and the audience to speak at the meetings. She noted that the audience members are observers. EPA staff in the audience cannot argue, debate, or comment on the deliberations of the subcommittee. An EPA staff member can only respond to questions from the subcommittee once he/she has been recognized by the chair.

Dr. Johnson proposed moving the last bullet under Section 4.3 to be the first bullet in that section. Dr. Clegg asked if that included all EPA staff and Ms. Kowalski replied that it meant all EPA staff, including

the DFO. Ms. Kowalski added that only the DFO has the authority to stop a meeting. Dr. Harding recommended that the Handbook make it clear that the subcommittee members cannot make requests for materials/information directly to the program staff. All requests must be submitted to the DFO.

Dr. Johnson explained that the purpose of Chapter 5 in the Handbook is to ensure consistency in format and content of the summary. He thought the wording about target audience may not be relevant; the parenthetical note in the third paragraph on page 10 could be deleted. Also the words “statement of task” in the first paragraph under Section 2 should be replaced with “charge questions.” Dr. Henderson thought that numbers 3 and 4 (bottom line and key conclusions and recommendations) could be combined in the summary. Dr. Clark noted that it is important to define the target audience for the report. Dr. Johnson responded that the AA/ORD is the primary audience for the reports. Dr. Daston commented that OMB may not be the primary audience but it is an important secondary audience. Ms. Kowalski stated that there has been too much emphasis placed on PART in the BOSC program reviews because EPA has stressed that connection. She wanted to make it clear to the BOSC that PART is just one of the uses of these reviews. EPA ensures that the charge questions address the information that will be needed by the Agency to respond to PART. The timing of the PART reviews has been driving the timing and sequence of the BOSC program reviews. Dr. Johnson stated that the BOSC reviews have helped EPA respond to PART reviews, but the program reviews go beyond a PART review.

Appendix A of the Handbook contains some common charge questions for BOSC program reviews. Dr. Johnson proposed adding several items to this appendix and he will provide his comments to Ms. Kowalski. Dr. Harding commented that the subcommittees do not always receive the information on resources necessary to address item 2 under Relevance. Ms. Kowalski said that every subcommittee should receive information about the total program budget; the breakdown of the budget is not available because the Agency tracks resources at the LTG level rather than the APM and APG level. A total budget number for the program is provided in each MYP. This funding level is based on the previous year’s budget. Dr. Johnson commented that the reviews focus more on process than funding. It is the process for allocating resources and setting priorities that is important. Dr. Harding thought that item 2 under Relevance was asking if the program’s resources were adequate. Ms. Kowalski responded that item 2 was intended to ask if the Agency is doing the right things with the funding that it receives.

Dr. Duke suggested adding a statement to the Handbook instructing the subcommittee to make it clear in the report if it did not have the information needed to address a charge question. He suggested deleting the words “With the resources currently available” because that is implicit in all of the questions. Dr. Duke also suggested combining item 2 with 1.b under Relevance. Dr. Johnson agreed with his recommendation. He also thought item 1.b should include the question: “Is the balance between intramural and extramural research appropriate?”

Appendix B contains the lessons learned by ORD and the BOSC in conducting the first five program reviews. Dr. Windom pointed out that many of the ORD lessons learned have no relevance to the subcommittee. He suggested that EPA try to expand the bibliometric analyses to identify how the research is being used. Dr. Windom also thought that 20-25 posters were too many to review during the meeting. ORD should give examples of partnering and collaboration and provide information on performance measures. The client testimonials were very helpful. At the Water Quality Review, he thought the individuals presenting the posters were somewhat confused about the difference between outputs and outcomes. ORD staff needs to start thinking in terms of who is using the outputs to bring about the desired outcomes. Ms. Kowalski said that EPA needs the Board’s feedback on the optimal number of posters. Is 20-25 optimal or is it too many? Dr. Windom replied that his meeting had 36 posters (20 in one session and 16 in another) to review. He thought that some could have been combined to reduce the number of posters. If there are fewer posters to review, the reviewers can spend more time discussing the research with the staff. Dr. Sayler said that he thought the poster sessions were extremely valuable and offered the only opportunity for the subcommittee members to discuss the science with the



investigators. Dr. Windom said that perhaps the time allocated to the poster sessions should correspond to the number of posters to review.

Dr. Johnson agreed that some of the items in the ORD list of lessons learned should be deleted because they are not relevant to the subcommittee chair. He will modify the list and send his comments to Ms. Kowalski. She acknowledged that there are items on the list that should be removed but she asked that the BOSC members provide feedback on these items to improve future program reviews. Dr. Daston was not certain of the value of Appendix B for the subcommittee. There will be a constant updating of helpful hints following each review. Perhaps the Handbook should just recommend a post-mortem survey. Dr. Johnson agreed to revise the helpful hints list so that all are germane to the subcommittee chair.

### **Risk Assessment Workshop**

Dr. Henderson explained that the AA/ORD (Dr. Paul Gilman was the AA/ORD at that time) asked the BOSC to provide a forum to present alternative methods to those described in Chapter 4 of the EPA document *Risk Assessment Principles and Practices*. The purpose of the workshop was to solicit information on alternative methods; it was not intended to be a critique of the chapter or EPA's current practices. The format of the workshop included a presentation from EPA followed by speakers who described alternative approaches. The workshop resulted in three products: (1) a proceedings document, which is posted on the BOSC Web Site; (2) a summary of the meeting published in *Environmental Science and Pollution Research—International*; and (3) extended abstracts of the meeting published in *Human and Ecological Risk Assessment*.

Dr. Johnson said that the BOSC needs to submit a letter to the AA/ORD identifying the products of the workshop. Dr. Henderson did not think the BOSC could recommend any of the alternatives because it was not a consensus workshop. She suggested that the BOSC could identify alternatives that the Board thought EPA should investigate further, but that would be a major undertaking. The letter also could identify the different alternatives that were presented. Dr. Daston was uncomfortable with these two options because the charge to the presenters was not that precise, it was not a consensus workshop, and the workgroup did not ensure a balance of opinions. Some presenters took the opportunity to make recommendations to EPA but others did not. The speakers were invited because the workgroup members thought they could provide some ideas for EPA to ponder. Dr. Daston thought it might be possible to identify some aspects of risk assessment practice that need to be revisited by EPA; however, the letter should be clear that these items do not represent consensus from the workshop. Ms. Kowalski stated that the workshop was an information gathering effort that would provide the BOSC with information on which to base a report to ORD. She was under the impression that the Risk Assessment Workshop would lead to report from the BOSC, similar to that developed by the Communications Subcommittee. Is there something that the BOSC can recommend to the Agency with respect to risk assessment?

Dr. Daston commented that the workgroup invited speakers who they thought would have fresh ideas, but there was no attempt to get balance among the speakers. The workgroup also did not police the presentations to ensure that they were within the bounds of Chapter 4. Dr. Harding said that she was a member of the Communications Subcommittee. That Subcommittee had a different mission—to identify best communication practices. The Communications Workshop was designed to collect information on best practices so that the Subcommittee could use the information to make recommendations to the Agency.

Dr. Duke noted that various speakers at the Risk Assessment Workshop interpreted the charge differently and some of them did not make any recommendations to EPA. He thought it might be possible to develop a list of items that should be explored in more depth by ORD.

Dr. Giesy stated that the workshop has outlived its usefulness. He was not supportive of distilling conclusions from the workshop. The quality of the abstracts varied considerably and some were even inflammatory. Dr. Johnson asked if the Board members thought the workgroup should draft a letter to the AA/ORD describing the workshop, what it achieved, and its major products. The members agreed with this approach. Ms. Kowalski stated that, in the future, the Board needs to identify the end product before launching such an information collection effort. Dr. Johnson thought the letter should be clear that the BOSC was making no recommendations concerning the risk assessment document. Both Drs. Daston and Henderson believed that the workshop fulfilled the intent of the initial request from the AA/ORD.

Dr. Johnson thanked the members for their comments. He asked that Drs. Henderson and Daston prepare a draft letter for review during tomorrow's meeting. Before recessing the meeting for the day, Dr. Johnson reminded the BOSC members to review the revised letter report on the Management MYP. The meeting was recessed at 5:48 p.m. to resume in the morning at 8:30 a.m.

## **Tuesday, February 14, 2006**

### **Review of the Management MYP Letter Report**

Dr. Johnson called the meeting to order at 8:30 a.m. and wished everyone a Happy Valentine's Day. He then called for comments on the revised letter report on the Management MYP. No comments were received so Dr. Johnson asked for a motion to approve the report. Dr. Clark made a motion to approve the Management MYP letter report and Dr. Windom seconded the motion. The letter report was approved unanimously by the BOSC Executive Committee.

Dr. Johnson asked the Board members to review the draft letter to the AA/ORD from the Risk Assessment Workgroup that was distributed this morning and be prepared to discuss it after the morning break.

### **BOSC Issues**

Dr. Farland mentioned that Dr. Gray will be back later today to discuss topics of mutual interest to the BOSC and the ORD Executive Council. The Executive Council members are the Laboratory and Center Directors, and other ORD senior managers, most of whom have been present at various BOSC meetings but never together at the same meeting. This will be a good opportunity to discuss a number of issues.

Dr. Farland congratulated the BOSC on its new logo. It is now being used on all BOSC materials and reports and it looks great.

There was some discussion of the upcoming Technology for Sustainability Program Review during the meeting yesterday. This is an important review to ORD because the program is in transition; its mission has been expanded and its role within ORD has increased. The program is being reinvented based on the "results not demonstrated" finding of the PART review. The new program must demonstrate results. The BOSC review will take place in late 2006 to early 2007.

Dr. Farland identified three new program reviews that the BOSC may be asked to undertake during the next year: Safe Products/Safe Pesticides, Homeland Security, and Human Health Risk Assessment. ORD is negotiating the timing of the PART reviews for these three programs. Unfortunately, OMB may decide to do the PART reviews on two of these programs in 2006. ORD is trying to push back these PART reviews to allow time for the BOSC to do the program reviews; however, ORD may not be successful in postponing these reviews. Dr. Johnson asked when the PART reviews would take place if ORD is successful in getting them postponed. Dr. Farland responded that they would take place in April 2007. If

the PART reviews are initiated in April-May 2006 as desired by OMB, there will not be time for the BOSC to review these programs prior to the PART reviews.

The ORD Executive Council is meeting now at the Ronald Reagan building and they will join us here at the conclusion of that meeting. ORD is moving forward to fill some of the Title 42 positions, and the managers are providing input for FY 2008 budget planning. The President's FY 2007 budget was just released.

One of the topics of interest to the Council is how to incorporate new initiatives into the MYPs. ORD needs a process by which new work is initiated, takes root, and then becomes an integral part of the MYPs. Some examples of these new initiatives include the Global Earth Observation System of Systems (GEOSS), computational toxicology, and nanotechnology.

Dr Farland reported that the 2007 budget for the National Institutes of Health (NIH) includes a directive that no additional funding be spent for the National Children's Study. EPA has been a full partner in developing this study and ORD plans to continue work on the pilot. This is an important study but without budget support from NIH it cannot move forward. He explained that the National Children's Study is a longitudinal study to follow 100,000 children for 20 years. It would have provided critical information needed to understand the effects of exposures in children. Dr. Farland noted that there probably will be some debate about the future of this study.

OMB recently released risk assessment guidance directed at all federal agencies conducting risk assessments. The guidance sets the minimum criteria for risk assessments conducted by the federal government. Much of the guidance is consistent with current EPA policies, but there are some items that are more prescriptive than the Agency would prefer. OMB is soliciting comments on the guidance until June 15, 2006. Dr. Johnson encouraged the Board members to comment on the guidance, reminding them that they would be commenting as individuals and not as members of the BOSC. Dr. Giesy asked for the Web site so that he could review the guidance, and Dr. Farland agreed to provide the URL for the Web site to the BOSC members. He added that the BOSC members also may want to comment on the OMB's risk assessment guidance. This document defines what constitutes guidance from federal agencies.

Dr. Harding asked if the National Children's Study was going to be terminated. Dr. Farland replied that the contracts supporting the Vanguard Study Centers probably will be closed out in 2006. There is no rationale provided in the budget for the termination of the funding. Dr. Daston explained that 2007 would have been the first year for recruitment into the study so the costs were expected to increase substantially. That probably contributed to the decision to terminate the funding. Dr. Farland stated that EPA has been investing about \$20-22 million/year in the study and this amount was expected to increase to an average of \$50-70 million/year for a period of 20 years, once the study was in the field. The expenditures in the first few years in the field probably would be even higher. Dr. Johnson asked if the decision was linked to the pesticide dosing issue and Dr. Farland replied that there was no connection.

Dr. Johnson asked if there will be a change in the charter of the National Homeland Security Research Center (NHSRC) to include natural disaster response. Dr. Farland responded that the charter of the Center has evolved as needs have been identified by the Department of Homeland Security, but he agreed that ORD should look at a broader agenda to serve that purpose. The President's Directive assigns EPA responsibility for water protection, so the Agency could investigate tools that could also be helpful in addressing natural disasters.

## **ORD Responses to BOSC Program Reviews**

### *ORD Response to Particulate Matter (PM)/Ozone Research Program Review*

Dr. Andy Miller (EPA/ORD) stated that he was making this presentation on behalf of Dr. Dan Costa (the NPD for the program) who was unable to attend the meeting because he was working with the World Health Organization to develop a position paper. Dr. Miller provided some background on the PM/Ozone Program Review. The PM/Ozone Subcommittee met March 30-April 1, 2005, in Research Triangle Park, North Carolina. The final version of the report was released in August 2005. The Subcommittee was generally pleased with the content and progress of ORD's PM/Ozone Research Program, but provided some conclusions and recommendations for improvement, including:

Recommendation #1: Develop a formal process for assessing customers' satisfaction.

ORD Response: ORD developed and distributed a survey to OAR in the fall of 2005. There was an 84 percent response rate to the survey and the overall score was 3.6 out of 5.0. The program scored a 3 or higher on 86 percent of the responses. ORD plans to refine the survey instrument and distribute the second survey in summer 2006. The regions, states, and tribes will be surveyed in this second round. Dr. Miller noted that the survey has not yet been sanctioned by OMB for use in the PART process.

Recommendation #2: Revise the wording of the LTGs.

ORD Response: ORD found the BOSC's suggestions for rewording the LTGs to be helpful, particularly the rationale for making those changes. The LTGs are continuing to evolve as the MYP is written, but along the same directions outlined by the BOSC LTGs. The LTGs in the current draft are to: (1) reduce uncertainty in standard setting and air quality management decisions due to advances in air pollution science, and (2) provide assessments of source to health linkages and reduce uncertainties that obscure these linkages.

Recommendation #3: The LTGs should embrace two to three hypothesis-driven pilots to demonstrate the source-to-outcome concept.

ORD Response: Pilots are being developed to evaluate the links between emissions, concentrations, exposure, and effects. These pilots will complement and expand current efforts. The program is investigating the effects of exposure to near-roadway emissions. This research addresses OAR's needs and it is designed to evaluate the hypothesis that emissions are the cause of increased effects near roads. To set the stage for the longer-term, expanded effort, ORD is addressing the question: "Do air regulations protect health and the environment?"

Recommendation #4: ORD should reconsider the decision to divest from ozone health research.

ORD Response: The program's move toward PM resulted from strong congressional support for increased PM research. Continued support for PM research is key to understanding the effects associated with both PM and ozone. Ozone health research is conducted as part of co-pollutant studies. This research may expand as multiple pollutant approaches grow. Collaborations with other agencies (e.g., National Institute of Environmental Health Sciences [NIEHS]) will provide additional opportunities to evaluate the effects of ozone. ORD will continue the development of the Ozone Criteria Document. Dr. Miller noted that significant expansion of the ozone health research program is unlikely in the immediate future because of budget limitations.

Recommendation #5: ORD should take a leadership role establishing multi-agency goals for PM/ozone.

ORD Response: ORD co-chairs the Committee on Environment and Natural Resources (CENR) Air Quality Research Subcommittee. ORD provided primary input for the CENR PM Strategy and response to the NRC's fourth report. ORD also provides expertise to other agencies in planning and reviewing research directions. For example, ORD has a Memorandum of Understanding (MOU) with the National Oceanic and Atmospheric Administration (NOAA) to enhance cross-agency efforts. Also, the Federal

Highway Administration (FHWA) and Department of Energy (DOE) include ORD in strategy development and research reviews. In addition, ORD and NIEHS co-sponsor extramural research Requests for Applications (RFAs).

Recommendation #6: ORD should commit to maintaining a strong intramural/extramural balance in the program.

ORD Response: The extramural STAR Program, including the PM Centers, is an integral part of the ORD PM/Ozone Program. The extramural efforts complement and fill gaps in the intramural efforts. Extramural funding for PM research is expected to be steady for the foreseeable future. ORD is using workshops and other efforts to communicate results from both aspects of the program and maintain integration of the intramural and extramural programs.

Recommendation #7: Funding decisions for active intramural research should be reviewed by the Research Coordination Team (RCT).

ORD Response: ORD agrees that all projects merit review for science quality and programmatic relevance. The RCT structure has been retained for Air. New program areas are reviewed in more depth and may be reviewed externally. The RCT review of the overall program ensures client support, quality science, and products that are of use to the program offices.

Recommendation #8: The MYP should indicate how National Research Council (NRC) goals flow into cross-cutting research.

ORD Response: ORD is fully committed to ensuring that the MYP meets this recommendation. The program has been aligned with the NRC priorities since the program's inception. The cross-cutting research is aligned with the NRC goals from the proposal stage forward. The narrative and APG/APM structure will fully reflect the NRC linkage. It also will follow the progression to the Multiple Pollutant Program.

Recommendation #9: Funds for anticipatory research should be identified, highlighted, and set aside.

ORD Response: ORD agrees with the Subcommittee regarding the importance of anticipatory research. The structure of the funding process makes explicit set-asides very difficult, but ORD laboratories/centers recognize the need to support anticipatory research. In general, the investigators are expected to commit time to exploratory or high-risk research where appropriate, but programmatic relevance must be maintained. When adequate progress in new areas is demonstrated, the initiative/proposal process brings the research into the formal program.

Referring to the results of the OAR survey, Dr. Johnson noted that a score of 3 out of 5 is not very good in academia. Dr. Miller responded that 5 was "exceeds expectations," 4 was "very good," and 3 was "good." He added that ORD would like to receive a higher score so the survey responses are being examined to determine what ORD can do to improve. He mentioned that the survey instrument also could be improved and ORD is working to accomplish that. Dr. Miller noted that the survey is not the only measure of customer satisfaction, but it is the best quantitative measure available. Dr. Henderson thanked Dr. Miller for doing such a good job in addressing the Subcommittee's recommendations.

#### *ORD Response to the Ecological Research Program Review*

Dr. Michael Slimak, Associate Director, National Center for Environmental Assessment (NCEA), presented ORD's response to the Ecological Research Program Review. He began by listing the comments that did not require a response:

- ✧ The Ecological Research Program (ERP) is of good to high quality.
- ✧ The ERP leadership is very good.

- ✧ The ERP has substantial accomplishments.
- ✧ The LTG 1 scheme is both scientifically sound and practically feasible.
- ✧ The new structure of the three LTGs is scientifically sound.
- ✧ The ERP has a logical and comprehensive design for demonstrating progress toward overall goals.
- ✧ Overall, the body of the research is superior in terms of quality and ability to produce beneficial outcomes.
- ✧ The LTGs are well articulated and crucial to the overall EPA mission.
- ✧ There is wide use of ERP results by stakeholders and clients.
- ✧ The ERP has resulted in desired outcomes and are consistent with the conclusion that protection of the nation's ecological resources is enhanced.
- ✧ The ERP scientists and collaborators frequently are leaders in their respective scientific fields.
- ✧ Results from the Atmospheric Deposition Program are exceptionally good and meet internationally recognized science quality standards.
- ✧ The potential benefits to the public and stakeholders are clearly articulated.

Dr. Slimak then identified the comments in the report that needed a response and the corresponding ORD response:

Recommendation #1: Improve integration.

ORD Response: ORD is expanding integration with federal, state, and academic organizations. Integration across the goals is being addressed through a new research element—the Mississippi Basin/Gulf of Mexico Program, which will demonstrate the use of ERP approaches.

Recommendation #2: Increase international collaboration.

ORD Response: ORD is working to increase international collaboration. LTG 1 is being expanded to include technical transfer of approaches to the Baltic Sea (9 countries), Yellow Sea (3 countries), Gulf of Mexico (2 countries), and Caribbean Sea (23 SIDS and 3 countries).

Recommendation #3: Increase stakeholder involvement.

ORD Response: ORD is increasing stakeholder involvement by formalizing communication for planning with the program offices, regions, and others (ECO MYP Discussion Group), developing Tiger Teams to assess the need for “new” research areas (includes stakeholders), and conducting post-research briefings on results and potential for applications to stakeholders.

Recommendation #4: Organize and plan LTG 3.

ORD Response: ORD plans a startup investment for LTG 3 in FY 2006 (\$2 million with \$1.5 million in NCER). Also in FY 2006, the Steering Committee will help develop a research plan that will be implemented beginning in FY 2007.

Recommendation #5: Maximize collaboration.

ORD Response: Senior leadership is discussing approaches to enhance collaboration.

Recommendation #6: Increase post-research communication.

ORD Response: Senior leadership is discussing new ways to expand and promote communication of results and potential for use to clients and stakeholders.

Recommendation #7: Enhance balanced research portfolio.

ORD Response: The ERP will continue to address ways to include riparian and terrestrial ecosystems in its research portfolio. The primary targets of the program at the present time are landscape ecology and cross-system interactions.

Recommendation #8: Include a social science component.

ORD Response: Social sciences are an important element of ORD's Sustainability Strategy and will be included in the LTG 3 research program to the extent that is practical.

Recommendation #9: Track and document outcomes.

ORD Response: Senior ERP leadership is examining approaches to better track and document outcomes associated with the ERP research.

Recommendation #10: Rebuild the NCER component (extramural) of the research.

ORD Response: ORD agrees that a healthy research program requires a healthy extramural component. The ERP has invested new resources in NCER projects (\$1.5 million in LTG 3). Within continuing budget limitations, the ERP will do everything practical to continue to rebuild a healthy Ecological Research Program with NCER.

Dr. Johnson thanked Dr. Slimak for his presentation and asked if Drs. Clegg or Giesy had any comments. Dr. Clegg said he thought it was a good response to the review. He understood that there was some concern about the general characterization of the program as good to very good. The Subcommittee did not mean that the program was mediocre. They were giving it a B to an A-. Dr. Clegg apologized if the wording was misconstrued. The Subcommittee thought the program was of high quality. Referring to Dr. Slimak's comment that recent natural scientist graduates have more social science training than in the past, Dr. Clegg stated that he was surprised but pleased by this statement. He noted that behavioral change is the key to achieving outcomes so more attention to the social sciences might aid the Agency in achieving its regulatory goals. Dr. Giesy had nothing to add but said that he had a wonderful experience working with the Subcommittee members on the review.

Dr. Johnson said that the BOSC would like to be involved in the SAB review of the MYP. Dr. Slimak replied that ORD would like the BOSC to be involved in the review of the revised MYP.

#### *ORD Response to the National Coastal Condition Letter Report*

Dr. Johnson reminded the Executive Committee that a BOSC workgroup (Drs. Clark, Daston, and Windom) reviewed the Second National Coastal Condition Report, which resulted in a letter report to the AA/ORD. He then stated that Dr. Slimak would be presenting the ORD response to this report.

Dr. Slimak identified the comments from the review that did not require a response from ORD:

- ✧ The report is a useful compendium of information.
- ✧ It is an effective communication tool.
- ✧ The report includes clear examples of outcomes.
- ✧ The figures, tables, and boxes complement the text.
- ✧ There is evidence of successful cooperation among agencies.
- ✧ Quality assurance was considered a priority by the Agency.

✧ The National Coastal Condition Reports are useful and on track.

Dr. Slimak then identified the comments that required a response along with ORD's response.

Recommendation #1: Indeterminate audience.

ORD Response: This may be problematic because there is not a single intended audience for the report. The audience includes Congress and the informed public. It is intended to be a document that has a strong scientific basis but content that is easily understood. ORD will continue to improve the writing to better address the intended audiences.

Recommendation #2: Incorporate planning and research needs into the report.

ORD Response: ORD agrees with this recommendation but it is impractical to do this within the precise format of the report. ORD is considering the development of a companion document to address knowledge gaps and planning.

Recommendation #3: Further explanation of variability should be included.

ORD Response: ORD is evaluating the need for including an expanded appendix to describe uncertainty in the next National Coastal Condition Report.

Recommendation #4: Expand monitoring in Alaska.

ORD Response: EPA initiated monitoring in South-Central Alaska in 2002, and continued monitoring in Southern Alaska in 2004. EPA plans to begin monitoring in the Aleutians in 2006.

Recommendation #5: Encourage continued monitoring at state-scale.

ORD Response: The transfer of estuarine sampling to OW is expected to be in operational mode after 2006. The intent is to continue monitoring at the state-spatial scale.

Recommendation #6: Address causes/remedial actions in the report.

ORD Response: It is unlikely that causation or remediation will be addressed in future reports because of the page constraints. Also, these topics are not the intention of the report.

Recommendation #7: Explain differing regional criteria.

ORD Response: Greater emphasis will be given to explaining why differential regional criteria are used for nutrients, water clarity, chlorophyll, and benthic index.

Recommendation #8: Include the Great Lakes in the report.

ORD Response: The Great Lakes are considered by OW to be the nation's north shore. OW as well as NOAA would like the Great Lakes included in future reports. ORD will reconsider inclusion of the Great Lakes in future reports based on the BOSC's input.

Dr. Clark thanked Dr. Slimak for his presentation and said that it is encouraging to see that ORD is looking at these reports and taking the advice seriously.

#### *ORD Response to the Mercury MYP Review*

Dr. Joel Scheraga, the NPD for the Mercury Program, apologized for not being able to attend the meeting yesterday when Dr. Russell presented an overview of the Global Change Research Program Review. (Dr. Scheraga also serves as the NPD for the Global Change Program.) He thanked Dr. Windom for serving as the Chair of the Mercury MYP Subcommittee and for leading the review of the Mercury MYP. Dr. Scheraga noted that he became the NPD for Mercury about the time the BOSC was reviewing the MYP.



In assessing the quality of ORD's Mercury Research Program, the Subcommittee found that ORD had accomplished much with the available resources. ORD is poised to contribute significantly more to the better understanding of the global mercury problem, particularly with respect to transport and fate.

Dr. Scheraga identified the five overarching comments resulting from the MYP review:

- ✧ The MYP would benefit from an interagency council.
- ✧ Prioritizing and sequencing of the APMs needs to be discussed more fully in the MYP.
- ✧ The MYP should be updated annually.
- ✧ The MYP should be emphasized as a communication document.
- ✧ The MYP should provide an assessment of outcomes.

Dr. Scheraga then provided the ORD response to each of the comments offered by the BOSC in the report.

Comment #1: The proposed scope of work in the MYP is consistent and well thought out.

ORD Response: ORD agrees that the funding provided for mercury research is limited considering the regulatory needs. ORD appreciates the fact that the BOSC recognized that EPA is maximizing the research productivity in all ways possible.

Comment #2: The MYP should be updated annually, documenting progress, outcomes, and any necessary revisions.

ORD Response: The most significant develop since the MYP was written is the Clear Air Mercury Rule (CAMR), which has changed the program's priorities. ORD is committed to: (1) revising the MYP in 2006 to reflect CAMR and resulting changes in priorities; and (2) producing annual updates (as an addendum to the existing MYP) to document progress, outcomes, and any significant changes in priorities. The criteria used to make any priority changes will be clearly articulated in the addendum.

Comment #3: The combination of some of the APGs would aid in the clarity of the MYP to clients and stakeholders.

ORD Response: ORD agrees fully with this comment. The APGs will be combined, wherever possible, to clarify to clients and stakeholders the outcomes being sought by the various activities being undertaken.

Comment #4a: The rationale for choosing APGs and APMs (and prioritizing them) should be laid out in more detail in the MYP, and the APGs and APMs should be at least roughly ranked.

ORD Response: The MYP will be revised to include Value of Information (VOI) exercises and these exercises will be conducted periodically. The goal is to identify key research gaps, new research questions, and new assessment questions.

Comment #4b: The MYP should show how APMs and their priorities have changed through time.

ORD Response: ORD is committing to produce annual updates (as an addendum to the existing MYP) of the MYP to document progress, outcomes, and any significant changes in priorities. The criteria used to make any priority changes will be articulated clearly.

Comment #5: The process for prioritizing research should be discussed so the reader can assess the impact of budgetary and other constraints.

ORD Response: In the revised MYP, ORD will clearly articulate the process by which future research will be prioritized.

Comment #6a: The Agency is strongly encouraged to develop a detailed plan for communication with domestic and international parties. The plan should: (1) address how states and other parties are brought

into the planning process; (2) include a detailed plan on how research products will be marketed and how results and technology can be transferred to the other parties; (3) include methods to determine the outcomes of EPA's research outputs; and (4) include research/data needs and current research plans.

ORD Response: A detailed plan for communication with domestic and international parties will be developed. The Mercury Program will articulate a communication strategy that uses a variety of methods to: (1) engage stakeholders in identifying and prioritizing issues and concerns; and (2) establish conceptual frameworks for conducting research. The strategy will articulate how ORD is doing research to achieve outcomes.

Comment #6b: Communications between EPA and other parties, including grant awardees, need to be more dynamic and flow in both directions.

ORD Response: The Mercury Program will articulate a communication strategy as described in the response to Comment #6a above.

Comment #7a: Produce a table/diagram that links the APMs to the six scientific questions.

ORD Response: The revised MYP will contain a table/diagram that links revised APMs to the six scientific questions.

Comments #7b and 7c: The proposed schedule to accomplish an APM in the current MYP should be compared to the anticipated timetable provided in the previous MYP, and some indication should be given for an APM not being accomplished. An annual revision of the MYP should be developed that tracks only the progress of each APM and their outcomes.

ORD Response: ORD will produce annual updates of the MYP (as an addendum) to document progress, outcomes, and any significant changes in priorities. The criteria used to make any priority changes will be clearly articulated.

Dr. Windom commented that the Subcommittee was very impressed with how much this program is doing with its limited resources. He also was pleased to see how ORD is responding to the Subcommittee's comments. Dr. Johnson pointed out that the Subcommittee recommended that the MYP identify criteria for sequencing priorities—certain APMs must be completed before others can be initiated. Dr. Scheraga responded that he failed to comment on sequencing in his presentation, but he acknowledged that the MYP must clearly articulate the linkages from one program that feed into another. It is a challenge to understand that activity A is on a critical path and might hold up progress.

Dr. Johnson stated that 91 percent of the BOSC's recommendations have been or are being implemented by ORD, but he asked the BOSC to think about the cost associated with making these changes. The Board needs to consider how its recommendations impact the resources available to implement the program. For some recommendations, it might be appropriate for ORD to respond that, from a cost-benefit perspective, a certain recommendation may not be feasible at the present time. Dr. Henderson commented that this was the case with ozone research; ORD wants to retain that research in the program, but the funding is not there to sustain it, so the response to that recommendation was in line with Dr. Johnson's comment. Dr. Windom agreed that ORD does not have the resources it needs so it is better to focus on the areas where EPA can make the most impact on the problem. Dr. Clegg mentioned that the Ecological Research Program funding has been reduced by about 30 percent, but the Subcommittee did not address that concern in the report; instead, the members focused on how effectively ORD was using the resources that were available. Dr. Duke said that in these program reviews, the subcommittees have tended to use a "one size fits all" approach in that the scopes of the reviews have been similar despite the size of the program. He asked if the Board should consider crafting the scope of the review to correspond to the size of the program. Dr. Johnson agreed that the size of the program may impact the time devoted to the review, but he thought there should be a common set of questions for the reviews.

### **Discussion of Draft Letter to ORD on the Risk Assessment Workshop**

Dr. Johnson asked for comments on the draft letter to ORD concerning the Risk Assessment Workshop held in February 2005. He indicated that the letter should be addressed to Dr. George Gray rather than Administrator Stephen Johnson. One Board member asked that the words “to present” be changed to “to focus on” in the fifth line of the second sentence. Another member suggested adding the words “or a comprehensive survey” after “consensus workshop” in the first sentence of the third paragraph. Dr. Giesy asked that the third sentence of the fifth paragraph be reworded as follows: “This nascent science is an integral part of systems biology...” When no more comments were offered, Dr. Johnson asked for a motion to approve the letter. Dr. Giesy made a motion to approve the letter with the suggested edits and Dr. Windom seconded the motion. The letter to the AA/ORD was approved unanimously by the Board.

### **Joint Session With the ORD Executive Council**

Dr. Johnson welcomed the members of the ORD Executive Council to the BOSC meeting. He then asked everyone to introduce themselves. He explained that Drs. Robert Kavlock, Lawrence Reiter, and Kevin Teichman have been asked to make presentations on the value of standing subcommittees, lessons learned from the BOSC program reviews, and future ORD efforts, respectively. Drs. Daston, Henderson, and Giesy have agreed to address these same topics from the perspective of the BOSC.

Dr. Johnson reminded the attendees that this meeting remains subject to FACA rules. He expressed his pleasure at having the opportunity to meet with the entire ORD Executive Council and discuss some topics of mutual interest.

#### *A Model for BOSC Standing Subcommittees*

Dr. Daston explained that the Computational Toxicology Subcommittee currently is the only Standing Subcommittee of the BOSC. The rationale for making this a standing subcommittee was to provide consistent advice as the new National Center for Computational Toxicology (NCCT) developed, rather than a single review at one point in time. The Subcommittee actually was formed before the Center was established by ORD, shortly after Dr. Reiter made a presentation on the new program to the Board. Both Drs. Daston and Reiter thought it would be better for the Subcommittee to provide ongoing advice on strategic directions and foundational issues as the Center was established. The Subcommittee then could follow up with the NCCT to ensure that there is adequate flexibility in the strategy, provide advice on the expertise needed to conduct the research, and track the Center’s progress. Dr. Daston noted that the Center has developed a good strategy, but it needs to be modified as new priorities arise and be responsive to budget and staffing changes. Therefore, the Subcommittee’s knowledge of the programs, staff, and the Center’s strengths are invaluable in providing sound advice. This knowledge is retained only through the use of a standing subcommittee.

Although the BOSC has conducted laboratory/center reviews in the past, the knowledge gained of the programs by the members conducting those reviews has not been used to benefit ORD. The use of standing subcommittees would offer this advantage and provide better, more timely advice to the laboratories and centers.

Dr. Kavlock (ORD/NCCT), Director of the NCCT, stated that the official start date for the Center was February 20, 2005. The first review by the BOSC Subcommittee occurred in April. At that time, the NCCT was just beginning to identify its direction based on the strategy outlined in the Framework for a Computational Toxicology Research Program. He commented that the creation of the Center was a somewhat risky undertaking by ORD. It is focusing on new science and new approaches so the advice provided by the BOSC Subcommittee has been extremely helpful in providing confidence in the specific areas of focus. An added benefit is that this external advice allows the scientists to focus quickly and

efficiently on the science once the strategic directions are established and supported by the BOSC Subcommittee. The BOSC Subcommittee also provided very useful advice about staffing needs. To date, the Subcommittee has been doing more prospective reviews, but as the Center's research progresses, there will be a retrospective aspect added to these reviews. The implementation plan for the Center, which was one of the specific recommendations to come from the first site visit, is currently being circulated within the Agency. It includes partnerships with NIH, NIEHS, and the National Toxicology Program (NTP). Dr. Kavlock also mentioned that the NCCT has established three communities of practice in response to the Subcommittee's suggestion. The BOSC Subcommittee also has advised the Center to broaden its focus beyond endocrine disrupting chemicals (EDCs), and this currently is being accomplished.

Dr. Kavlock indicated that the Center is working to determine the scope of the Subcommittee's upcoming review. The BOSC could review the ORD Computational Toxicology Research Program, which is broader than the NCCT, or the review could be focused just on the direct activities of the NCCT. Another issue is at what frequency should the BOSC conduct reviews? Perhaps the reviews should be more frequent for new centers. He thought that 4 years between reviews was too long for a new center. Does the BOSC have the depth of expertise needed to provide sound, indepth comments on the science? He noted that the Computational Toxicology Subcommittee has expanded its expertise to meet this need for the NCCT. The Subcommittee probably will conduct a site visit to the Center in June 2006.

Dr. Peter Preuss (ORD/NCEA), Director of NCEA, stated that Drs. Daston and Kavlock raised some very interesting points. The idea of setting up standing subcommittees to work with the laboratories and centers is very important. There are two ongoing forces that are changing the face of science at EPA: (1) there are new requirements imposed from outside the Agency that must be discussed with an external advisory group at intervals much less than 4 years; and (2) the state-of-the-science is changing more rapidly than it has in the past. He agrees that a review every 4 years is not sufficient to meet the needs of the laboratories and centers. Dr. Preuss stressed the importance of getting the right expertise on the subcommittees—individuals who have the depth and understanding of the work needed to provide sound advice. The previous BOSC reviews did not delve far enough into the science.

Dr. Sally Gutierrez (ORD/NRMRL), Director of NRMRL, said that she has been taking a fresh look at NRMRL programs since she became the Laboratory Director. She does not think the laboratory can move forward strategically without an advisory group. She scanned the two previous BOSC reviews of NRMRL and, although they were helpful, there was not enough follow-up after the reviews. Dr. Gutierrez thought NRMRL would have benefited from follow up by the BOSC. The laboratories and centers need input on a timely basis because of rapidly changing priorities. There are two dimensions that must be covered in these reviews: (1) framework—to guide decisions and to align the workforce; and (2) science—is the laboratory doing the right science and doing it right? Both components are important.

Dr. Clark said that he had been involved with previous BOSC laboratory/center reviews and he recognizes the importance of that historical perspective when it comes to understanding and advising the laboratory/center. The Laboratory/Center Directors manage their resources to see that the right science gets done when it is needed by the NPDs. This is a very difficult job. Together, ORD and the BOSC need to determine the focus of the proposed standing subcommittees. Is it the science? Is it the laboratories/centers? Is it the programs? The challenge is to define the focus of the subcommittees and develop a charge that addresses ORD's needs.

Dr. Farland commented that when the BOSC was established, ORD entertained the idea of standing subcommittees but it was decided that the Board should provide high-level advice to the AA. The BOSC has evolved somewhat since that time and is revisiting the idea of establishing standing subcommittees. These subcommittees could look at how the science is being managed and implemented to address multiple requirements. The BOSC also would conduct program reviews every 4 years. He agreed that it

is important for the laboratories and centers to receive periodic feedback from interactions with the BOSC.

Dr. Gray said that the BOSC's program reviews have been very helpful. ORD undertakes a wide range of research to meet various goals. It takes institutional memory to determine how things are changing so standing subcommittees would serve ORD well. They would help preserve and transmit knowledge over time.

Dr. Johnson asked if anyone present was opposed to the idea of establishing standing subcommittees for the ORD laboratories/centers. No one had any objections. Dr. Johnson said these subcommittees would be charged with reviewing the management of the laboratories/centers, management of the science, and the appropriateness of the science. Dr. Reiter added that there also should be an advisory component. The laboratories/centers need access to an advisory group that can be consulted on ideas and possible directions as well as management issues. He hoped that these consultations could be somewhat less formal than the BOSC program reviews. Dr. Farland suggested that the subcommittees may have to conduct an initial review of the laboratories/centers to get up to speed and then meet periodically in an advisory capacity. He asked the members to determine if there would be any conflict in reviewing research in which BOSC members may be involved. That could eliminate a number of the BOSC members from participating on these subcommittees. Dr. Henderson responded that this is an important issue. She also stressed the need to distinguish between the charge for the program reviews and the charge for the standing subcommittees. Dr. Johnson asked Drs. Daston and Kavlock to work with Ms. Kowalski in developing a charge for the standing subcommittees. He also asked them to develop a list of questions that could be used for the laboratory/center reviews and for advisory/consultative functions. Dr. Hal Zenick (ORD/NHEERL), Acting Director of the National Health and Environmental Effects Research Laboratory (NHEERL), asked that the differences between the BOSC reviews and the SAB reviews be clarified in the charge. Dr. Johnson responded that one major difference is that the BOSC's advice is directed to the AA/ORD rather than the EPA Administrator. He mentioned that the BOSC hopes to participate in the SAB reviews of the revised MYPs because of the experience gained on the program reviews. He noted that the SAB has taken the lead on reviewing MYPs and the BOSC has taken the lead on program reviews, which includes the MYPs. He hopes there will be more collaboration in the future.

#### *Lessons Learned From Program Reviews*

Dr. Henderson stated that the BOSC has been extremely busy conducting program reviews. There was considerable time devoted to discussing the positive aspects of the program reviews during yesterday's meeting. The discussion covered topics such as the responsiveness of the NPDs, the amount of material provided to the BOSC Subcommittee, how the fast pace of the reviews was driven by the PART review schedule, the clarity of the charge, and common areas to be covered in every program review. Dr. Henderson said that the Board received feedback from ORD on two of the recently completed program reviews. The BOSC members are pleased to see that ORD is seriously considering the recommendations and implementing appropriate changes. She noted that for some of the program reviews, the BOSC has brought in consultants to assist the subcommittees to ensure that there is appropriate expertise to conduct the reviews.

Dr. Reiter (ORD/NERL), Director of the National Exposure Research Laboratory (NERL), agreed that the program reviews had been conducted at break neck speed driven by the timing of the PART reviews. He said that ORD really appreciates everything the BOSC has done to complete so many reviews in such a short time.

He identified the intended uses and potential users of the BOSC evaluations. The evaluations can be used to: (1) improve the relevance, quality, performance, and scientific leadership of ORD research programs;

(2) make decisions about research investments, disinvestments, and future research directions; (3) compare ORD research programs with programs designed to achieve similar outcomes in other parts of EPA and in other federal agencies; (4) report evaluation results and recommendations to OMB for PART; (5) document when outcomes (client use of research for key decisions) have been achieved; and (6) communicate research results to targeted audiences, including Government Performance and Results Act (GPRA) performance and accountability reports. The potential users include: (1) ORD, EPA clients, stakeholders, OMB, Congress, and Office of the Chief Financial Officer.

Dr. Reiter asked if the BOSC review process could be improved to: (1) further strengthen the research programs, (2) make decisions about future research directions, and (3) compare ORD research with other programs designed to achieve similar outcomes.

Currently, the BOSC evaluations consider whether ORD is “doing the right science” and “doing the science right.” Current reviews apply the R&D Investment Criteria to recommend program improvements and document when outcomes have been achieved. The background information for the BOSC program reviews includes: (1) the MYPs that document the research projects, APGs, APMs, and measures along the critical path to client use of research; (2) overview presentations about program goals and outcomes; (3) poster presentations organized by research topic or LTG about new research knowledge and its applications; and (4) client presentations about their use of research for decision-making. Dr. Reiter asked what changes would be needed to extend the focus of the BOSC evaluations to identify future research directions and recommend program improvements that respond to these new directions.

Practically speaking, the key question is: Can we improve the BOSC review process so that the Agency can more effectively report evaluation results and recommendations to OMB for the PART reviews and better document when outcomes have been achieved? Currently, the BOSC’s program review reports are available to the public via the BOSC Web Site and are cited as evaluation evidence in ORD communication with OMB, Agency clients, and partners. As these reports are disseminated and cited in program assessments, preliminary OMB comments indicate that the BOSC reports constitute evidence for PART questions 2.6 and 4.3. It is not clear, however, whether OMB understands the BOSC evaluation approach, methods, and findings. For example, the level of detail required to identify and communicate recommendations for meaningful program improvement is not compatible with OMB inquiries about a single numerical program rating. Are there approaches and actions that would encourage OMB participation in the BOSC face-to-face meetings? Are there approaches and actions that would improve OMB knowledge of BOSC evaluation methods and findings? Dr. Reiter said that he hopes to find ways to encourage OMB participation and to better communicate the meaning of the results of the BOSC reviews.

Dr. Johnson said that the Executive Committee has identified a list of common charge questions for the program reviews. Ms. Kowalski will provide that list to the ORD Executive Council. He asked the members to provide comments on the list and any suggestions for additional questions. The information that is needed by ORD to meet its various requirements (e.g., PART, GPRA) should be addressed in the charge questions. Dr. Johnson stated that the BOSC discussed the use of the tool proposed by ORD to develop a quantitative score for the program reviews, but the members decided that the tool was not adequate. Perhaps other models may be more acceptable to the BOSC. Dr. Reiter responded that he did not know all the constraints of FACA but he found it frustrating that there could not be a better dialogue with OMB so that the reviewers have a better understanding of the value of the program reviews. What can EPA do to help OMB gain a better appreciation for the value of the BOSC’s program reviews?

Dr. Daston agreed that the BOSC has tried to design the program reviews to accomplish much more than provide information for the PART reviews, but PART has been a primary consideration. He thought it would be useful to have a direct dialogue with OMB to explain the importance of the program reviews.

Dr. Henderson agreed that such interaction may be beneficial. She mentioned that it took some time for her PM/Ozone Subcommittee to understand why a regulatory agency needs to do research. Without ORD's research, the program offices could not regulate effectively and achieve the desired outcomes. OMB is asking researchers to quantify the outcomes of the research, but that is extremely difficult for ORD.

Dr. Preuss mentioned that EPA is about to review the second Report on the Environment. EPA is considering using the questions in that report as part of the Agency's strategic plan. What are the program offices doing to answer questions about air quality, water quality, and so forth? Is the research program defined to help answer the critical questions that the Agency is trying to address? Is there a clear continuum from the research to the answers?

Dr. Farland commented that PART has a significant impact on ORD's funding and the role it plays. From OMB's perspective, the issue is not whether the BOSC is providing good advice, but whether the BOSC's reports present evidence of program results in terms of environmental outcomes. Does the report present evidence that the program has produced scientific results? OMB is not undervaluing the BOSC's reports, but it is looking at them from a different perspective. Perhaps this should be the focus of a dialogue between OMB and the BOSC.

Dr. Gary Foley (ORD/NCER), Director of NCER, stressed the importance of bringing stakeholders/potential users of the science into the process at a very early point. The decision-makers/science users should be involved in planning the research. For example, the Climate Change Program workshop devoted an entire day to applications and decision-making and brought in a number of users who were interested in the research. GEOSS also plans to move in that direction to show how additional measurements will affect decisions that will benefit society. This approach helps increase the probability that the science will be used by the right people to bring about the desired outcomes. Perhaps the BOSC could ask questions of the stakeholders to determine if the science is being used and identify ways to make that more likely and to measure it. Dr. Johnson replied that the BOSC would be more likely to review the process used by EPA to make that assessment and to ensure that the Agency is engaging stakeholders to ensure that the science is valuable and used to bring about outcomes. It is unlikely that the BOSC would collect such information from stakeholders. In response to Dr. Foley's comments, Dr. Henderson noted that it is very difficult to measure quantitatively how the science is contributing to outcomes.

Dr. Johnson stated that the BOSC is developing a Handbook for BOSC Subcommittee Chairs to assist them in conducting future program reviews. He noted that the Executive Committee wants to institutionalize the process and retain the knowledge gained in conducting these reviews. Dr. Johnson indicated that the current version will be revised and he asked ORD to review the next draft and provide comments to improve the Handbook.

Dr. Sayler said that the program staff should be better prepared in these reviews to respond to questions about what others—within EPA, other agencies, and international organizations—are doing in the same area. This also is linked to the program's leadership in a particular area. He noted that many of the staff members involved in these reviews do not see the position of EPA in the bigger picture. It would be helpful to provide that information to the BOSC in the reviews. Dr. Johnson added that it also is important for the NPD to explain why ORD has selected a certain niche.

#### *Emerging and Future Issues*

Dr. Giesy stated that EPA's goal should be to prevent problems before they occur, but this requires brainstorming on how to identify emerging and future problems. EPA is doing applied research and the focus is increasingly on outcomes so it is becoming increasingly difficult to apply resources to address

issues before they become problems. How does the Agency get “credit” for solving a problem before it occurs? How does ORD identify new directions and how does research on emerging issues fit into the programs? How does ORD get feedback on emerging issues and how might the BOSC help in this area? Is there something that the BOSC can do to help ORD identify future issues and implement high-quality research to address them?

Dr. Teichman (ORD/OSP), Director of the Office of Science Policy (OSP), pointed out that Goal 5 of ORD’s Strategic Plan calls for ORD to conduct anticipatory research. That goal states that ORD will evaluate opportunities for and, as appropriate, will conduct research to anticipate and assess future environmental stressors—whether human health or ecological—before their effects adversely impact people or the environment. Toward this end, ORD has three stated objectives: (1) to develop an organizational capacity for environmental foresight, (2) to stimulate dialogue both inside and outside EPA on future environmental developments and their significance, and (3) to perform a pilot futures analysis for a few key environmental issues.

Dr. Teichman reported that ORD has some existing futures efforts, including:

- ✧ “Shaping Our Environmental Future: A Handbook on the Benefits and Methods of Foresight for Environmental Research and Development.” This handbook builds on how to implement the recommendations from the National Academy of Public Administration (NAPA).
- ✧ Cross-agency scanning and evaluation efforts (e.g., biofuels).
- ✧ Project Horizon, which includes 14 different federal agencies. There will be focus groups doing work on future scenarios in March/April 2006, and the results and lessons learned will be available for EPA to apply after September 2006.
- ✧ Researching emerging issues and implications. There is a contract pending with the Wilson Center to focus on identifying emerging technologies and social issues. Past topics that have been addressed include genomics and nanotechnology, both of which have been integrated into EPA’s research program.
- ✧ Participation in forward-looking cross-Agency efforts.

Dr. Teichman closed his presentation by looking back to the future. In 1978, the Scandinavian countries began doing research on indoor air quality; DOE encouraged EPA to focus on this area because of growing concerns about how tighter, energy-efficient buildings may impact indoor air quality. Eventually, indoor air quality research was added to EPA’s budget. There were many unanswered questions when EPA greatly expanded its PM research program. In the most recent PM Criteria Document, about 40 percent of the publications are ORD publications. The Long Island Breast Cancer Project was at the forefront of the nation’s concern about EDCs and encouraged EPA to move forward on this issue. The events of September 11, 2001, became the forcing function for EPA’s entrance into homeland security issues. The race for mapping the human genome and Dr. Paul Gilman’s interest in this breakthrough led to the creation of the computational toxicology research program at EPA and subsequent creation of the NCCT. The previous Administration launched the National Nanotechnology Initiative, which in the current Administration led to the creation of the nanotechnology research effort within NCER. Of special note, the President’s FY 2007 budget includes funding for an intramural program in addition to the ongoing extramural nanotechnology effort. Advances in computer technology that has made it possible to handle very large data sets has led to the creation of GEOSS. Water infrastructure is a huge emerging issue that has been identified by OW. ORD’s Test & Evaluation (T&E) Facility in Cincinnati, Ohio, is conducting research to address this issue. Dr. Teichman concluded his presentation by stating that ORD’s extramural and intramural programs have been and will try to continue to be responsive to emerging



needs, and that the impetuses for emerging research issues are varied. He asked the BOSC: How robust should these futures efforts be and how can ORD contribute to addressing emerging issues?

Dr. Giesy stated that he would like to determine if the BOSC is doing enough to help ORD address future issues. Dr. Johnson asked if ORD's nanotechnology program is addressing the health and environmental effects of these new products. Dr. Teichman replied that although most federally funded nanotechnology research focuses on applications, approximately 60 percent of the nanotechnology research funded by ORD focuses on implications (health and environmental impacts). The new intramural efforts also will focus on implications. Dr. Foley noted that about \$1 billion is being spent each year on nanotechnology research, but only \$38.5 million is spent on the health and environmental implications of nanotechnology, and this amount includes the application of nanotechnology to do cleanups that will benefit the environment. ORD is attempting to inventory all of this work so that gaps can be identified.

Dr. Johnson asked if EPA is collaborating with NSF on GEOSS, noting that NSF is investing major funding in the collection of environmental data. Dr. Foley replied that NSF is a member of CENR's U.S. Group on Earth Observation but that participation primarily has come from the climate program rather than the environmental data collection program. He agreed that there may be some opportunities for EPA and NSF to collaborate. Dr. Johnson asked if NSF and EPA have looked at who is going to be using the data. Dr. Windom mentioned that NOAA's Integrated Ocean Observation System is operational but will not be sustainable unless NOAA gets more funding. He did not think that the NSF was the best agency for such efforts. It should be an agency involved in operations.

Dr. Johnson asked how the BOSC could help ORD to address emerging and future issues. What are the most pressing issues? He asked each of the members of the BOSC and the ORD Executive Council to express his/her comments.

Dr. Jack Puzak (ORD/ORMA), Director of the Office of Resources Management and Administration (ORMA), stated that some of these new areas (e.g., nanotechnology, genomics/computational toxicology) need to be expanded but there is little likelihood of that given the budget limitations. He agreed that it is important to keep an eye on future issues, but the Agency is having a difficult time funding research to address existing problems. He thought it was more critical to develop metrics to evaluate the existing programs. OMB is requiring these metrics and EPA needs to figure out the metrics that make the most sense. Dr. Gray agreed that just because we can identify a future problem does not mean that the Agency should abandon ongoing efforts to address existing problems. How big will this new problem be and what research will be displaced to work on it? Is the concern large enough to warrant a new research effort and how long should the Agency work on the new concern?

Given the recent response to Hurricanes Katrina and Rita, Dr. Zenick thought EPA should begin to do more research on disaster recovery to help make better short- and long-term decisions. What does contribute to adverse health effects or disease? The Agency needs to take a holistic approach and look at contributing risk to determine the best areas to focus the research dollars.

Dr. Duke stated that changing the context of existing inquiries—the ecological context of chemical stressors—and how the context determines the effect is a priority.

Dr. Clark suggested that a new area of focus could be the life cycle analysis of future energy sources. There are numerous ways to process hydrocarbons and myriad alternative technologies, but many of them may yield products that may lead to future problems.

Dr. Andy Avel (ORD/NHSRC), Director of the National Homeland Security Research Center (NHSRC) identified the need to develop microbiological risk assessments. He also suggested more effort on quantitative uncertainty analysis.

Dr. Gutierrez stated that the complexity of environmental problems is increasing so the solutions will be multimedia and multidimensional. A systems-based approach to environmental protection is needed.

Dr. Farland proposed emerging issues associated with the built environment. What new exposures are associated with the changes in the built environment and how we house ourselves?

Dr. Johnson suggested more attention on emerging issues of concern to stakeholders and the public and how to improve communications with these groups.

Dr. Gray identified water quality and water quantity as an emerging issue that will impact the entire world.

Dr. Henderson proposed moving from a system that regulates chemical by chemical to one that regulates mixtures from sources.

Dr. Sayler suggested moving beyond EDCs to look at pharmaceutically active chemicals as well as emerging infectious diseases.

Dr. Clegg identified the need to move away from focusing on single factors to investigating interactions of multiple factors in a systems context. He also suggested that natural disaster response as an emerging issue.

Dr. Preuss did not think the BOSC needed to develop a list of emerging issues. The Agency can put together a very long list at any time. The real question is which of these emerging issues should be addressed by EPA and which ones is EPA allowed to address given its regulatory mission. If there is no legislation addressing an issue, the Agency has a difficult time obtaining funding to do the research. Which items on the list should EPA address, given its limited budget?

Dr. Windom noted that changing demographics and the impact on the environment is an emerging area. As the population in coastal areas increases, what impact will this have on water resources? As more areas turn to desalination for water, for example, what is to be done with the saline discharge?

Dr. Foley stated that urban development is one of the most pressing issues in the Great Lakes region. An emerging area is the development of tools for decision-makers that support sustainable growth. Also, environmental forecasting is needed to teach the public about environmental issues and to encourage the regulated industry to make voluntary improvements that will benefit the environment.

Dr. Teichman said that, while addressing all of these emerging issues can be important, much can be achieved by devoting effort to removing the economic and social barriers to implementing what we already know.

Dr. Reiter pointed to sustainability as a new focus. Sustainability has to permeate the way ORD thinks about all of its research programs. The Agency needs to determine how the valuation of ecological resources factors into environmental decision-making. He stressed the need to look at the environment from a holistic perspective.

Dr. Kavlock stated that computational toxicology has the potential to change the way toxicology is conducted in the next 10 years. It will lead to more effective use of animals and better data for risk assessors.

In concluding this session, Dr. Giesy said that he recognizes that ORD has limitations. Can the BOSC help ORD in addressing emerging and future issues?

Dr. Gray thanked the BOSC members on behalf of ORD for their efforts and willingness to take on even more work to assist ORD. He also thanked the members of the ORD Executive Council for coming to meet with the BOSC.

Dr. Johnson said that the BOSC will examine this list of ideas and try to determine which ones would be within EPA's purview and which ones would be most appropriate for ORD to address and why. He agreed to provide this information to ORD. He also thanked the members of the ORD Executive Council for their input.

### **Future BOSC Business**

Dr. Johnson stated that the next Executive Committee meeting will be held June 1-2, 2006 in Las Vegas, Nevada. The fall meeting was scheduled for September 18-19, 2006, but Dr. Henderson has a conflict so he would like to identify an alternate date. Most of the members said that they were available October 2-3 or October 5-6, 2006. He asked the BOSC members to notify him of their availability for those two optional dates.

Dr. Johnson reminded the members to comment on OMB's document on risk assessment guidelines. He did not object to several BOSC members collaborating on a response, but he reminded them that they would not be submitting comments as members of the BOSC.

Dr. Johnson said that he will be scheduling a conference call in April to review and approve the Water Quality Program Review Report. Ms. Kowalski mentioned that EPA probably plans to submit their PART to OMB by April 30, 2006. Dr. Windom said that he hopes to have the report ready for distribution to the Executive Committee on April 1. Dr. Johnson asked that the Board members be allowed 7-10 days to review the report. He will send out an e-mail to determine a date for the conference call.

Dr. Johnson mentioned that the BOSC may be undertaking three new program reviews during the next year, he asked for vectors for the Water Quality Program Review Report. He noted that Drs. Clark, Johnson, and Windom will be rotating off the Board. Drs. Clegg, Daston, and Harding are available according to the table of assignments. Drs. Clark and Duke volunteered to serve as vectors for the Water Quality report. Dr. Johnson will ask Dr. Harding if she will serve as the Chair for the Safe Products/Safe Pesticides Subcommittee, and Dr. Daston if he will serve as the Chair for the Human Health Risk Assessment Subcommittee. Dr. Sayler agreed to Chair the Homeland Security Subcommittee. Dr. Johnson asked the members to give some thought to serving on the standing subcommittees for the laboratories/centers.

With three members rotating off the Board by October, Ms. Kowalski hopes to have five new members on the Board in time to attend the June Executive Committee meeting. She plans to fill the remaining three vacancies by the October meeting. The June meeting agenda should include a discussion of the expertise needed for the three vacant positions in October. Ms. Kowalski was going to find out if the three new Board members could be appointed before the existing three members rotate off the Board.

Dr. Johnson thanked the Board members for their efforts to make the meeting productive and for volunteering for the new assignments. He then adjourned the meeting at 1:08 p.m.

## **Action Items**

- ✧ Beverly Campbell will make the requested changes to the September 2005 BOSC Executive Committee Meeting Summary approved by the BOSC and submit it to Ms. Kowalski for posting on the BOSC Web Site.
- ✧ Any BOSC member who has not completed his/her required ethics training, updated his/her biographical sketch and curricula vitae for the BOSC Web Site, and submitted his/her confidential disclosure form should do so immediately.
- ✧ The BOSC members are encouraged to completed the survey asking for opinions about FACA. The survey will be conducted in spring 2006.
- ✧ Dr. Johnson will prepare a letter to recognize Mr. Tim Oppelt's contributions during his tenure as AA/ORD and to express the Board's appreciation.
- ✧ Dr. Johnson will circulate the URL for accessing the journal article by Dr. Jerry Schnoor, former Chair of the BOSC, which was recognized as paper of the year by the journal *Human and Ecological Risk Assessment*.
- ✧ Drs. Clark and Sayler (vettors of the Global Change Research Program Review Report) will send their written comments on the report to Ms. Kowalski.
- ✧ Drs. Clegg and Harding (vettors of the Land Restoration and Preservation Research Program Review Report) will send their written comments on the report to Ms. Kowalski.
- ✧ Dr. Duke will work with Dr. Russell to incorporate the final changes approved by the BOSC into the Global Change Research Program Review Report. Drs. Clark and Sayler will review the final changes to ensure that they are incorporated correctly before the report is posted on the BOSC Web Site.
- ✧ Dr. Clark will work with Dr. Menzie to incorporate the final changes approved by the BOSC into the Land Restoration and Preservation Program Review Report. Drs. Clegg and Harding will review the final changes to ensure that they are incorporated correctly before the report is posted on the BOSC Web Site.
- ✧ Dr. Windom will complete the next draft of the Water Quality Research Program Review Report by March 1. It will be submitted to the Executive Committee for review following the March 3 Subcommittee conference call and the incorporation of any final changes requested during that call.
- ✧ Dr. Johnson will schedule a conference call for the Executive Committee to review the Water Quality Research Program Review Report between March 6 and the June 1-2, 2006, Executive Committee meeting in Las Vegas, Nevada. The call probably will be scheduled sometime in April.
- ✧ Dr. Johnson asked the BOSC members to review the draft Handbook for BOSC Subcommittee Chairs provided in the meeting notebook and provide their comments to him.
- ✧ Dr. Giesy will develop a list of expertise needed on the Sustainability Subcommittee and provide it to Ms. Kowalski. The BOSC members should provide suggestions for areas of expertise as well as the names of individuals who may be appropriate for the Subcommittee.

*February 13-14, 2006 BOSC Executive Committee Meeting Summary*

- ✧ Dr. Johnson will provide his suggestions for additions to Appendix A of the Handbook for the BOSC Subcommittee Chairs to Ms. Kowalski.
- ✧ Dr. Johnson will revise the list of items in Appendix B of the Handbook, particularly the ORD list of lessons learned so that all items on the list are germane to the subcommittee chair. He will send the revised list to Ms. Kowalski.
- ✧ Ms. Kowalski asked the BOSC members to review the entire list of items in Appendix B, even those that are to be deleted by Dr. Johnson, and provide to her feedback on these items to improve future program reviews.
- ✧ Dr. Farland will provide to the BOSC members the URL for the Web site to access the risk assessment guidance recently released by OMB. OMB is soliciting comments on the guidance until June 15, 2006. Dr. Johnson encouraged the Board members to comment on the guidance, reminding them that they would be commenting as individuals and not as members of the BOSC. Members also may want to comment on the guidance because this document defines what constitutes guidance from federal agencies.
- ✧ Drs. Daston and Kavlock will work with Ms. Kowalski to develop a charge for the standing subcommittees for the ORD laboratories/centers. They also will develop a list of questions that could be used for the laboratory/center reviews and for advisory/consultative functions.
- ✧ Dr. Johnson said that the Executive Committee has identified a list of common charge questions for the program reviews. Ms. Kowalski will provide the list of common charge questions for the program reviews to the members of the ORD Executive Council so that they can provide comments on the list and any suggestions for additional questions.
- ✧ Ms. Kowalski will provide a copy of the next version of the Handbook for BOSC Subcommittee Chairs to the members of the ORD Executive Council for their review and comment.
- ✧ The BOSC members will examine the list of future/emerging ideas and try to determine which ones would be within EPA's purview and which ones would be most appropriate for ORD to address and why. Dr. Johnson will provide this information to ORD.
- ✧ The BOSC members should notify Ms. Kowalski and Dr. Johnson concerning their availability to meet on October 2-3 or October 5-6, 2006.
- ✧ Drs. Clark and Duke volunteered to serve as vettors for the Water Quality Research Program Review Report.
- ✧ Dr. Johnson will ask Dr. Harding if she will serve as the Chair for the Safe Products/Safe Pesticides Subcommittee, and Dr. Daston if he will serve as the Chair for the Human Health Risk Assessment Subcommittee.
- ✧ Dr. Sayler agreed to Chair the Homeland Security Subcommittee.
- ✧ Dr. Johnson asked the members to give some thought to serving on the standing subcommittees for the laboratories/centers.
- ✧ Ms. Kowalski will determine if the three new BOSC members who will be replacing the three members who rotate off the Board in October can be appointed prior to October so that they can attend the October meeting.

## BOSC Executive Committee Members

### Chair:

#### **James H. Johnson, Jr., Ph.D.**

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

### Vice-Chair:

#### **Rogene F. Henderson, Ph.D., DABT Scientist**

Emeritus  
Lovelace Respiratory Research Institute  
2425 Ridgecrest Drive, S.E.  
Albuquerque, NM 87108  
Phone: 505-348-9464  
Fax: 505-348-4983  
E-mail: rhenders@lrri.org

### Members:

#### **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

#### **Michael T. Clegg, Ph.D.**

Department of Ecology and Evolution  
498 Steinhaus Hall  
Irvine, CA 92697-4490  
Phone: 949-824-4490  
E-mail: mclegg@uci.edu

#### **George P. Daston, Ph.D.**

Miami Valley Laboratories  
The Proctor & Gamble Company  
11810 E. Miami River Road  
Cincinnati, OH 45252  
Phone: 513-627-2886  
Fax: 513-627-0323  
E-mail: daston.gp@pg.com

#### **Clifford S. Duke, Ph.D.**

Director of Science Programs  
The Ecological Society of America  
1707 H Street NW, Suite 400  
Washington, DC 20006  
Phone: 202-833-8773, ext. 202  
Fax: 202-833-8775  
E-mail: csduke@esa.org

#### **John P. Giesy, Ph.D.**

Distinguished Professor of Zoology  
Professor of Veterinary Medicine  
Department of Zoology  
Natural Science Building  
Michigan State University  
East Lansing, MI 48824-1222  
Phone: 517-353-2000  
Fax: 517-432-1984  
E-mail: jgiesy@aol.com

#### **Anna K Harding, Ph.D., R.S.**

Associate Professor  
Department of Public Health  
309 Waldo Hall  
Oregon State University  
Corvallis, OR 97331-6406  
Phone: 541-737-3830  
E-mail: anna.harding@oregonstate.edu

#### **Gary Sayler, Ph.D.**

Professor/Director  
Center for Environmental Biotechnology  
The University of Tennessee  
676 Dabney Hall  
Knoxville, TN 37996-1605  
Phone: 865-974-8080  
Fax: 865-974-8086  
E-mail: sayler@utk.edu

#### **Herbert L. Windom, Ph.D.**

Professor Emeritus  
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

## **BOSC Executive Committee Members (Continued)**

### **SAB Liaison to BOSC:**

#### **George Lambert, M.D.**

Director  
The Center for Childhood Neurotoxicology  
and Exposure Assessment  
Robert Wood Johnson Medical School  
University of Medicine and Dentistry  
of New Jersey  
170 Frelinghuysen Road  
Piscataway, NJ 08854  
Phone: 800-644-0088  
Fax: 732-253-3520  
E-mail: glambert@umdnj.edu

### **Committee Staff:**

#### **William Farland, Ph.D.**

Acting Deputy Assistant Administrator for  
Science  
U.S. Environmental Protection Agency  
Office of Research and Development  
Mail Code 8101R  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-6620  
Fax: 202-565-2430  
E-mail: farland.william@epa.gov

#### **Lorelei Kowalski**

Designated Federal Officer  
U.S. Environmental Protection Agency  
Office of Research and Development  
Mail Code 8104R  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-3408  
Fax: 202-565-2911  
E-mail: kowalski.lorelei@epa.gov

#### **Heather Drumm**

Alternate Designated Federal Officer  
U.S. Environmental Protection Agency  
Office of Research and Development  
Mail Code 8104R  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-8239  
Fax: 202-565-2911  
E-mail: drumm.heather@epa.gov

### **Contractor Support:**

#### **Angela Hays**

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

#### **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: bcampbell@scgcorp.com

## Additional Meeting Participants

### **Andy Avel**

Acting Director, National Homeland Security  
Research Center  
U.S. Environmental Protection Agency  
Office of Research and Development  
National Homeland Security Research Center  
Mail Code 163  
26 West Martin Luther King Drive  
Cincinnati, OH 45268  
Phone: 513-569-7951  
E-mail: avel.andy@epa.gov

### **Peter Fargo**

U.S. Environmental Protection Agency  
Office of Research and Development  
Office of Science Policy  
Mail Code 8104R  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-3746  
E-mail: fargo.peter@epa.gov

### **Gary Foley, Ph.D.**

Director, National Center for Environmental  
Research  
U.S. Environmental Protection Agency  
Office of Research and Development  
National Center for Environmental Research  
Mail Code B105-15  
Research Triangle Park, NC 27711  
Phone: 919-541-0711  
E-mail: foley.gary@epa.gov

### **Elaine Francis, Ph.D.**

U.S. Environmental Protection Agency  
Office of Research and Development  
National Center for Environmental Research  
Mail Code 8701F  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-343-9696  
E-mail: francis.elaine@epa.gov

### **Janet Gamble, Ph.D.**

U.S. Environmental Protection Agency  
Office of Research and Development  
National Center for Environmental Assessment  
Mail Code 8601N  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-3387  
E-mail: gamble.janet@epa.gov

### **George Gray, Ph.D.**

Assistant Administrator for Research  
and Development  
U.S. Environmental Protection Agency  
Office of Research and Development  
Mail Code 8101R  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-6620  
E-mail: gray.george@epa.gov

### **Sally Gutierrez, Ph.D.**

Director, National Risk Management  
Research Laboratory  
U.S. Environmental Protection Agency  
National Risk Management Research Laboratory  
Office of Research and Development  
26 W. Martin Luther King Drive  
Cincinnati, OH 45268  
Phone: 513-569-7683  
E-mail: gutierrez.sally@epa.gov

### **Alan Hecht, Ph.D.**

U.S. Environmental Protection Agency  
Office of Research and Development  
Mail Code 8101R  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-4772  
E-mail: hecht.alan@epa.gov



## Additional Meeting Participants (Continued)

### **Lek Kadeli**

Deputy Assistant Administrator for  
Management  
U.S. Environmental Protection Agency  
Office of Research and Development  
Mail Code 8101R  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-6620  
E-mail: kadeli.lek@epa.gov

### **Robert Kavlock, Ph.D.**

Director, National Center for Computational  
Toxicology  
U.S. Environmental Protection Agency  
Office of Research and Development  
National Center for Computational Toxicology  
Mail Code B205-01  
Research Triangle Park, NC 27711  
Phone: 919-541-2326  
E-mail: kavlock.robert@epa.gov

### **Dale Pahl, Ph.D.**

U.S. Environmental Protection Agency  
Office of Research and Development  
Office of Resources Management and  
Administration  
Mail Code D305-01  
Research Triangle Park, NC 27711  
Phone: 919-541-1851  
E-mail: pahl.dale@epa.gov

### **Peter Preuss, Ph.D.**

Director, National Center for Environmental  
Assessment  
U.S. Environmental Protection Agency  
Office of Research and Development  
National Center for Environmental Assessment  
Mail Code 8601D  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-3322  
E-mail: preuss.peter@epa.gov

### **Jack Puzak**

Director, Office of Resources Management  
and Administration  
U.S. Environmental Protection Agency  
Office of Research and Development  
Office of Resources Management  
and Administration  
Mail Code 8102R  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-6700  
E-mail: puzak.jack@epa.gov

### **Lawrence Reiter, Ph.D.**

Director, National Exposure Research  
Laboratory  
U.S. Environmental Protection Agency  
Office of Research and Development  
National Exposure Research Laboratory  
Mail Code D305-01  
Research Triangle Park, NC 27711  
Phone: 919-541-2106  
E-mail: reiter.larry@epa.gov

### **Monica Rodia**

U.S. Environmental Protection Agency  
Office of Research and Development  
Office of Science Policy  
Mail Code 8104R  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-8322  
E-mail: rodia.monica@epa.gov

### **Toni Rousey**

U.S. Environmental Protection Agency  
Office of Cooperative Environmental  
Management  
Mail Code 1601E  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-233-0075  
E-mail: rousey.toni@epa.gov

## Additional Meeting Participants (Continued)

### **Joel Scheraga, Ph.D.**

National Program Director for Mercury  
Research  
U.S. Environmental Protection Agency  
Office of Research and Development  
Mail Code 8601N  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-3385  
E-mail: scheraga.joel@epa.gov

### **Michael Slimak, Ph.D.**

U.S. Environmental Protection Agency  
Office of Research and Development  
National Center for Environmental Assessment  
Mail Code 8601N  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-3324  
E-mail: slimak.michael@epa.gov

### **Anita Street**

U.S. Environmental Protection Agency  
Office of Research and Development  
Office of Science Policy  
Mail Code 8104R  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-3626  
E-mail: street.anita@epa.gov

### **Kevin Teichman, Ph.D.**

Director, Office of Science Policy  
U.S. Environmental Protection Agency  
Office of Research and Development  
Office of Science Policy  
Mail Code 8104R  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-6705  
E-mail: teichman.kevin@epa.gov

### **Betty Wonkovich**

U.S. Environmental Protection Agency  
Office of Research and Development  
Mail Code 8101R  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-6989  
E-mail: wonkovich.betty@epa.gov

### **Harold Zenick, Ph.D.**

Acting Director, National Health and  
Environmental Effects Research Laboratory  
U.S. Environmental Protection Agency  
Office of Research and Development  
National Health and Environmental Effects  
Research Laboratory  
Mail Code D305-01  
Research Triangle Park, NC 27711  
Phone: 919-541-2281  
E-mail: zenick.hal@epa.gov

### **Paul Zielinski**

U.S. Environmental Protection Agency  
Office of Research and Development  
Office of Science Policy  
Mail Code 8104R  
Ariel Rios Building  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460  
Phone: 202-564-6772  
E-mail: zielinski.paul@epa.gov

**31<sup>st</sup> EXECUTIVE COMMITTEE FACE-TO-FACE MEETING****DRAFT AGENDA****February 13-14, 2006**

Grand Hyatt Hotel

1000 H Street, NW

Washington, DC

Tel: (202) 582-1234

**Monday, February 13, 2006**

8:00 a.m. – 8:30 a.m.	Registration	
8:30 a.m. – 9:00 a.m.	AA/ORD Remarks	Dr. George Gray, Assistant Administrator for Research and Development
9:00 a.m. – 9:30 a.m.	Welcome and Introductions - Review of September Meeting Minutes - Reports/Letters Transmitted to ORD - Overview of Agenda	Dr. James H. Johnson, Jr. Chair, Executive Committee
9:30 a.m. – 9:45 a.m.	BOSC DFO Remarks - Administrative Issues	Lori Kowalski, Office of Research and Development
9:45 a.m. – 11:00 a.m.	Subcommittee Reports Global Change Program Review - Chair Presentation  - Discussion	Dr. Milton Russell, Subcommittee Chair BOSC Executive Committee
11:00 a.m. – 11:15 a.m.	Break	
11:15 a.m. – 12:30 p.m.	Subcommittee Reports (Continued) Land Restoration and Preservation Program Review - Chair Presentation  - Discussion	Dr. Charlie Menzie, Subcommittee Chair  BOSC Executive Committee
12:30 p.m. – 1:30 p.m.	Lunch	
1:30 p.m. – 3:00 p.m.	Subcommittee Reports (Continued) - Management Multi-Year Plan Workgroup Review	Dr. James H. Johnson, Jr. Chair, Executive Committee

	- Water Quality Program Review	Dr. Herb Windom, Subcommittee Chair
	- Science to Achieve Results (STAR)/Greater Research Opportunities (GRO) Fellowship Program Review	Dr. Cliff Duke, Subcommittee Chair
	- Computational Toxicology	Dr. George Daston, Subcommittee Chair
	- Technology for Sustainability Research Program Review	Dr. John Giesy (Proposed Chair)
3:00 p.m. – 3:30 p.m.	Technology for Sustainability	Dr. Alan Hecht/Dr. Gordon Evans, Office of Research and Development
3:30 p.m. – 3:45 p.m.	Public Comment	
3:45 p.m. – 4:00 p.m.	Break	
4:00 p.m. – 5:00 p.m.	Risk Assessment Workshop - Draft Letter Report	Dr. Rogene Henderson, Workgroup Chair
5:00 p.m. – 5:30 p.m.	SAB Activities	Dr. George Lambert, SAB Liaison to the BOSC
5:30 p.m.	Adjourn	

## **Tuesday, February 14, 2006**

8:30 a.m. – 8:45 a.m.	BOSC Issues - ORD Update	Dr. William Farland, Acting Deputy for Science for Research and Development
8:45 a.m. – 10:15 a.m.	BOSC Program Reviews - ORD Responses	ORD National Program Directors
10:15 a.m. – 10:30 a.m.	Break	
10:30 a.m. – 12:30 p.m.	Discussion - Emerging Science Issues	BOSC Executive Committee, ORD Executive Council
12:30 p.m. – 1:00 p.m.	Future Discussion/Future Business - Meetings in 2006 - Other Business	Dr. James H. Johnson, Jr. Chair, Executive Committee
1:00 p.m.	Adjourn	