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

BOARD OF SCIENTIFIC COUNSELORS EXECUTIVE COMMITTEE MEETING

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May 15-16, 2003

Thursday, May 15, 2003

Welcome and Introductions

Dr. Jerry Schnoor (University of Iowa), Chair of the Board of Scientific Counselors (BOSC) called the meeting to order at 8:25 a.m. He welcomed everyone to the May meeting and recognized Dr. Michael Clegg, a toxicology expert at the University of California–Riverside, as the newest member of the BOSC. In addition, Dr. Schnoor made several announcements. Dr. James Johnson (Howard University) has been appointed the Vice Chair of the BOSC, and Dr. William Farland (EPA/ORD) is the new liaison from EPA Office of Research and Development (ORD) to the BOSC. Dr. Schnoor thanked Dr. Peter Preuss (EPA/NCEA) for his many years of successful service as the liaison to the BOSC. Dr. Schnoor indicated that the purpose of this meeting was to glean conclusions and recommendations regarding ORD's communications from today's presentations. He then asked Dr. Ann Bostrom (Georgia Institute of Technology) to provide an update on the efforts of the Communications Ad Hoc Subcommittee in reviewing ORD's communication of research results.

Summary of Findings on Communication of Research Results from the Laboratory/Center Review

Dr. Bostrom indicated that the BOSC Communications Ad Hoc Subcommittee was convened to examine how EPA ORD research results currently are communicated, both within and beyond the Agency, and how they might be more effectively communicated. The Subcommittee's immediate goal is to help ORD more effectively disseminate its research products, to explain their significance, and to assist others inside and outside the Agency in applying them. To make progress toward this goal in a short time-frame, the Subcommittee decided to focus on communications innovations, identifying one or two innovations of interest for each Laboratory and Center. The Subcommittee members also reviewed the responses submitted by the Laboratories and Centers regarding the communications question included in the 2001-2002 Laboratory/Center review conducted by the BOSC. That review included a question regarding the communication of research results within the organization (i.e., Labortatory/Center), within ORD, within EPA, to outside agencies, and to the outside world. After reviewing the responses to these questions, the Communications Ad Hoc Subcommittee developed the following findings and recommendations regarding ORD's communication of research results:

- ✧ Communicating research results is an (often self-identified) area of importance and desired improvement for the Laboratories and Centers.

- ✧ The Laboratories and Centers have not formally identified, characterized, or prioritized the audiences for their research results.

- ✧ Ongoing documentation and assessment of the quantity and quality of research results communications, covering a range of communications as well as processes and products, are lacking.

- ✧ Passive information provision (e.g., Web pages and journal publications) is central to the current efforts to communicate research results.

- ✧ Several of the Laboratories and Centers have insufficient communications expertise on their staffs to improve their communication of research results.

- ✧ There are specific cases of good communications practices that could be useful for the Laboratories and Centers to share.

The Subcommittee used the responses to the communications question to guide the selection of innovations for further review. Representatives from each of the five Laboratories and Centers are here today to present their responses to this question and describe these communications innovations. Dr. Bostrom thanked Mike Moore (EPA/ORD) and Michael Brown (EPA/ORD) for their assistance in planning and organizing this meeting. She noted that one of the goals of this meeting is to share best communication practices within ORD and outside the Agency and to identify opportunities for ORD to improve the effectiveness of its efforts to communicate research results.

AA/ORD Remarks

Dr. Paul Gilman, Assistant Administrator for Research and Development (AA/ORD), informed the BOSC that the National Academy of Sciences' (NAS) National Research Council (NRC) had completed its review of EPA's Science to Achieve Results (STAR) program, and the preliminary report has been provided to the BOSC (in the meeting notebook). In a recent press release on this review, the Academy stated that the "STAR program has established and maintained a high degree of scientific excellence." It has established a rigorous, independent peer-review process for selecting grant awardees and funds scientists with impressive track records. The NRC report indicated that the STAR program is on a par with, and in some respects exceeded, the grants programs of the National Institutes of Health (NIH) and the National Science Foundation (NSF), which is remarkable given that the STAR program has only been in existence since 1995. Dr. Gilman commended former AA/ORD Bob Huggett and the NCER staff for their excellent work in establishing and building such an outstanding grants program. He mentioned that there are a number of recommendations in the NRC report to improve the STAR program and one concerned better communication of research results. Therefore, it is appropriate that the BOSC has undertaken an effort to examine ORD's communication efforts. Dr. Gilman asked the BOSC to help ORD figure out what needs to be done to improve its communication of research results. He considers communications a critical component of ORD's research program.

Dr. Bostrom asked if ORD had made any efforts to hire staff with communications expertise. Dr. Gilman replied that his new Associate Assistant Administrator, Michael Brown, is an expert in communications. Dr. Gilman noted that this demonstrates his commitment to improving ORD's communications efforts. The Administrator and Deputy Administrator are trying to bring about attitudinal and stuctural changes that support communications. Early communication of research results is essential for the conversion of scientific knowledge to policy decisions and the subsequent acceptance of those decisions.

Dr. Rogene Henderson (Lovelace Respiratory Research Institute) asked about the future of the STAR program. Will the funding be expanded? Dr. Gilman replied that the funding for the STAR program is about one-third that of the grants programs of NIH and NSF. He also noted that the research funded by STAR is unique; it differs from the research conducted by NSF and the National Institute of Environmental Health Sciences (NIEHS). Nevertheless, EPA still struggles to maintain the current $100 million level of funding for the program. He mentioned that the growth rate for the STAR program has been about 1.6 to 1.9 percent, while the growth rate of NIH grants has been about 50 percent. Dr. Gilman

stated that Region 1 has expressed interest in meeting with STAR researchers to learn about their research and to identify Region-specific issues and concerns. Region 1 also has asked about the possibility of converting some of the grants to cooperative agreements so that the Regional staff can collaborate with the researchers. Dr. Gilman pointed out that this is a good testimony for the value of the STAR program. Dr. Robert O'Keefe (Health Effects Institute) said that EPA funds considerable research but does not always get the credit. Dr. Gilman replied that the National Center for Environmental Research (NCER) is trying to implement procedures to ensure that EPA is acknowledged by the STAR researchers.

Dr. Schnoor asked about the recent EPA Science Forum. Dr. Gilman responded that the second Agency-wide Science Forum was held May 5-7 at the Ronald Reagan Building in Washington, DC. Last year, the Forum attendance was under 700, and this year it was attended by more than 1,100; of which about 40 percent were from outside EPA. Dr. Gilman noted that this year's Forum focused on partnering and included a large poster session. He said that there was more effort this year to involve the Program Offices in presenting at the various sessions; next year, there will be more effort on drawing in other federal agencies and organizations that work with EPA.

Dr. Schnoor asked about Dr. Gilman's vision for future BOSC efforts. Dr. Gilman replied that he would like the BOSC to provide more pragmatic and project-specific input than it has in the past. Also, he wants to involve the BOSC more at the front-end of the research process. He would like to continue the briefings, such as those on computational toxicology and biotechnology, and to obtain letter report responses on a shorter schedule than past BOSC reports. Dr. Gilman also mentioned the need for BOSC input regarding risk assessment methods and guidance. EPA needs to examine its past practices; identify those that should not be continued as well as those practices that rely too heavily on assumptions. Once EPA has completed this examination, it should seek input from external organizations to determine if its practices are on track and in sync with common practice. EPA also needs to determine if its risk assessment guidance is being used in the field. Dr. Schnoor commented that risk assessment would be a good topic for the BOSC, and he agreed to work with Drs. Gilman and Farland to develop a plan for BOSC input on risk assessment.

Michael Brown (EPA/ORD) identified some specific indicators of Dr. Gilman's commitment to improving ORD's communications. Last week, ORD was granted the authority to issue its own press releases; previously, all press releases were issued through the Office of Public Affairs. This is a major milestone for ORD. In the past several months, Mr. Brown has provided communications training for approximately 100 ORD staff, both in person and via teleconference and computer, and he plans to conduct more communications training sessions in the future. ORD also is establishing a list serv to communicate the results of its research. He noted that the mainstream media are becoming more interested in ORD's activities. Dr. Gilman recently met with 15 journalists, including representatives from the *Wall Street Journal* and *New York Times,* to discuss communications. He pointed out that it is no longer just the trade press that is interested in ORD's activities. The EPA Administrator is making visits to the Laboratories and Centers to show her support for science and these visits offer opportunities for media coverage and the communication of ORD science. Mr. Brown encouraged the BOSC to ask the Laboratories and Centers if their communications staff report to senior management. Do the communications staff participate in senior-level staff meetings? Mr. Brown stressed that communications staff should report to the top of the organization, as it does in industry and academia. He asked that the BOSC consider this as a recommendation to ORD. Dr. Dorward-King (Rio Tinto) asked if there were plans to expand communications training within ORD. Mr. Brown replied that the individuals who are involved in communications have received the training; future training sessions will be opened to others who are interested in communications.

Dr. George Daston (Proctor & Gamble) asked if there were plans to centralize communication coordination within ORD. Mr. Brown responded that he preferred establishing goals and objectives for

communication and allowing the Laboratories and Centers to develop their own mechanisms and procedures for achieving them. However, he believes that communications staff across ORD should report to top management and be involved in senior staff meetings. The information to be communicated is best determined with the communications leader at the table.

National Center for Environmental Research (NCER)

Jack Puzak, Acting Director of NCER, identified the Center's primary communication tools, which include: annual research progress review workshops; STAR Regional Environmental Science Seminars; news releases and advisories; publications such as STAR Reports, State-of-the-Science Reports, SBIR Success Stories, and Workshop Proceedings; Web posting of annual, progress, and final reports, as well as Requests for Applications, science pages, search engines, news and events, personalized pages, and research capsules; quarterly updates on grant awards; NCER Presents and Office of Environmental Information (OEI)/ORD lecture series; and the NCER warehouse.

Mr. Puzak highlighted the success of the STAR Regional Environmental Science Seminars at which STAR researchers present and discuss their work with Regional staff and managers. He reported that a pilot seminar was held in Region 1 in November 2002. For these seminars, NCER staff work closely with the Region at which the seminar is to be held to ensure that the seminar covers the research topic(s) of interest to the Region. State and tribal representatives also are invited to attend the seminars. Six more STAR Regional Environmental Research Seminars are planned during the remainder of FY2003 (Dallas, May 28; Chicago, June 17; Kansas City, August 13; Atlanta, September 10; San Francisco, October 8; Philadelphia, September/October). Mr. Puzak indicated that the audiences for these seminars include Regional staff and managers, state and tribal environmental representatives, local media, industry, and university professors and students.

The communication goals of the STAR Regional Environmental Science Seminars are to: (1) make staff and managers aware of the STAR research being conducted at local universities, (2) let Regional staff know that they can contact grantees for information, (3) inform the Region about the NCER Web Site and other grants that they could use in their work, (4) provided research information to state/tribal agencies, (5) determine whether other Regions would like to plan seminars, and (6) inform the public through the media. Other communication tools used to achieve these goals include a Regional Web site, a brochure that is mailed to state agencies and provided to Regional staff and managers, e-mails that are sent to staff from the Region's management, and notification of local media. Mr. Puzak spoke of the success of the Region 1 seminar held last November. The presentation topics included drinking water, air pollution and human health, harmful algal blooms, water and air monitoring, mercury, funding land conservation, phytoremediation, and climate change.

The success of the Region 1 seminar was measured by a number of factors. More than 200 people attended the opening session, and more than 90 people attended the scientific sessions. In addition, there was high attendance by Regional staff and management as well as attendance from state agencies, nonprofits, industry, universities, and other federal agencies. The written feedback from participants was overwhelmingly positive and verbal feedback from the STAR grantees was positive. Another indicator of the success of the Region 1 seminar is that six other Regions have expressed a desire to hold similar seminars. Mr. Puzak attributed the success of the Region 1 seminar to the following:

- ✧ The Region asked for the information so the audience was interested in the topics.
- ✧ Upper-level management in NCER and the Region supported the seminar.

- ✧ The AA/ORD was supportive of the seminar.

- ✧ The topics were directly applicable to Regional needs.

- ✧ STAR grantees were willing to present their findings at the seminar.

- ✧ The NCER and Regional staff responsible for the seminar worked hard to make it happen.

Mr. Puzak identified a few suggestions for improving NCER's Regional seminars. These included: extending personal invitations to state agencies, rather than just sending out mailings; adding teleconference and simulcast options for those with travel restrictions; increasing the attendance of nonprofits, tribes, and academics in the Region; and sending out followup questions to participants to determine if and how the seminar information was used.

Another NCER communications innovation noted by the Communications Ad Hoc Subcommittee is the NCER Web Site. Mr. Puzak stated that the Web site conveys information on applying for research grants, fellowships, and contracts as well as research projects and their results. Mr. Puzak pointed out that the Web site was redeveloped in FY2002 and now includes an Oracle database that provides several new or improved features such as easy access to NCER research abstracts and progress and final reports, dynamically generated pages that are automatically updated, improved and flexible search results reports and tailored search functions, links to results and investigator publications, and the ability to pass NCER data to other databases such as Environmental Information Management System (EIMS), Science Inventory, and Web Inventory. The Oracle database contains 2,600 research project abstracts, 1,500 progress reports, 1,000 final reports, 16,300 investigator publication bibliographic citations, 4,800 journal article bibliographic citations, and 500 full-text pdf journal articles. More recent Web site advancements were made such as the inclusion of the projects by Region function, top awarded institutions function, highly cited researchers page, EIMS drinking water portal, science pages, New User Quick Guide, and home page research news and events. The projects by Region function allows Regions to compile grants and fellowships by state, and permits advanced sorting to generate reports by Region with state and institution sub-sorts as well as project funding amounts and state and Regional funding tallies. The top awarded institutions function facilitates the generation of reports for the top awarded institutions based on either funding or number of grants. The highly cited researchers page was compiled using ISI's highly cited researchers list and it identifies the most highly cited investigators funded by NCER. It is linked to contact, abstract, progress, and publication information, and there are plans to link to highly cited publications and citation rates. The page also conveys the relevance of the investigator's publications in the scientific literature. The EIMS drinking water portal groups ORD projects related to drinking water covering topics such as microbial/disinfection byproducts, arsenic, and contaminated candidate list. The Office of Water (OW) will use the data shared through this portal for its upcoming DRINK database. The science topics pages on the NCER Web Site show NCER goals, requests for applications, grant recipients, and results for multiple years on a particular science topic. These pages convey the breadth, direction, and success of NCER research for a specific science topic.

Mr. Puzak identified several indicators of success used by NCER to determine the effectiveness of its Web site. The Web statistics show high usage of the site (i.e., about 40,000 users and more than 500,000 hits per month, and the number of list serv subscribers also has increased at an average of 34 percent since 1999. Currently, there are more than 11,000 list serv subscribers. NCER also receives positive feedback on the Web site from Project Officers, the ORD Web group, Regional scientists, and ORD management.

Mr. Puzak attributed the success of the NCER Web Site to its design, which meets the specific needs of several user groups. He noted that early and frequent communication was critical for identifying the initial requirements and it has been essential in defining evolving needs. NCER's quick response to

Regional feedback concerning the Web site, resulted in the development of tools to meet Regional needs. Mr. Puzak added that frequent communication with OEI has helped improve database efficiency and search times. He noted, however, that the NCER Web Site could be improved by developing better tools to assess user satisfaction and the use of research results. NCER has prepared an online user survey (http://www.epa.gov/ncer/draftsurvey) and plans to develop a database to analyze survey feedback over time, as well as a tool to analyze the e-mail inquiries received via the Web site. NCER also could improve the dissemination of results used to support EPA rulemaking by developing a new list serv for the Program Offices. He pointed out that the Web Site user survey was suggested by the BOSC during its second review of NCER to ascertain user satisfaction and needs that could lead to further improvements.

Dr. Rae Zimmerman (New York University) asked how NCER staff respond to the inquiries received via the Web site. Mr. Puzak responded that the Web site is designed to be both user friendly and sufficient. NCER is compiling a list of frequently asked questions (FAQs) and their responses so that these can be posted on the Web site. NCER staff think that inclusion of the FAQs on the site will reduce the number of inquiries. Dr. Anna Harding (Oregon State University) pointed out that nonprofits and tribes may have more difficulty getting access to information via the Internet. Mr. Puzak replied that NCER has not made a concerted effort to reach nonprofits, but there has been some effort to reach tribes. Dr. Caron Chess (Rutgers University) asked about the resources needed for the seminars. What are the barriers to conducting similar efforts? Mr. Puzak responded that cost is the major barrier. Some seminars were held in conjunction with other meetings to reduce the associated cost. Also, EPA staff do most of the work associated with these seminars to keep the costs down; contractors and sometimes professional societies are responsible only for the logistics. We have found this to be both cost effective and helpful. Dr. Chess asked what made it so difficult for others to emulate these seminars. Mr. Puzak replied that the most difficult part has been scheduling the seminars to ensure that the intended audience is available to attend the meeting. The regulatory deadlines of the Regional and Program Offices make it very difficult to schedule the seminars. NCER has been searching for other means to transfer this information. Dr. Herb Windom (Skidaway Institute of Oceanography) asked if NCER was attempting to hold seminars throughout the United States. Mr. Puzak replied that NCER tries to determine the best location for each seminar. For example the particulate matter seminars are held in Research Triangle Park, NC. We try to locate the seminar where it will draw the largest audience. He added that NCER is trying to conduct seminars in 8 of the 10 Regions, but the Center does not have enough staff to cover more of the country.

Myles Morse (EPA/NCER) asked the BOSC members to review and comment on the draft user survey on the Web site. He noted that the questions are geared toward obtaining information about how the user is using NCER's research results.

National Risk Management Research Laboratory (NRMRL)

Dr. Hugh McKinnon, Director of NRMRL, pointed out that communication was an important part of the Laboratory's function. He thanked Lynnann Paris, who is responsible for many of NRMRL's outreach efforts, for her help with this presentation. He noted that NRMRL has been working with EPA's Program and Regional Offices for many years, and since the ORD reorganization in 1995, the Laboratory has been moving toward an intramural-based research program.

Dr. McKinnon stated that NRMRL has three types of communications: direct, written, and electronic. The direct communications serve many nontechnical customers. Each year, NRMRL responds to approximately 3,000 telephone requests, operates a free public video library of environmental subjects, distributes hundreds of EPA general audience publications, maintains a Public Affairs liaison with local Congressional offices, and manages local media relations. NRMRL also sponsors a variety of scientific meetings. In 2002, the Laboratory reached more than 100,000 people through its exhibits.

With regard to written communications, NRMRL offers 134 technology transfer documents for distribution within and outside EPA. NRMRL's research results are published in peer reviewed journals (e.g., *Environmental Science & Technology, Journal of Environmental Engineering, Atmospheric Environment, Ground Water Monitoring and Remediation,* and *Remediation*). From 1998 to 2002, NRMRL researchers published 611 articles in 271 refereed journals. Dr. McKinnon mentioned the risk communication tool series and several publications for a general audience.

As part of its electronic communications, NRMRL creates in-house interactive multimedia CDs for training, research, and workshops/conferences. Dr. McKinnon pointed out that this innovative multimedia technology presents and enhances information in a radically new and engaging way. It incorporates digital video, audio, 3-D animation, high-end graphics, and peer reviewed content. NRMRL uses interactive CD and DVD formats that can be linked or converted to Web sites. He showed several video excerpts from conferences and training sessions.

Dr. McKinnon presented a diagram that illustrated the typical multimedia development cycle. The steps identified in this cycle were: (1) create video, audio, 3-D animation, graphics, and image media; (2) create the technical content; (3) design the interactivity structure; (4) integrate media into interactive software; (5) subject the product to peer review; and (6) obtain the necessary clearance and publish the product. Dr. McKinnon mentioned NRMRL's virtual tour as an example of this technology.

NRMRL is measuring its communications success through a Customer Satisfaction Program. This program provides a tool for measuring success and input for strengthening future products with regards to reaching the target audience, selecting topics of interest, and effective delivery to the intended audience.

Using the Pollution Prevention Workshop as an example to illustrate how NRMRL seeks customer feedback, Dr. McKinnon indicated that the customer feedback regarding the workshop rated the quality of the workshop as a 4.4 on a 1-5 scale. They also provided feedback regarding the delivery methods (i.e., direct communication, Internet postings, and guidance documents). Dr. McKinnon stated that NRMRL also uses DIALOG Science Citation Statistics to measure success. NRMRL searches approximately 4,500 scientific and technical journals for citations and uses those statistics to track improvement over time.

Dr. McKinnon identified some plans for enhancing NRMRL's communications efforts. There are plans for a NRMRL Multimedia Laboratory, which is intended to increase the use of digital technologies to enhance communications. The Multimedia Laboratory would be in a centralized location and would provide cost-effective sharing of software and hardware. He also mentioned the 3 M's—match, mold, and measure—of the Science Results Integration Program. This program is intended to: (1) integrate science results across ORD and deliver information without organizational boundaries, and (2) expand the use of ORD's research and measure outcomes. He noted that the audience is involved in all three steps (i.e., match, mold, and measure). Dr. McKinnon also mentioned three pilot projects under the program—Regional Seminars on Molecular Biology, Mercury Risk Communication, and Understanding Drinking Water Disinfection Byproducts and Microbial Contaminants. He concluded his presentation with NRMRL's communication goal: "We get the right information in the right format to the people who need it."

Dr. Bostrom asked about the results of the citation analyses. Dr. McKinnon responded that the results are not yet available. Dr. Bostrom asked for more information on the mercury risk communication pilot. Dr. McKinnon replied that it will focus on measuring the effectiveness of risk communication tools through focus group feedback. She asked who would facilitate the focus group sessions, and Dr. McKinnon replied that a contractor would serve in that role. Dr. Chess asked what format will be used for the focus groups. Dr. McKinnon indicated that the format has not been finalized and asked the BOSC for input on

this matter. Dr. Harding asked if Dr. McKinnon had any sense of how successful NRMRL's communications programs have been in changing policies or decisions. He replied that NRMRL tried to address that in the response to questions. He noted that NRMRL is involved in contributing information for policy papers and criteria documents that influence Program Office decisions. NRMRL's input is based on current risk management methods and costs. Dr. McKinnon commented that NRMRL's results are evident in EPA decisions but there is no formal method for tracking the Laboratory's input. Dr. Windom asked how NRMRL marketed its risk communication tools. Dr. McKinnon replied that these tools are marketed through the approaches he described in his presentation (e.g., they make the tools available at meetings and on the Internet). He noted that they have not yet received any feedback on the tools.

National Center for Environmental Assessment (NCEA)

Dr. Peter Preuss, Director of NCEA, commented that although he no longer serves as the BOSC liaison, he will continue to support the BOSC and its efforts. He explained that NCEA focuses on: national-level assessments, risk assessment guidance, risk assessment methodology, and consultation and training. NCEA's mission is to serve "as a national resource center for the overall process of human health and ecological risk assessments and the integration of hazard, dose-response, and exposure data and models to characterize risk." NCEA's vision is to be "a high performing assessment center providing timely and high-quality risk information to environmental decisionmakers." NCEA has three divisions located in Washington, DC; Research Triangle Park, NC; and Cincinnati, OH.

Dr. Preuss defined the purpose of NCEA's Human Health Assessment Program, which is to develop contaminant-specific risk assessments on chemicals/stressors that are of high public concern. These assessments then are used by EPA, the states, and the international community. Some of the contaminants addressed by NCEA include diesel, dioxin, mercury, fuel and fuel additives, particulate matter and ozone, and polychlorinated biphenyls (PCBs). The purpose of NCEA's Ecological Risk Assessment Program is to: (1) improve the science of ecological risk assessment, (2) develop ecological risk assessment approaches, and (3) integrate human dimensions into ecological risk assessments. Dr. Preuss noted that NCEA also includes the staffs and the management of nationally recognized programs such as the Integrated Risk Information System (IRIS), Global Change Assessment, and the Risk Assessment Forum.

Dr. Preuss listed the following items as necessary for the "roll-out" of a major NCEA product: coordination across the Agency; coordination with other federal agencies and the Executive Office of the President; audience identification; accurate information; clear information; timely information; plain language information; different types of information; outreach to stakeholders; and media outreach. He used the Draft Final Guidelines for Carcinogen Risk Assessment and the Supplemental Guidance for Assessing Cancer Susceptibility From Early-Life Exposure to Carcinogens (available online at http://www.epa.gov/ncea/raf/cancer2003.htm) to describe NCEA's roll-out process. The first step is to develop a comprehensive communication plan. This plan describes the action (e.g., public comment on the draft guidelines), background, key messages, audience, expected reactions from stakeholders, detailed communication strategy, announcement notification plan, and contacts. The next step is the preparation of a *Federal Register* announcement to seek public comment on the draft guidelines. For this example, NCEA also developed fact sheets on the draft guidelines and made them available on the Internet. Other communications about the roll-out of the Draft Cancer Guidelines included briefings (press, stakeholders, and Congressional members and staff), online public questions and answers (available on the Internet), press releases/media advisories, and announcements in major U.S. daily newspapers (*The Washington Post, Los Angeles Times,* and *The New York Times*). NCEA also has developed program/issue-oriented Web pages that are user-friendly, provide one-stop shopping, focus on high-profile activities/products, and involve cross-Agency coordination. NCEA has developed Program/Issue-Oriented Web Pages for

the Risk Assessment Forum, IRIS, Global Change Research Program, and Dioxin and Draft Reassessment; NCEA was instrumental in the development of the MTBE (methyl tertiary butyl ether) Home Page and assisted OW in developing the Drinking Water Research Tracking Portal (for Intranet use).

In concluding his presentation, Dr. Preuss listed a number of NCEA's communication/outreach innovations, which included: investing in communications and outreach, building the staff, listening to stakeholders (internal and external), identifying Agency needs, working with ORD Laboratories and Centers and EPA Offices, and addressing BOSC recommendations.

Dr. Zimmerman asked if there was a way to expedite the process required to finalize NCEA documents so that they could be cited in the literature. She explained that NCEA's draft documents cannot be cited until they are finalized, which takes considerable time, making it difficult for scientists to refer to NCEA's products. Dr. Preuss responded that this may get worse before it gets better because he would like to involve outside scientists earlier in the process; however, he is taking steps to streamline the process by trying to eliminate certain steps or reduce the time they require. Dr. Daston stated that one of ORD's problems is that the Program Offices do not know what ORD is doing. Have the Program Offices found the drinking water site to be useful? Are there plans to develop other sites with the Program Offices? Dr. Preuss replied that the drinking water site has been very useful to the Office of Drinking Water, and that Office would like NCEA to keep the site up to date. He added that NCEA has created some similar sites. For example, NCEA worked with the Health Effects Institute (HEI) on a large database on air that is publicly available. The Center also has worked on a similar product on endocrine disruptors. He mentioned that the Science Inventory should provide individuals both inside and outside the Agency the ability to identify the research EPA is doing on a particular topic. Dr. James Bus (Dow) asked how NCEA plans to meet the challenge of keeping IRIS current. Dr. Preuss explained that IRIS contains data on about 550 chemicals. This information has been developed over the past 2 decades. The data on many of these chemicals are outdated and do not follow the conventions of modern science. The two staff members who were assigned originally to the task of updating IRIS could not possibly keep the data on all 550 chemicals up to date and they relied on information provided by others in the Agency. However, Dr. Gilman and Congress have made it possible to obtain additional funds and staff to meet the challenge of updating IRIS, but it will take some time to accomplish the task.

National Exposure Research Laboratory (NERL)

Dr. Gary Foley, Director of NERL, introduced Cindy Yu, who leads NERL's communications efforts. He stated that Ms. Yu reports directly to him and meets regularly with senior staff at NERL. Dr. Foley indicated that his presentation would address NERL's communication goals, NERL's delivery and feedback system, and two of NERL's specific communication innovations.

NERL's communication goals are: (1) raising awareness of NERL's relevant high-priority research; (2) engaging all NERL staff in the communication effort; (3) ensuring that all NERL staff can articulate the work being done at the Laboratory to a variety of audiences; (4) sharing and showcasing NERL's research through the right channels and at the right times; and (5) keeping NERL staff aware of the communication products being produced. He presented a diagram to describe NERL's Delivery and Feedback System. He noted that it is updated every year and includes a Task Information System (TIS) that provides a production tracking system with feedback loops to communicate the research through publication in scientific journals, posting on the Internet, and inclusion in the Agency's Science Inventory.

One of NERL's communication innovations noted by the BOSC's Communications Ad Hoc Subcommittee is the research abstracts (RAs). For the past 4 years, NERL has posted its RAs on the

Web. These abstracts are intended to highlight outstanding research that would draw attention both within and outside the Agency. They communicate in "plain English" and link NERL science to regulatory, public health, and policy outcomes. These RAs also are intended to encourage discussion of other types of communication that may be helpful to clients, reduce inquiries about how NERL's research should be interpreted and communicated to others, and simplify the annual process of reporting major accomplishments.

Each research abstract must go through a clearance process, which includes: (1) entering data for the RA into the TIS with built-in approvals similar to other tasks; (2) preparing the RA for every significant research output/outcome (including Annual Performance Measures); and (3) transmitting the approved abstract to the client, along with a peer-reviewed major product. NERL produces approximately 20 to 40 RAs each year and they are disseminated by the Laboratory Director, Deputy Laboratory Director, Associate Directors for Health and Ecology, Assistant Laboratory Directors (ALDs), and scientists. The RAs are posted in the TIS and on the NERL Web Site. Dr. Foley noted that additional notification of potential audiences and further marketing are necessary for RAs.

The second NERL communications innovation described by Dr. Foley is the scientist to scientist workshops. NERL has taken a leadership role for 30 of these workshops, including one on models, one on the lessons learned at the World Trade Center, and one on the use of genomics for measuring endocrine disrupting compounds. Dr. Foley elaborated on a specific scientist to scientist workshop—the Biological Assessment and Criteria (BAC) Workshop. This workshop was co-sponsored by EPA and the National Council of State Governments, and NERL worked closely with OW to identify experts and coordinate the workshop. It was attended by 246 biologists from 47 states, 26 tribes, and 1 territory. The workshop consisted of 5 days of training (including 4 tracks with 18 courses), informal meetings, and problem-solving sessions. Dr. Foley identified a number of benefits to the workshop participants, which included direct technology transfer from EPA scientists, seeing other states demonstrate the use of EPA tools, and greater use and higher esteem of EPA science. He also listed a number of benefits for NERL: facilitation of the use of research methods, tools, and models; direct communication and interaction with end users of science; and fortification of relationships with customers inside and outside the Agency. Dr. Foley indicated that continued improvement is important and should include broader outreach to stakeholder clients and placing more emphasis on integrating products across ORD.

Dr. Foley stated that NERL's research is successful only if it is completed on time, it is of high quality, it is completed within cost, it is delivered to the client, and the client is using it either directly or indirectly. However, this is not enough to define success. NERL wants the client to use the research results to make better environmental decisions that have a positive impact on the environment. Dr. Foley stressed the need to integrate products across ORD and he noted the need for continual improvement—to do a better job of working with clients earlier in the process and ensuring that clients understand how to use the tools developed by NERL. Dr. Windom asked how NERL determines if clients are using the Laboratory's products to make better environmental decisions. Dr. Foley responded that it is not enough to disseminate the products; it is essential that NERL staff spend time with users to ensure that they understand the products and know how to use them. Dr. Dorward-King asked how NERL was going to identify other clients that could benefit from NERL's products. Dr. Foley replied that NERL needs to attract more users/stakeholders to these scientist to scientist meetings. Dr. Dorward-King pointed out that a key audience may be decisionmakers who are not scientists but need to understand the science to make decisions. She noted that NERL may need to use another mechanism to reach these users. Dr. Foley acknowledged that if a decisionmaker does not have scientific support staff, then it may be difficult to reach them through this mechanism. Scientific support staff are instrumental in helping decisionmakers understand the science and how to use the tools that are available. He noted, however, that NERL does not have the resources to reach beyond the scientific support staff at this time.

Dr. Bus asked Dr. Foley to expand on how NERL engages outside clients/users in developing a research strategey for exposure. Dr. Foley stated that, in some instances, NERL has engaged a number of outside clients early in the process, but that does not happen across the board. NERL is actively seeking client interaction in the very early stages of research development. The first step is to determine the gaps, the decisions the client is making, and the perceived timeline of the client. Dr. Foley stressed that it is important to listen to the client. Next, NERL conducts an analysis and makes suggestions on what NERL can do to assist the client in making the decisions. Dr. Rogene Henderson praised the success of the scientist to scientist workshops. She pointed out that the problem may be in trying to get the scientist to talk to the regulator and then the regulator to talk to the stakeholders in a meaningful way. She commented that NERL may need to devote some resources to addressing this issue. Dr. Foley pointed out that there are many scientists who only have time to find the science they need and use it. He noted that NERL is trying to focus on these scientists. Dr. James Clark (Exxon Mobil) asked if NERL scientists are interacting with their peers at other federal agencies such as the U.S. Geological Survey (USGS). Dr. Foley explained that a Memorandum of Understanding (MOU) was signed recently between EPA and the National Oceanic and Atmospheric Administration (NOAA) to encourage research collaboration between peers on the issues of climate change, air quality, and the movement of pollutants through the atmosphere and marine food chain. EPA also has an MOU with the USGS, through which NERL is trying to engage USGS in a persistent toxic substances monitoring program to investigate the link with uptake in humans and wildlife. The goal of this collaboration is to determine if current efforts to reduce persistent toxic substances are effective.

National Health and Environmental Effects Research Laboratory (NHEERL)

Steven Hedtke, Deputy Associate Director for Ecology at NHEERL, pointed out that NHEERL has nine Divisions and two field stations in eight different geographic locations, which makes communications a challenge even within the organization. Mr. Hedtke described NHEERL's best practices for communicating research results. He emphasized that communications should occur at all levels, and that there is more to communicating research than just developing and disseminating products. He stated that NHEERL's communication goals are to: (1) be accurate and innovative in communicating research results to a wide variety of audiences, (2) provide the tools to NHEERL scientists to assist them in communicating their research, and (3) inform decisionmakers.

NHEERL's communications program practices involve clearly defining the audience; using a high-quality, audience-appropriate writing style; and using modern, graphics-rich formats. In addition, NHEERL believes that obtaining feedback from NHEERL and ORD scientists, management, and staff; Program Offices and Regions (through scientists and NHEERL ALDs); and the scientific community and public regarding publications and requests for information is very important to improve future communications efforts. Mr. Hedtke presented a diagram that listed some of the communication products produced by NHEERL, including Coastal Communications, journal articles, high profile reports, science reports, and annual reports, each of which has different objectives, target audiences, and measures of success.

Mr. Hedtke indicated that the objectives of the Coastal Communications are to: (1) provide an alert to upcoming/ongoing research in a region of interest, and (2) improve recognition of ORD's role in coastal research. The target audience for the Coastal Communications includes scientists and managers within coastal communities. Two of the measures of success for this product are the receipt of requests to be added to the distribution list and the positive feedback from users.

Results of NHEERL research often are reported in journal articles. The objectives of publishing in peer reviewed journals are to: (1) report on scientific advances discovered by NHEERL researchers, and (2) build the scientific credibility of NHEERL staff. The target audience for these articles is the scientific

community. The measures of success used by NHEERL are the approximately 260 articles published in journals each year and the receipt of awards such as EPA Honor Awards, Science and Technological Achievement Awards, and awards from professional societies.

NHEERL research results are sometimes communicated in high profile reports. These reports are intended to rapidly release scientific findings on particularly "hot" topics, and they target decisionmakers, the scientific community, and the public. Measures of success for these reports include feedback from Program Offices and Regions, the number of copies requested from the EPA Warehouse, and the number and type of requests received by ORD and the NHEERL communications team.

Science reports are produced by NHEERL to report on scientific advances and they target Agency staff and the scientific community. Measures of success for the science reports include feedback from NHEERL and other EPA scientists, as well as the Program Offices and Regions.

NHEERL prepares an annual report each year that makes research highlights available to a wide audience, including government agencies, Congress, the scientific community, and the interested public. Measures of success for the most recent annual report include: requests received by the EPA Warehouse for 1,900 publications; numerous requests from NHEERL ALDs, Program and Regional Offices, and the public; the NHEERL annual report served as a model for the ORD Accomplishments Report (Spring 2002), and receipt of an award of merit for design excellence from the Society for Technical Communications. Mr. Hedtke acknowledged that one of NHEERL's biggest challenges is measuring the success of its communications efforts. How can we tell our communications are working?

Dr. Chess expressed appreciation for NHEERL's focus on obtaining input from stakeholders. She asked Mr. Hedtke to return to the diagram of products he presented and identify at what point that input is sought, for example, with the Coastal Communications. Mr. Hedtke replied that the stakeholder input to which he was referring in his presentation concerned the research planning process rather than the communication process. He added that stakeholder input is important in planning the research and in deciding what type of communication plan to use, but he was not certain where it would fit in the diagram. Mr. Hedtke said that NHEERL's Communications Team Leader could possibly answer that question but she was unable to attend the meeting. Dr. Johnson commented that it appears that NHEERL has not sought input regarding communications planning and has relied on a trial-and-error type approach to determining the type of communications to implement. Mr. Hedtke replied that NHEERL tries to obtain user feedback for all its communication mechanisms. He pointed out that it is easier to count citations of NHEERL publications than it is to measure the impact of NHEERL research results. He acknowledged that NHEERL's process could be improved.

Dr. Harding asked for some examples of feedback that NHEERL has received from constituents and an explanation of what the Laboratory did with that feedback. Mr. Hedtke replied that most of the feedback NHEERL receives is positive. For example, the Laboratory received tremendous feedback on the quality of the Coastal Communications, but the feedback did not include any suggestions for improving them. NHEERL also received some feedback on the quality of the information contained in its annual report. Dr. Clark asked Mr. Hedtke to elaborate on when the communications staff get involved with a product. Mr. Hedtke responded that the communications staff are involved in many of the communication products from the early stages, including the high profile reports, science reports, and annual reports. He added that the role of the communcations staff increases as the product goes through the preparation process; however, the scientist must remain involved to ensure that the science in the product is correct.

Dr. Dorward-King asked if NHEERL perceives that it is important to do a better job in communicating its research results. Are there plans to put a process in place to systematically improve communications? Mr. Hedtke replied that NHEERL recognizes the importance of improving its communications and the

staff are anxious to hear about about the best communication practices of the other Laboratories/Centers, and other agencies and organizations.

In responding to the two questions posed earlier by Mr. Brown, Mr. Hedtke commented that NHEERL's Communications Team Leader does not report to the Laboratory Director and does not participate in senior staff meetings. Dr. Bostrom asked if NHEERL was considering changing the reporting structure for its communications team, and Mr. Hedtke replied that the communications team is located down the hall from the Laboratory Director so although the leader of the team does not report directly to the Director, she does interact with him on a routine basis. Michael Moore (EPA/ORD) pointed out that Mr. Hedtke had not mentioned the NHEERL's many conferences or its other types of communications. Mr. Hedtke replied that his presentation was not intended to be comprehensive; it did not mention the communications training that all NHEERL staff must complete, nor the biannual and annual workshops sponsored by NHEERL.

Office of Science Policy (OSP)

Dr. Kevin Teichman, Director of OSP, explained that OSP performs three major roles within ORD: science integration, science coordination, and science communication. To integrate science, OSP develops unified ORD positions on the use of science, manages the ORD research planning process, and coordinates the implementation of Agency science policies. To coordinate science, OSP ensures that ORD's research addresses EPA's priorities, brings together ORD and the 10 EPA Regions, and manages ORD's program support function. To communicate science, OSP represents ORD to tribes, states, and local communities, and sponsors colloquia, workshops, and scientific meetings. OSP's primary target audience is EPA's Program and Regional Offices; OSP's secondary target audiences include state and local governments, tribes, the environmental justice community, other federal agencies, professional societies and associations, and the general public.

Dr. Teichman stated that OSP reaches its audiences for science integration through progress reviews; meetings with Program and Regional senior management; and the Program Support Priorities List. OSP reaches its audience for science coordination through the Research Coordination Teams (RCTs); scientist to scientist meetings; Tribal Science Council; National Environmental Justice Advisory Council; and workshops, symposia, and colloquia. OSP reaches its audiences for science communication through the ORD Accomplishments Report, OSP Quarterly Report, and Web sites/portals. Dr. Teichman used the Regional Science Source Book as an example of a successful OSP communications tool. The Regional Science Resource Book was initiated by OSP to provide each Deputy Regional Administrator (DRA) with information on research in his/her Region. It was prepared for a Region-ORD Summit, held in Atlanta on September 25, 2002, that was attended by senior leadership from ORD and each EPA Region. The Regional Science Resource Book was considered a success by OSP because:

- ✧ OSP received positive feedback from the DRAs.
- ✧ The AA for the Office of International Affairs (OIA) requested a similar book for international research activities.
- ✧ The book was used as a "scorecard" to track progress on action items.
- ✧ The book was used as a reference by both ORD and Regions in subsequent meetings.

Dr. Teichman attributed the success of the Regional Science Resource Book to the support of the AA/ORD, the commitment of ORD to expend the necessary resources to produce the book, the contributions by ORD Laboratories and each EPA Region, and the usefulness of the information to

DRAs. He identified a number of challenges to developing additional resource books, including the cost of producing them, preparing books that are useful to a specific audience, collecting the information to include in the book, and keeping the book current.

A second example of a successful OSP communications product is the Region-ORD Critical Ecosystems Workshop. The topics of the workshop were initiated by the Regions, and the workshop was intended to improve the participants' understanding of the science completed, underway, and needed for ecological assessments. The outputs of the workshop included presentations, papers, and a proceedings report. Dr. Teichman stated that the workshop resulted in a better understanding of science issues and needs, and development of a network of Regional and ORD scientists who will collaborate beyond the workshop.

Dr. Teichman summarized his presentation by stating that OSP's communication matches its roles of science integration, coordination, and communication. OSP's audiences are its clients and stakeholders, and the communication tools developed by OSP can be resource intensive; however, they can pay large dividends in furthering ORD's role of providing science to support EPA's mission. Dr. Teichman noted that journal articles are not the best source of scientific information for decisionmakers; better environmental decisions will be made only if managers and policymakers have a better understanding of the science, and that will require communicating by less traditional means.

Dr. Steven Lewis (Exxon Biomedical Sciences, Inc.) asked about metrics and instruments for measuring improved understanding. Dr. Teichman pointed out that if the Agency's scientific basis for its decisions/policies is better understood by stakeholders there will be fewer comments questioning the science behind the decision/policy. The use of science should make the regulations scientifically defensible. EPA is doing more to communicate the impact of its research. For example, EPA invited those who have used Agency science in making a decision that achieved a positive environmental impact to share their experiences at the recent EPA Science Forum.

Dr. Bostrom asked if OSP had examined the cost effectiveness of its communication efforts. Dr. Teichman replied that OSP has not undertaken any efforts to assess the cost effectiveness of any product; he speculated that it might be helpful to ask the Regions how much money they would have contributed to the production of the Regional Science Resource Book. Dr. Bostrom asked why the synthesis documents mentioned by Dr. Teichman would not be subjected to peer review. He replied that although the synthesis documents are not targeted for peer reviewed journals, but they would be targeted for risk managers that need scientific information in easy-to-understand language, and these documents would be peer reviewed by the Program Offices. Dr. Schnoor suggested that OSP could possibly help other ORD groups in measuring success.

Dr. Schnoor asked the BOSC members to prepare comments on today's presentations during the evening so that they could provide their comments to the Communications Ad Hoc Subcommittee during tomorrow's session.

Particulate Matter Research Program

Dr. Dan Costa, Chief of the Pulmonary Toxicology Branch at NHEERL and Acting ORD Particulate Matter (PM) Program Manager from January 2002 to October 2002, provided some background information about ORD's PM Research Program. In 1998, Congress added $22.4 million per year to ORD's $27.8 million budget to address PM research. ORD based its PM research strategy on the 11 issues identified in NRC's first report on PM research needs. Since that report, NRC has published two additional reports on PM research needs and recommended a multi-year portfolio of the highest priority research topics.

The add-on Congressional funding in 1998 was a substantial investment into the PM issue and as the 5 years drew to a close, the idea emerged within ORD that a "highlights" report with an assessment of program productivity and advances in knowledge would be appropriate and timely. It also could lay out a conceptual plan to address remaining important knowledge gaps. This report became known as the PM Synthesis Report.

Dr. Costa described the history of the development of the PM Synthesis Report. The "idea" and the "need" for the report emerged in January 2002, and the conceptual plan and schedule for the report were developed from April to June. The sections of the report were drafted from August to October, a full draft with appendices was produced in October, revisions were made through February 2003, a near final draft was prepared by March 15, Dr. Gilman was briefed on March 27, and final editing of the report is ongoing. It is expected to be completed in June 2003.

The report is intended to communicate the PM Program to diverse clients (e.g., AA, Congress, NRC, management, investigators) in a succinct and positive manner. It captures the essence and highlights of the program over its 5-year funding augmentation, in light of the NRC priorities. It provides a comprehensive and balanced report and includes a global narrative, project descriptions, budget information, and a bibliography. Dr. Costa noted that the report was designed to be very user friendly. As part of the report preparation efforts, a PowerPoint briefing was developed that could serve as a resource for AA Office presentations.

The ALDs coordinated the writing efforts to address the 11 Research Topic Areas of the NRC priority needs. Each section was laid out in a format to address the uncertainties, relevance, accomplishments, program implications, and future directions of each Topic Area. The PM Program Manager then took responsibility for the major revisions and rewriting of the report, and once the draft was completed, a number of NCER staff were asked to review it. Dr. Costa pointed out that considerable effort was expended on the Executive Summary and the 3-page overview.

The report was prepared almost exclusively by EPA staff from across ORD Laboratories and Centers. No additional funding or staff were provided for preparation of the report. Several face-to-face meetings, e-mails, and teleconferences were the primary conduits of communications among the staff working on the report and they were very responsive in performing their tasks. Dr. Costa indicated that senior managers were briefed and given an opportunity to review the report before it was submitted to the AA. Professional editors now are working to finalize the report.

Dr. Costa identified a number of lessons learned from preparing the report. It forced the program leadership to critically examine the program's accomplishments, overall plan, and future directions. Dr. Costa stated that a vested (and not contracted) and sometimes blinded effort drove the project to completion. The PM Program Manager needs more administrative support to complete such tasks, and there is a clear need for a PM Program Web site to serve as a resource for intramural and extramural scientists and regulators.

Dr. Costa stated that the success of the report is measured by the positive feedback received from many managers throughout ORD and by the support from the AA's Office. He mentioned that one of the greatest challenges to the development of the report was gaining trust among the various contributors within the Agency, especially during the time that funding shifts were being made across the Laboratories to meet the Agency's needs. However, this challenge was overcome and the document development team focused on completing the report.

Dr. Henderson asked if the PM Synthesis Report included only EPA-supported work or the work of others as well. Dr. Costa replied that the report addressed only the PM research conducted or supported

by ORD. He added that there are plans to prepare an article for publication in *Science* that describes the findings in the report. Dr. Bostrom asked when the report will be available and if there are any plans, other than the article in *Science*, to communicate the information in the report. Dr. Costa replied that the report should be available in a month or two. With regard to communicating the report's findings, there are no plans beyond the *Science* article. Dr. Bostrom asked Dr. Costa to elaborate on his statement that NCEA's bibliography was not very useful in preparing the report. Dr. Costa explained that NCEA's bibliography was developed for a criteria document, and it was designed for use by NCEA staff. Also, it resides on a system that was designed for NCEA and cannot be easily accessed by others. Dr. Bostrom also asked if there were any formal plans to assess the effectiveness of the PM Synthesis Report after its release. Dr. Costa stated that he was unaware of any formal plans to do so.

EPA Office of Air and Radiation

Prudence Goforth, Communications Director for the Office of Air and Radiation (OAR), stated that she reports to the AA/OAR as well as the Associate Assistant Administrator for Communications, Education, and Media Relations in the Office of the Administrator. Ms. Goforth indicated that her primary role in OAR is to connect to the public and end users so that they understand the science behind EPA decisions, policies, and regulations. She is in contact with the press on a daily basis and the range and complexity of the subjects that she covers is extensive. Ms. Goforth stressed the importance of communicating the research underpinning Agency decisions. She works with media as well as state and local regulators. To illustrate some of her responsibilities, Ms. Goforth mentioned that she was involved in the recent release of the Ozone Implementation Plan, and she has been involved in the 5-year review of the National Ambient Air Quality Standards (NAAQS) that is due to be released very soon.

One of her roles is to capture the interest of the reporters who are seeking 30-second sound bites. She posed the question: What do you do when you are asked to communicate something before the research and analysis has been completed? She warned against assuming that the data speak for themselves. It is essential that the communicator take the time to put the data in context. Ms. Goforth said she learned this lesson the hard way with regard to EPA's involvement with the World Trade Center. Her office received thousands of inquiries about air quality during the weeks and months following September 11. The staff were overwhelmed and, as a result, made a critical mistake in posting a massive amount of air monitoring data on the Web without giving it context. Everyone with an agenda started mining the data for their own purposes. They would focus on a 1-hour spike or a 1-day spike to exaggerate the risk. Ms. Goforth said that it has taken them months to undo the damage caused by the misinformation reported from the EPA data. She learned similar lessons when working on the anthrax incidents.

Ms. Goforth stated that the best way to get the research results used by decisionmakers is to make a connection between the researcher (technical) staff, the communications staff, and a Web specialist. This will ensure that the researcher is focusing on how the results will be announced or released and made available on the Web. This group should be asked to identify the level of interest of various audience groups and to anticipate their reactions. What concerns will be raised? Who is likely to be interested in the results? What will be of interest to the public? Ms. Goforth emphasized the importance of anticipating the worst and thinking of the best approach to communicate the information. She said that her approach is to have someone on her staff write the best story that could be released as well as the worst story. These are not for distribution outside the Agency, but they are very helpful in preparing EPA staff for release of the results.

Another issue to consider is who should be involved in releasing the information. Who will give the announcement credibility (e.g., EPA Administrator, American Lung Association)? Should the information being communicated be put in a larger context? What has been done in the past and where is it headed in the future? What relationship does this research have to issues the government is facing?

How will the research findings help or hurt a regulated organization? Knowing the answers to these questions helps to formulate an effective communication strategy.

Ms. Goforth mentioned that more and more universities and other organizations are using press conferences to announce their research results. She noted that the President's Clear Skies Initiative was announced at a press conference. Reporters should be invited to attend such press conferences and given the opportunity to discuss the results with the researchers. Other common means of disseminating research results is through fact sheets and questions and answers. Ms. Goforth stated that the Web is the best way to communicate over time, but we need to do a better job of informing users of what to expect from the links. She encouraged everyone in attendance to use their communications staff and emphasized the importance of putting the science into context.

Dr. Windom expressed some concern about over communicating so that it is difficult to hear the important messages through the noise of the many communications. He suggested the development of a hierarchy so that the important messages do not get lost. Dr. O'Keefe noted that ORD can issue its own press releases and Ms. Goforth's group is developing various messages. Is there one central voice within EPA? Ms. Goforth replied that it is EPA's policy to limit the number of individuals talking to reporters, but there is not one central voice for the Agency. She added that most interviews with large newspapers are conducted through the press office. Dr. Zimmerman said that trust is a big factor in communications. Is EPA doing anything to build trust with the media? Ms. Goforth responded that she fosters relationships with technical and program staff as well as reporters. She knows what is important to reporters and she calls them only when there is something of interest to them.

National Center for Environmental Health, Centers for Disease Control and Prevention (CDC)

Dr. Marsha L. Vanderford, Deputy Director of Communication at the National Center for Environmental Health (NCEH), CDC, emphasized the importance of being consistent in communicating information to the public. Her presentation focused on communication research associated with the National Report on Human Exposure to Environmental Chemicals. The first National Report included information on the measurement of 27 toxicants in humans at levels that were previously unknown. Most of the data compiled were baseline measurements, and there were trend data for only 3 of the 27 chemicals. In addition, most of the health effects of the toxicants were unknown.

The first report received positive feedback from scientists, and this led to the development of a second report in January 2003, which focused on 116 chemicals measured between 1999 and 2000 (most of which were first time measures). The Office of Communications received hundreds of requests for interviews about the report, and early media coverage of the report suggested that the public was interested in the report as well. In addition, previous qualitative studies suggested public desire for more information/attitudes about environmental health hazards. As a result, formative research was conducted on the communication of the reports.

The primary audiences for the first report were intended to be public health agencies, the scientific community, and policymakers. The audiences for the second report included the public, environmental advocacy organizations, and professional audiences (scientists, state and local pubic health agency staff, health care providers, federal partners).

Dr. Vanderford stated that qualitative audience research provides insights on the target audience and increases understanding of the motivations and reactions of the audience. This type of research answers the question "why" rather than "how" prevalent. It also provides access to responses the researcher might not have considered and offers insights into the core values and underlying beliefs, behaviors, and perceptions of the audience.

Telephone interviews were conducted with four focus groups comprised of people from across the United States. The participants included 20 females and 12 males ranging in age from 18 to 65+, with 21 of the 32 participants between the ages of 25 and 64. Seven of the participants had a high school degree only, one was a high school senior, five had some college, nine had a college degree, nine had some graduate school or a graduate degree, and one had an unknown level of education. The household annual income of 26 of the participants ranged from <$20K to >$60K; 5 were retired and 1 was a student. The formative research participants were located in 23 different states. The materials reviewed during the research process included news reports, fact sheets and Web information, and links to EPA information.

Findings from the formative research showed that there was personalization of the information (i.e., relationship to local events or to family's or friends' illnesses), expectations that the report would indicate high levels of exposure and dangerous health effects, and skepticism that the findings would not be used to improve public health. The findings also indicated that some individuals would prefer not to know about possible exposures.

The formative research also investigated what participants would be motivated to do (e.g., seek information, limit further exposure, seek personal testing, share information with others, talk to a physician, participate in limited activism).

The implications of the formative research findings were that: (1) communication materials should be developed specifically for lay audiences and should include FAQs to respond to questions from the public, fact sheets for public dissemination, and information posted on Web pages; and (2) audiences should be directed to credible sources where more local and personal information is available. The study also indicated that given the unknown risk, two-way communications should be available and boundaries should be placed around the uncertainty (e.g., attention should be focused on lead and cotinine, for which there are known health effects and chronological trends, with the surprise of "good news").

There were four major messages to be communicated: (1) advances in biomonitoring are a major step forward in tracking exposure; (2) it is too early to judge new baselines, but the good news is that there is a decline in exposure to lead and cotinine; (3) in time, there will be many valuable uses of the data—all of which will be aimed at protecting public health; and (4) everyone (i.e., science, government, industry, and the public) benefits from knowing more about exposures to these chemicals.

Dr. Vanderford stated that an evaluation of media coverage from March to April 2001, revealed 84 news reports (TV, radio, print, Web, and wire) and 66 print reports. A media analysis of the print coverage was conducted to determine the effectiveness of the communication strategy in emphasizing priority messages. The analysis indicated that 99 percent of the reports included one or more priority messages and these messages filled 41 percent of all print media space. In most cases, at least one of the priority messages was placed in the first third of the report.

CDC decided to assess how effectively it communicated about the first report to the primary audiences (i.e., scientists, public health staff and officials, health care providers, and federal partners), so that it could do a better job communicating the second report. Dr. Vanderford pointed out that these primary audiences are the ones who will use the report to: (1) determine if chemicals are getting into the bodies of Americans, (2) assess the effectiveness of public health efforts to reduce exposure, (3) establish reference ranges for comparison with at-risk populations or individuals, (4) track trends in levels of exposure, (5) determine whether levels are lower in different demographic groups, and (6) set priorities for research on human health effects of chemicals. The audience research was designed to obtain information from the audience regarding the relevance of the report to participants' work and professional interest, channels for accessing the report, impressions of the report, impact of the report on participants' work, evaluation of the report format, and awareness and expectations for the second report.

The audience research process involved semi-structured in-depth interviews with 54 participants (15 scientists, 13 health care providers, 13 public health officials, and 13 federal partners. Dr. Vanderford added that there was a high level of awareness of the report among certain groups of participants. The channels used for the initial notification were professional organizations, list servs, and colleagues and contacts with the CDC. The primary sources of information about chemicals and human exposure came from published literature; state and federal databases; federal agencies such as the Agency for Toxic Substances and Disease Registry (ATSDR), National Institute for Occupational Safety and Health (NIOSH), EPA, NIH, and CDC; and professional associations. Most participants expected to use the report in the future; current uses of the report included comparison with other studies, setting/changing research agendas, and serving as a model for sampling and analytic methods. Dr. Vanderford indicated that the value of the report was in providing reference ranges, a geometric mean, percentiles, and sufficient information to model the data. The participants were dissatisfied with the report because of the demographic variations and the lack of health effects, safety thresholds, criteria for selection, access to raw data, and accessibility to lay audiences. Dr. Vanderford noted that the level of awareness varied among the audience groups and most health care providers were unaware of the reports. With regard to expectations about future reports, there were some who were anticipating the next report, and they wanted to know when the next report would be released and what would it would cover.

Dr. Chess asked how the scientists responded to the qualitative data. Dr. Vanderford indicated that some of the scientists were skeptical, until they reviewed the media analysis. Dr. Zimmerman asked how to deal with taste and smell. She noted that in New York City following 9/11, people often assumed if they could smell something there was a risk. Dr. Vanderford replied that they did not capture nonverbal, sensory data because they did telephone surveys, but she suggested such data could be collected by hosting in-person groups to get a sense of people's reactions. Dr. Harding asked how CDC decides which products need an audience evaluation. Dr. Vanderford pointed out that CDC does not conduct such evaluations for all programs. The National Report was a high profile product that was Congressionally mandated; therefore, the CDC decided to conduct an audience evaluation for this report. Dr. Daston asked how decisions were made regarding press releases and what information to include in them. He mentioned that there were many risk reference numbers not mentioned in the press releases. Dr. Vanderford informed the BOSC that CDC made the decision to focus the press releases on biomonitoring. Most of the levels were very low so they tried to focus on establishing a baseline measure.

Health Effects Institute (HEI)

Dr. Robert O'Keefe, Vice President of HEI, provided HEI's view on how to communicate scientific information. He stated that it was important to build trust in the messenger. The perceived credibility of the organization affects the receptiveness to the message. HEI is an independent nonprofit research institute that is jointly funded by industry and government. Its mission is to provide independent research on the health effects of air pollution from sources in the environment. In addition, HEI's core function is to provide research that directly informs regulatory decisions. Dr. O'Keefe added that HEI is structured to maintain credibility and transparency in controversial national regulatory debates. HEI not only has joint and equal funding, but also has an independent Board of Directors and a standing Research and Peer Review Committee. HEI is not affiliated with sponsors, has no perceived point of view, and does not take policy positions.

Dr. O'Keefe described HEI's various science products, including research reports, reviews of the scientific literature, reanalysis of studies, and HEI Perspectives. Research reports are highly technical in nature and are HEI's core scientific product. Examples of these reports include epidemiological and toxicological studies of particulates, benzenes, etc. Reviews of the scientific literature usually are conducted on key topics (e.g., MTBE or diesel exhaust) and are moderate to highly technical. HEI also reanalyzes studies central to the regulatory process, such as the Harvard Six Cities Study and GAM

impact. HEI Perspectives is a synthesis/primer on key issues that are central to understanding health effects of pollutants (e.g., PM mechanism, epidemiology).

The HEI audience includes the following: sponsors (EPA, industry); science community (investigators); stakeholders (environmental nongovernmental organizations, industry associations, citizens, etc.); Congress; other federal agencies (Office of Management and Budget, Department of Energy, Federal Highway Administration, etc.); international/other regulatory bodies (World Health Organization [WHO], European Commission, Japan EPA, International Agency for Research on Cancer [IARC], California Air Resources Board [CARB]); international lenders (World Bank, Asian Development Bank); and the press. HEI publications are targeted to a diverse constituency. Reanalysis often is needed to communicate to a broad spectrum of policy and scientific professionals. Congress wants to know if the study held up under scrutiny, if there was an open process, and if adequate data were provided. Regulators may want to know about the reanalyzed relative risks and the implications for other studies. Scientists want to know about the methodological approaches, implications for science, and future research. Industry, NGOs, and others also have unique interests.

HEI publications are organized to communicate to a diverse audience. Therefore, each contains an HEI statement that provides a synopsis in lay terms of the project context, results, implications, and conclusions (2-4 pages). Each also includes a preface, which provides details on the process; an investigators report, which is a detailed technical report by the scientific research team including data, methods, and scientific approaches; and a review committee commentary, which is a technical peer review and integrated distillation of key findings, strengths and weaknesses, conclusions, and implications for regulatory decisions.

Dr. O'Keefe described four phases in a study release. Study Release I begins with a decision to undertake the major research area or project. HEI communicates its motivation to stakeholders to explain why they should trust HEI, the relevance of the project to its sponsors, the regulatory agenda, the scientific rationale for undertaking the research, the public health implications, and the expected benefits. He noted that an early face-to-face meeting is ideal. In Study Release II, program summaries are prepared providing key scientific background, and workshops are held with stakeholders during study design/implementation. HEI provides briefings and updates of study progress, and holds an annual conference where posters and abstracts of the latest results are displayed. In Study Release III, HEI conductes a pre-briefing with the sponsors to inform them of key findings 24-48 hours prior to release. HEI typically prepares a press release for major studies and a press backgrounder for complex studies or exceptional circumstances. On the day of release, HEI calls key stakeholders to inform them of the release. Notification of the release is sent via e-mail and hard copy, and it is posted on the Web. In the weeks following the release, HEI visits key stakeholders to provide face-to-face briefings and to answer detailed questions. Although this process is labor intensive, it has been effective and appreciated. Dr. O'Keefe added that it sets the stage for future releases and prepares the sponsors and stakeholders for unfavorable results. Study Release IV involves followup synthesis, such as publication of HEI Perspectives.

Dr. O'Keefe noted that tracking and evaluating the communication of scientific information is very difficult. HEI tracks the citing of its research studies/reviews in rulemaking (EPA criteria documents, CARB rulemaking, WHO guidelines processes, IARC monographs, etc.). HEI also tracks journal publications from its studies, the demand for HEI Perspectives, and the number of visitors on the Web site and the documents downloaded. The soft measures include invitations to present HEI's results at key stakeholder forums or to Congress. HEI also tracks the reactions of sponsors and stakeholders. In addition, HEI tracks whether new groups or the press (trade and popular) are taking an interest in the studies. Dr. O'Keefe reviewed the key elements to communicating scientific information, which include:

- ✧ Pay attention to organizational perceptions, which matter and require early and consistent maintenance.

- ✧ Interact with the audience to minimize any surprises.

- ✧ Tailor the publications, in type and internal structure, to communicate effectively.

- ✧ Subject the publication to editing (by non-scientists); this can be a challenge but is worth the effort.

- ✧ Understand individual reporter interests and prepare supplemental press materials—especially for technical documents.

- ✧ Track hard and soft measures.

Dr. O'Keefe concluded his presentation with some additional points for consideration by EPA. He stated that the Agency should track the publication of important studies it sponsors and pursue joint press strategies with the investigators. In addition, EPA-funded results should be summarized and communicated in a synthesis document, on the Web, and in the science press.

Dr. Lewis asked how HEI measures understanding. Dr. O'Keefe replied that HEI gathers some information on the understanding of stakeholders and sponsors during the briefings. He noted that it is difficult to determine when a scientific issue is fully understood. Currently, soft measures are the only things available to measure understanding. Dr. Windom asked how HEI prioritized its projects. Dr. O'Keefe responded that the research committee assists HEI in thinking through questions regarding the regulatory agenda and the scientific questions that remain unanswered. HEI also spends consider time working with its sponsors to determine the issues of importance to them. HEI has found that different groups often agree on the remaining questions and needs. Dr. Puzak commented that NCER has been working with the STAR grantees to obtain advance notification of the release of study results via press releases. He mentioned that EPA would like to have the opportunity to consider joint press releases or to provide background information or context. In addition, NCER is trying to ensure that the grantees acknowledge EPA funding in these releases.

CIIT Centers for Health Research

Dr. Fred Miller, Vice President for Research at the CIIT Centers for Health Research, described the process for developing, implementing, and communicating research at CIIT. He noted that CIIT is a small research institute that publishes its research results in the open literature; however, CIIT does not stop with mere publication of results. CIIT communicates its results through a quarterly newsletter, its Web site, an educational outreach program (for K-12), and a number of other communication tools. CIIT's core program consists of about $16 million of research funded by the American Chemistry Council (ACC). The research conducted by CIIT focuses on systems biology—the what and the why.

The fundamental characteristics of environmental health research at CIIT are: (1) risk assessment (RA) orientation, which involves institutional commitment and experience to bring science to bear on the decisionmaking process; (2) integration of basic and applied science; and (3) commitment to address uncertainties that often arise in RAs such as low dose responses, interspecies extrapolation, and susceptible populations. Dr. Miller explained that systems biology is the quantitative study of biological processes as whole systems instead of isolated parts. A systems level view is needed to understand the complex dynamics that underlie the physiology in both the normal and diseased states. CIIT's approach employs a synergistic integration of theory, computation, and experiment.

The expected outcomes from using a systems biology paradigm at CIIT are that complex biological data are more effectively integrated into risk assessments; uncertainties such as relevance of animal data to humans are reduced and sometimes eliminated; the mode of action is better understood; and the determinants of interindividual variability and, by extension, potential developmental and gender-specific susceptibilities are defined. Dr. Miller added that the nature and extent to which proposed research will address and reduce uncertainties in assessing human health risks is a major factor for identifying and prioritizing core research on issues and topics. The long-term viability and effectiveness of the core research requires a mixed portfolio comprised of program projects to address major issues that require an extensive, integrated research strategy; individual projects that address important topics; methods development activities; and an investment in and use of cutting-edge technologies.

Dr. Miller pointed out that CIIT uses a program orientation and implementation guidelines document that covers relevance and scientific questions specific to identifying and prioritizing program and individual projects as well as methods development projects. The questions that should be asked when identifying and prioritizing program and individual projects are: What is the issue and what part do we want to work on? What RA uncertainties would be addressed? What would represent an impact and how likely can we achieve it? The scientific approach questions to ask are: What is the hypothesis? What is the scope of the program needed? Is a systems biology approach feasible and would it add value? The areas of emphasis for core research include the developing organism, risk assessment elements, and susceptibility factors.

Dr. Miller provided an example from the CIIT research program and how it links to the focus areas of respiratory biology/toxicology. In the study on mechanisms of adaptive and adverse responses in the respiratory tract following low-level exposure to inhaled reactive gases (J. Kimbell, P.I.), the issues were that human exposures to reactive gases are often low level. Extrapolation of animal exposure data to humans is needed. Another issue was that many reactive gases induce rodent nasal lesions, and the predictability of rodent nasal lesions for humans is uncertain. Dr. Miller pointed out the need to understand the dose-response relationships over time; the pathogenesis of lesions; the susceptibility factors, including gender, age, ethnicity, and genetics; and the risk assessment context. The relevance of this study is that it: (1) addresses Long-Range Research Initiative (LRI) research strategy issues, including real-world human exposures, demonstration of adversity, and biological sensitivity; (2) has a high probability of impact (i.e., it builds on existing strengths and knowledge at CIIT, is a current focus of regulatory attention, and will provide a template for broader RA efforts); and (3) addresses uncertainties in risk assessment, including interspecies and intraspecies extrapolation as well as acute to subchronic to chronic extrapolation.

Dr. Miller stated that one of the research program goals of this study was to compare and contrast focused, coordinated studies on two reactive gases to elucidate modes of action for insight on adaptive and adverse effects, and then to apply this knowledge to Cl_2 and H_2S risk assessments. Additional goals were to use a systems biology approach and to focus on the primary responses. Dr. Miller indicated that this project has examined the differences in complexity of the nose geometry of the rat and the human. CIIT has developed anatomically rich, computational fluid dynamic (CFD) models built from rat, monkey, and human data. These models describe how the complex anatomy of the nasal passages affects airflow patterns in the nose. The goal is to use this model to extrapolate dose data for human exposures. In concluding his presentation, Dr. Miller presented a diagram that illustrated the interactions and synergies of three CIIT projects—Olfactory Toxicity of H_2S, Cl_2 Risk and VOI Analysis, and Cl_2 Dosimetry and Pathobiology. He noted that all three of these projects are building on CIIT's dosimetry modeling core.

Dr. Bostrom asked if CIIT has a centralized communication staff. Dr. Miller replied that the communication group leader reports to the President of CIIT, but the communications staff are not

included in senior staff meetings. He added that CIIT is a small organization, which makes it very easy for staff to speak with each other directly.

National Institute of Environmental Health Sciences (NIEHS)

Dr. Allen Dearry, Associate Director of Research Coordination, Planning, and Translation at NIEHS, provided a brief overview of the Institute. The mission of the NIEHS is to reduce the burden of human illness and dysfunction from environmental exposures by understanding each element and how they interrelate.
He pointed out that the NIEHS achieves its mission through multidisciplinary biomedical research, prevention and intervention efforts, and communication strategies that encompass training, education, technology transfer, and community outreach. Dr. Dearry explained that environmental health, in its broadest sense, comprises those aspects of human health, disease, and injury that are determined or influenced by factors in the environment.

The NIEHS target audiences include the general public, community and advocacy groups, professional organizations, grantees, health professionals, other agencies, and Congress. NIEHS' Office of Communications and Public Liaison (OCPL) is responsible for developing press releases, pamphlets, videos, fact sheets, conference exhibits, public service announcements, responses to public and media inquiries, and developing information for posting on the NIEHS Web Site (http://niehs.nih.gov/home.htm). In addition, NIEHS publishes the journal *Environmental Health Perspectives*, which has global distribution and includes 17 issues per year. The journal covers the topics of toxicogenomics, children's health, and environmental medicine. NIEHS has made the journal available to underdeveloped countries and has developed a Chinese edition.

NIEHS also coordinates the National Toxicology Program (NTP), which is an interagency program that coordinates toxicological testing programs within the Department of Health and Human Services (DHHS), develops and validates improved testing methods, and provides information about potentially toxic chemicals to health regulatory and research agencies, the scientific and medical communities, and the public. The NTP issues an annual report on carcinogens that provides data on substances known to be carcinogenic. The three centers of the NTP facilitate information sharing among various federal agencies on alternative toxicological methods, risks to human reproduction, and phototoxicology. The NTP also maintains a Web site, including a list serv; holds public meetings; and produces technical reports. The translational research that is conducted at the NIEHS strives to improve our understanding of how physical and social environmental factors affect human health; develop better ways of preventing environmentally related health problems; and promote partnerships among scientists, health care providers, and community members.

One of NIEHS' roles is translational research, which is the conversion of environmental health research into information, resources, or tools that can be used by public health and medical professionals and by the public to improve overall health and well being. Translational research at the NIEHS is intended to improve understanding of how physical and social factors affect human health, develop better means of preventing environmentally related health problems, and promote partnerships among scientists, health care providers, and community members. NIEHS' translational research programs focus on environmental justice, community-based participatory research; health disparities, children's environmental health and disease prevention; and ethical, legal, and social implications. The NIEHS Translational Research Web Site can be found at http://www.niehs.nih.gov/translat/home.htm.

Dr. Dearry emphasized the importance of two-way communication, noting that true communication is always two way. The benefits of two-way communication include more collaborative communication, improved research that is relevant to public health, and more cost-effective approaches that will link

research to health outcomes as well as translate and disseminate the information to the target audiences. The challenges of two-way communication, however, are in identifying key participants, investing the required time, being proactive in the face of controversies and crises, and meeting the expectations and needs of the audience. The two-way communication at the NIEHS includes research (Community Outreach and Education Programs), education (K-12 Program), and priority setting (workshops, roundtable meetings, retreats, brainstorming sessions; the NAS and Institute of Medicine (IOM) Committees; town meetings; Interagency Working Groups; and Public Interest Liaison Group). NIEHS supports numerous Centers across the United States.

Dr. Dearry indicated that NIEHS' future directions will include translational research that involves creating environmental justice partnerships for communication, establishing seven to eight Centers for Population Health and Health Disparities, working with the National Cancer Institute on breast cancer and the environmental centers, and the built environment (man-made structures, land-use planning). Additional future directions include environmental medicine (nurse training, research, and practice), and the Division of Research Coordination, Planning, and Translation.

Dr. Clegg asked if information is made accessible to other parts of the world and if there is emphasis on a certain geographic area. Dr. Dearry replied that the NIEHS makes information accessible to other countries. In conjunction with the Fogarty International Cancer Center, NIEHS is conducting international research. NIEHS also brings investigators to the United State for training; these researchers then return to their countries and collaborate with U.S. scientists on future research efforts. Dr. Dearry indicated that NIEHS Information is made available to all parts of the world, not just certain geographic locations. Ms. Yu asked how NIEHS addresses the issue of "branding"? Does NIEHS present itself as DHHS or NIH? Dr. Dearry responded that NIEHS is represented as DHHS to the public; however, NIEHS products often include the logos of DHHS, NIH, and NIEHS. Dr. Bostrom asked why the NIEHS decided to publish the *Environmental Health Perspectives* in Chinese and provide 35,000 copies to China. Dr. Dearry explained that China has many serious environmental issues, and China asked the NIEHS to produce a Chinese edition. Dr. Dearry added that the journal has a substantial subscription base and is self supporting.

Communications Subcommittee Synthesis

Dr. Bostrom pointed out that ORD has made a laudable effort to improve its practices and innovations in communicating research results. There is increased focus and efforts taken to communicate to various target audiences in all ORD Laboratories and Centers. In addition, ORD has made organizational changes, hired more staff, and allocated more resources to communications. At the front end of communications is defining the audiences and goals. Most of the Laboratories and Centers target three or four audience groups. Should the press be considered an audience? She noted that most Laboratories/Centers recognize the importance of obtaining input on communications design earlier in the process, and there is increased outreach to end users in the design of research programs. She commented that a similar approach could improve ORD communications. In examining outputs versus outcomes, Dr. Bostrom asked if ORD can determine if its research is affecting EPA policy. Dr. Henderson asked about communicating risk. She pointed out that this issue had not been discussed during the presentations. Dr. Bostrom replied that the CDC presentation mentioned risk communication, but she added that risk communication was not a specific part of the Subcommittee's charge. The Subcommittee decided to limit its focus to the communication of research results. Dr. Farland agreed that risk communication is an important issue, adding that it should be dealt with independent of this review.

Dr. Farland asked the BOSC if the press should be viewed as an audience or a tool. Dr. Windom commented that the press is an important audience, because of the tremendous amount of information to be communicated from ORD. He thought it was important that ORD consider the press an audience and

develop specific messages for them. He added that ORD can build public trust through the news media. EPA should be proactive in identifying the good that it does. This should be communicated to the press to build public trust. Dr. Schnoor agreed that the press is important and media reports of ORD research should be tracked. He added that academia closely tracks its press coverage by both the popular and trade press. Dr. Bostrom thought that the press should be considered an audience, and ORD should make a concerted effort to involve the press in its communication efforts. Dr. Lewis noted that the scientific literacy of the press has increased substantially in the past 10 years. Dr. Bus said that he was struck by Michael Brown's comments about each Laboratory/Center developing its own methods and outputs for communication. He asked if it is in ORD's best interest to maintain all of these different methods and outputs. Should ORD consider centralizing certain aspects of communication, such as Web sites? Is it cost effective for each Laboratory/Center to maintain its own Web site? More efficient communications could free resources for the research activities. Dr. Miller commented that the inclusion of the media as an audience depends on what is being communicated. In some cases the media becomes a public driver. Ms. Yu pointed out that centralizing ORD communications might separate the communicators from the scientists, leaving the communicators with less of an understanding of the science.

Dr. Clark said that ORD needs to prioritize its messages and its audiences. He noted that the public and the scientific community are among ORD's priority audiences. Mr. Moore commented that most EPA staff communicate regularly with the trade press, and there has been an increase in the popular press picking up ideas from the trade press. He stressed the importance of building public confidence—ORD needs to be perceived by the public as an organization that is conducting valuable research in a cost-effective manner to improve public health.

Dr. Bostrom stated that there has been a great deal of positive feedback on the products developed by ORD's Laboratories and Centers. Some of the products also have received publication awards. The question arises, "How successful is EPA's communication of research results?" Also, "Does EPA's research affect policy? To what extent and how do the communication efforts influence the degree to which science influences policy? What changes in communication strategies can help EPA to obtain greater results?"

Dr. Chess was struck by how much progress EPA has made in communications in the past 10 years. Although the goals for communicating could be better defined, it is clear that EPA recognizes the value of communication. It appears that internal audiences may need more attention. Dr. Bostrom mentioned that Diane Maple, Director of Media Relations for the American Lung Association was unable to attend the meeting because of illness. Her presentation, however, is included in the handouts for this meeting. Dr. Bostrom asked participants to send via e-mail any additional comments or suggestions to her or Ms. Shirley Hamilton. Dr. Schnoor thanked Dr. Bostrom and the other Communications Ad Hoc Subcommittee members for their efforts in organizing such a valuable session on ORD communications. He indicated that the BOSC Executive Committee is looking forward to reviewing their report.

Friday, May 16 , 2003

Approval of January 2003 Meeting Minutes

Dr. Schnoor called the meeting to order at 8:35 a.m., and announced a few changes to the agenda. He stated that the session on the Report on the Environment will be postponed until the September meeting, because the report is not ready for public disclosure. Dr. Schnoor asked if there were any comments on the January 2003 meeting minutes. BOSC members noted several changes to the section on disclosures, and Dr. Zimmerman suggested a change in the wording of the fourth sentence in the second paragraph on page 13. Dr. Bostrom requested a wording change in the first bullet on page 15. The minutes were

approved unanimously with the suggested revisions. Beverly Campbell (SCG) agree to make the revisions and send the minutes to Ms. Hamilton.

Dr. Schnoor asked members who were not present at the last meeting to provide a public disclosure of their investments, research grants, memberships, and other information that might bias their opinions or input. Dr. Dorward-King stated that she is the head of Health, Safety, and the Environment at a mining company. Although she does not conduct research, the company supports research to develop a better understanding of the behavior and transport of metals in the environment, and to rehabilitate and remediate mining sites. She also does some work with universities. She is an advocate for the use of science and risk assessment in decisionmaking and policy. She is not a member of any other boards, but she sits on an advisory panel for Texas Tech.

Dr. Clegg, Professor of Genetics at the University of California–Riverside, conducts research on molecular evolution and population genetics. He currently receives funding from two NSF grants; one is for bioinformatics research and the other is a standard research grant. He was awarded a third grant from the California Avocado Association to conduct agricultural research. He has taken public positions on issues of importance to agriculture and he serves in a compensated position with the NAS. He assists the NAS in developing positions on international issues and travels to other countries to present the Academy's position. Dr. Clegg has chaired several NAS committees related to endangered species and he was a member of the Atlantic Salmon Committee, which will be issuing a report soon.

Appreciation of Members Departing the BOSC

Dr. Farland expressed his deep appreciation to two departing charter members of the BOSC, who had been serving ORD in this capacity since 1996—Dr. Rae Zimmerman and Dr. James Bus. In 1998, Dr. Zimmerman chaired the Subcommittee that reviewed NHEERL, and in 2001-2002, she chaired the Subcommittee that reviewed NCEA. She also chaired a Subcommittee for the PM Research Program review. She has been actively involved in the activities at the World Trade Center for the past 2 years, and she has been participating in the World Congress on Risk. Dr. Farland thanked her for her outstanding contributions to EPA and the BOSC.

In 1998, Dr. Bus chaired the Subcommittee that reviewed NCEA, and in 2001-2002, he chaired the Subcommittee that reviewed NHEERL. He also was involved in the PM Research Program review. Dr. Bus was involved in ACC's Long-Range Research Initiative and devoted much time to ensuring that the research conducted by the chemical industry is relevant. Dr. Farland said that Dr. Bus has been a long-time colleague and friend, and he thanked him for all the work he did for the BOSC and ORD.

Ms. Hamilton announced that the BOSC now has a Web site at www.epa.gov/ord/edrlupvx/bosc/index.htm, and all BOSC reports are posted on the Web site as well as the BOSC meeting minutes and biosketches of the Board members. She also reported that the BOSC members would be receiving a small increase in their compensation. In addition, Ms. Hamilton informed the BOSC that Betty Jo Overton is no longer at NCER; she moved with Dr. Preuss to NCEA. Ms. Hamilton thanked Ms. Overton for her efforts over the past 6 years to make the travel arrangements for the BOSC members.

Nominations Committee Discussion

Dr. Johnson, chair of the BOSC Nominations Subcommittee distributed a report from the Subcommittee, which includes Drs. Harding, Henderson, Windom, and Stewart. He noted that a request for BOSC nominations was posted on the NCER Web Site, distributed to the Laboratory/Center Directors, and e-mailed to a register of peer reviewers for NCER grants. As of May 14, 2003, 255 responses had been received. Although a number of additional venues for advertising the openings were identified at the last

meeting, it was decided that an adequate number of nominations had been received to fill the two vacant positions on the Board. A spreadsheet of the nominations was distributed as a handout, and the resumes of the candidates were provided to the BOSC on a CD-ROM for convenience. Dr. Farland will distribute a letter requesting a resume from those individuals who were nominated but did not submit a resume. Dr. Johnson asked each member of the Executive Committee to review the spreadsheet to ensure that the individuals they would like considered for the vacant positions are on the list. Please provide any additional names to Ms. Hamilton no later than May 31, 2003. The Subcommittee members will participate in several conference calls in June, and by the end of June, the Nominations Subcommittee will have developed a short list of nominations. Dr. Johnson has paired the Subcommittee members to review about 50 resumes each. The Subcommittee members will reduce the number of nominees by identifying candidates who have expertise in the key areas required on the BOSC, and taking into consideration other factors to ensure a balanced Board, such as affiliation, geographic diversity, cultural/ethnic diversity, and gender. This short list will be distributed to the BOSC Executive Committee for review in July.

Dr. Henderson expressed some concern about the number of self nominations. She asked the Executive Committee members to submit nominations if they did not think the list was adequate. Dr. Clegg noted that providing technical guidance to ORD requires individuals who have maturity in their fields. In response to a question about the list of candidates developed previously, Dr. Johnson stated that the BOSC members should nominate any individuals from that list who should be considered for the vacant positions. Ms. Hamilton asked the BOSC members to refer those who have questions to the BOSC Web Site. Dr. Johnson suggested posting a list of frequently asked questions and their answers on the Web site. Dr. Acosta asked if two members from the same university could serve on the BOSC. Dr. Johnson replied that the BOSC currently has two members from Georgia Tech. Dr. Schnoor reminded the BOSC that three additional members were scheduled to cycle off next year. Therefore, it would be useful to identify candidates to fill these positions. He suggested a short list of approximately 12-15 candidates. A letter will be sent to each of these individuals asking them if they would be willing to serve on the BOSC.

Ms. Hamilton explained that the short list of candidates, once approved by the Executive Committee, will be submitted to Dr. Gilman for review. He will submit his recommended list to the EPA Deputy Administrator for final selection. Dr. Schnoor suggested that the Executive Committee schedule a closed conference call in July to discuss the short list developed by the Nominations Subcommittee. By July 31, the list should be submitted to Dr. Gilman so that it can be submitted to the Deputy Administrator by mid-August and new members can be invited to the September meeting.

BOSC Future Directions

Dr. Schnoor asked Dr. Bostrom if there was something that the BOSC members should consider with respect to the Communication Ad Hoc Subcommittee Report. He asked if she needed input from the Executive Committee before the September meeting. Dr. Bostrom replied that a draft report will not be developed until mid-June. She expected to hold at least one Subcommittee conference call before September. She hoped to distribute a draft report to the Executive Committee members in early August so that they have time to review it before the September meeting. Dr. Schnoor indicated that there will be final vetting of the report at that meeting. He reminded the members that the next meeting was scheduled for September 11-12; it will be a full day on the 11th and a half-day on the 12th.

Dr. Schnoor asked if the members had any thoughts about possible future directions for the BOSC. He added that the BOSC must develop a clear charge on an issue prior to undertaking a review. Homeland security is one future direction that has been suggested. Dr. Clegg asked about the coordination of homeland security with other agencies. Dr. Farland responded that EPA is actively coordinating with other agencies and working to build bridges with the new Department. EPA also is working with other

agencies to conduct the needed research. Dr. Zimmerman thought the BOSC should look at the workforce and management needs associated with homeland security. The BOSC also could look at the assumptions underlying short-term risk assessment.

Dr. Johnson reminded the BOSC members that a list of future directions had been developed at the last meeting. Are we revisiting that list? Eight topics—Report on the Environment, Computational Toxicology, Biotechnology (Genomics/Proteomics), Global Climate Change Modeling, Homeland Security, Environmental Measurements and Modeling, Communications, and Multi-Year Plans (especially Mercury)—were discussed at the previous meeting. The risk assessment paradigm is the only area that has been added since then. Dr. Schnoor indicated that Dr. Gilman had encouraged the BOSC to examine homeland security, the risk assessment paradigm, computational toxicology, and biotechnology. Dr. Windom expressed some concern about these four areas because the current Board has little expertise in these areas. He was more interested in reviewing the Multi-Year Plans. Dr. Farland suggested that the BOSC consider a research program in association with a Multi-Year Plan. As the Multi-Year Plans for computational toxicology and biotechnology are developed, the BOSC could review the drafts and suggest improvements. The BOSC could review the initial research plans for these areas and help guide ORD in determining how these fit into the Agency's long-term goals.

Dr. Bostrom expressed interest in reviewing the Report on the Environment. Dr. Farland indicated that a draft report would be available for review in June 2003. Dr. Schnoor noted that the report will be on the September meeting agenda. Dr. Bostrom asked what type of feedback from the BOSC on the Report on the Environment would be useful. Dr. Farland replied that he would discuss it with Dr. Preuss and the ORD Executive Committee and then get back to the BOSC with some guidance.

Dr. Dorward-King suggested that the BOSC focus its future efforts on areas that will help ORD move forward with its science agenda. The BOSC should select areas that are either technically or managerially difficult for ORD. The Board has some expertise in biotechnology, and the BOSC could comment on whether EPA is ready to meet the coming challenges in this area. Dr. Farland commented that it is important to know more about the health implications of biotechnological products and their movement in the environment. Dr. Schnoor commented that EPA's niche in this area is ecological risk associated with potential pest resistance. Dr. Bus commented that EPA has oversight for pesticides. The Agency will play an important role in balancing the risks—those associated with pesticide use and those associated with ecosystem alterations attributed to biotechnology. EPA needs to understand the dynamics of this comparative risk assessment.

A consultation on the Report on the Environment is on the agenda for the September meeting and the report will be distributed to the members in advance of the meeting. The BOSC will prepare a brief letter report for ORD. Dr. Farland noted that the Agency is struggling with the indicator aspect of the report. Most of the environmental indicators ORD has examined have scientific shortcomings that make it difficult to use them to assess the state of the environment. ORD needs input on indicators. A letter report would be appropriate for the Report on the Environment, but the BOSC may want to consider further consultation on environmental monitoring and indicators. Dr. Bostrom suggested that the September meeting include a session to discuss the report and these issues following Dr. Preuss' presentation.

Dr. Bostrom suggested inviting some homeland security experts to the September meeting; she thought that Dr. Zimmerman should be invited to consult on the area of homeland security. Dr. Schnoor agreed with her suggestion. Dr. Acosta stated that CDC is grappling with the issue of poor communication among federal agencies with regard to environmental and homeland security issues. Perhaps the BOSC could focus on helping ORD identify ways to improve communication between EPA and other federal agencies. What is being done at Dr. Gilman's level to coordinate with other agencies? Dr. Farland stated

that Tim Oppelt, Director of ORD's National Center for Homeland Security, has been very involved with CDC. He thought it might be helpful to have Mr. Oppelt discuss this issue in his presentation at the September meeting. Dr. Schnoor thought it might be appropriate for the BOSC to comment on the communications and integration with regard to homeland security. Dr. Farland reminded the BOSC that the Center is focusing on building cleanup, water security, and rapid risk assessment. Dr. Henderson asked if there were other areas to which EPA could contribute. Dr. Schnoor stated that the BOSC may identify some other areas for EPA to address. Dr. Windom thought it might be helpful to determine if there are areas of overlap as well as areas that may have fallen through the cracks. Dr. Farland replied that the Department of Homeland Security is responsible for doing just that. He suggested that someone from the Department be invited to discuss this issue at the September meeting.

Dr. Farland thought it might be possible for the BOSC to review the homeland security research plan, which is under development. Dr. Bostrom suggested examining the plan to ensure that it adequately addresses communications and integration with other agencies. Dr. Acosta asked if the September presentation also could address what research ORD can do with the resources the Agency has allocated to homeland security. Can the Agency accomplish what it has been asked to do with regard to homeland security?

Dr. Schnoor recapped the agenda items for the September meeting. The agenda will include a homeland security consultation, including presentations from ORD's new Center and the Department of Homeland Security, as well as review of ORD's draft homeland security research plan. The September meeting also will include a presentation and consultation on the Report on the Environment, with special focus on the environmental indicators. Dr. Schnoor mentioned that the meeting also will include vetting of the report from the Communications Ad Hoc Subcommittee.

With regard to future directions, Dr. Farland stated that ORD is in the process of posting the multi-year plans on the Web. The first few plans were posted in early May. He added that 14 of the 16 plans are publicly available, and there is an ongoing dialog as to when they will be subjected to external peer review. He indicated that these plans informed the current budget planning efforts for 2005. Another iteration of the plans will be needed by 2004. He noted that there may be some opportunity for BOSC input on the issue of watershed environmental monitoring. Given the full agenda for the September meeting, he stated that input on the Multi-Year Plans would have to wait until the January 2004 meeting. Dr. Farland agreed to provide a brief update on the plans at the September meeting.

Dr. Farland thought the BOSC may want to consider hosting a workshop on environmental modeling. He mentioned that ORD brought in Wendy Wagner from the University of Texas to talk about legal issues with regard to the use of models. ORD also brought in an expert from Duke University to discuss technical uncertainties associated with the use of models. Dr. Farland suggested that the BOSC members may be interested in attending some of these presentations. Perhaps one or two BOSC members could attend and then report back to the Executive Committee. Ms. Hamilton commented that many of these presentations are posted on the ORD calendar and she could notify the BOSC members of upcoming events that might be of interest. Dr. Farland suggested discussing upcoming items at the BOSC meetings and identifying someone who could attend.

Dr. Schnoor commented that the BOSC probably will not address environmental measurements and modeling until 2004. Dr. Windom noted that expanded measurements in watersheds related to TMDLs is a big issue with the states. The states are not getting consistent advice from the Agency. Dr. Farland replied that ORD does not have a big role in this issue at present and is trying to figure out what needs to be done. The BOSC could invite someone from the OW to discuss this issue at a future meeting. Dr. Schnoor added that one of the tasks the BOSC may want to consider in 2004 is a review of the ORD budget.

Dr. Schnoor asked what the members wanted to do with regard to risk assessment, computational toxicology, and biotechnology. Dr. Farland stated that ORD is developing research plans for computational toxicology and biotechnology and perhaps the BOSC could review those. Dr. Acosta asked if ORD was interacting with NIEHS on computation toxicology and how EPA's efforts would be different. Dr. Farland replied that the interaction between ORD and NIEHS on this issue is extensive. NIEHS is focusing on basic understanding of genomics and the genetic basis for health impacts of environmental chemicals, while EPA is trying a systems biology approach to determine if there are steps in the approach that can be skipped. He noted that this broader perspective is quite different from the research conducted by other agencies. Dr. Henderson suggested that the BOSC review the draft research plans for these two areas at the January 2004 meeting. Dr. Schnoor indicated that he, Dr. Johnson, and Dr. Farland would meet with Dr. Gilman to seek more direction with regard to the topic of risk assessment. Dr. Farland explained that the quality of ORD's research, which follows the risk paradigm, has been criticized and questioned; therefore, ORD is examining its use of the risk paradigm. He added that ORD is beginning to formulate a plan to address this issue and Dr. Gilman has made it a priority and is seeking the BOSC's input. Dr. Farland agreed to keep the BOSC informed about this issue. Dr. Clegg asked if there were other agencies doing research on risk assessment, and Dr. Farland replied that EPA has been the leader in this area. Dr. Clegg suggested that the BOSC may be able to identify research gaps that should be addressed by EPA. Dr. Bus noted that computational toxicology has the potential to dramatically change the way we do risk assessments. Therefore, ORD needs a vision and roadmap to revisit the way it does risk assessments in view of the rapid changes in biology and the emerging tools. He suggested that the BOSC could be of assistance to ORD in developing such a research plan.

Dr. Schnoor reported that the five Laboratory/Center reviews had been submitted to Dr. Gilman and the Laboratory/Center Directors. He also has revised the common themes letter based on comments received from the Board members, but noted that it is already out of date. The Board suggested some final revisions and Dr. Schnoor asked Beverly Campbell to prepare the final letter for submission to Dr. Gilman and the Laboratory/Center Directors.

Communications Subcommittee Discussion

Dr. Bostrom thanked the members of the Subcommittee for their hard work as well as those Executive Committee members who submitted comments. She encouraged the Board members to send any additional comments to her. She then reviewed the outline for the Communications Subcommittee Report, which includes: mission statement; communication section of research management; goals for communication; audience selection; content design, format, and staffing; and conclusions of the Subcommittee. Dr. Bostrom expects that the report will be about 10 pages. She reiterated that the draft report would be sent to the Executive Committee members in mid-July. The goal is to complete the report by mid-August so that it can be discussed at the September BOSC meeting. Dr. Stewart indicated that there appears to be substantial differences in the sophistication of the communication approaches among the Laboratories and Centers, and she suggested more cross-ORD meetings to share best practices. She also proposed that the next Laboratory/Center review examine communications to determine if improvements had been made. Dr. Farland mentioned that the ORD communications specialists participate in weekly or biweekly calls. The BOSC could encourage such efforts. Dr. Windom stated that EPA needs an ongoing strategy to ensure that the Agency is addressing its credibility, honesty, and bias with regard to its communications. Ms. Hamilton suggested that the draft report be submitted to Michael Brown before it is submitted to the Executive Committee.

ORD Strategic Workforce Planning: Scientific and Engineering

Dr. Hal Zenick joined the BOSC meeting via conference call to make this presentation. He defined workforce planning as "having the right people with the right skills in the right job at the right time." He

added that workforce planning helps align human resource decisionmaking to support strategic goals and scientific and financial commitments. The issues that drive strategic workforce planning include: ORD strategic plans, succession planning/leadership development, skills mix, retirements, FTE reductions, postdocs, diversity goals, and flexibility to respond to changing priorities. Dr. Zenick noted that strategic workforce planning is a logical and essential companion to ORD's strategic plans, and it is an important element of overall human capital efforts. The four step methodology for workforce planning involves demand analysis, supply analysis, gap analysis, and solutions analysis.

The first phase involves the initial scoping. The Executive Council's set of assumptions about ORD's work and workforce of the future are defined and the degree of consensus is assessed. The assumptions help frame the "analysis" and determine the relative amount of effort that goes into different phases and different workforce topics. The workforce planning exercise is intended to cover a time period of 10 years but the initial focus is on now and the next 3-5 years. Along with the survey results, the demographic profile of the current ORD workforce aids in refining the assumptions and contributes to other phases.

Dr. Zenick emphasized that ORD has been moving from strategic directions to core competencies. The problems and trends of the next 5-10 years drive the core components needed to conduct the work. These, in turn, drive the core competencies (i.e., the critical expertise/skills) required by ORD. The major competency categories/subcategories include health sciences, chemistry/physics, earth sciences, ecology, economics, engineering, exposure sciences, informational sciences, mathematical/computer sciences, social sciences, and environmental sciences. The demand analysis examined each of the competencies, projected future emphasis, and whether ORD needed a presence or a critical mass in that competency. The supply analysis assessed the current staffing at each skill level for the required competencies. The gap analysis involved combining the demand and supply data to determine specific gaps. Some gaps are Laboratory/Center specific and others need more attention at the ORD-wide level.

Dr. Zenick stated that workforce shifts have already begun. NRMRL has shifted from traditional engineering to integrated risk management and from control technologies to prevention/remediation. NHEERL has moved from classical toxicology to a mechanistic focus and from ecotoxicology to effects of nonchemical stressors on ecosystems/watersheds. NERL has moved from traditional analytical chemistry to emerging measurement technologies and from a primary environmental characterization to human and ecological exposure focus. NCEA has shifted from classical toxicology to a mechanistic focus and from ecotoxicology to integrated ecological assessment. Dr. Farland noted that many of these work shifts were initiated in response to the BOSC review of the Laboratories/Centers.

Dr. Zenick stated that in his example, the near-term hiring priorities for Scientific/Technical Professional positions (STs) would be hydrology, systems ecology, human exposure, GIS/spatial analysis, atmospheric sciences, environmental epidemiology, risk assessment modeling, genomics/proteomics, and bioinformatics. A number of white papers have been prepared on cross-ORD teams (e.g., systems ecology, human exposure, risk assessment modeling). Dr. Farland commented that there is enthusiasm among ORD staff to participate in cross-ORD teams, but the staff have not figured out how to do that as well as their regular jobs.

He added that the next steps would be to revisit the current ORD approach for assigning postdocs, identify and prepare for needs of the cross-ORD teams, cross-walk drivers with the Multi-Year Plans, prepare a similar analysis for administrative support, develop a communications plan, and continue to follow redirections that the Laboratories and Centers have already begun. In addition, ORD should explore other types of solutions such as the use of IPAs and Title 40 Authority, different team structure from the PI-led unit, leveraging resources of other agencies, succession planning and mentoring, outsourcing, and hiring retiree "consultants."

Dr. Schnoor thanked Dr. Zenick for his presentation, noting that the BOSC has expressed an interest in ORD's workforce planning since 1997. He was pleased to see how much progress ORD has made in this area. Dr. Schnoor asked if ORD collected data on degrees as well as current responsibilities, and Dr. Zenick replied that the data are available and need to be added to the analysis. Dr. Farland commented that if ORD did its workforce planning based on degrees or job descriptions the analysis would be meaningless. ORD had to figure out what the staff are actually doing in their jobs. Dr. Schnoor noted that workforce planning was one of the common themes among the Laboratory/Center review reports. He asked Dr. Farland to consider this briefing as one of ORD's responses to the BOSC recommendations in those reports.

Wrap-Up

Dr. Schnoor indicated that the BOSC is expecting responses from ORD regarding the PM Research Program review report, the five Laboratory/Center review reports, and the measures of success letter (dated January 2003). He asked for a motion to adjourn the meeting. Dr. Johnson moved to adjourn, and Dr. Stewart seconded the motion. Dr. Schnoor adjourned the meeting at 12:15 p.m.

Action Items

- ✧ Dr. Schnoor agreed to work with Drs. Gilman and Farland to develop a plan for BOSC input on risk assessment.

- ✧ Dr. Bostrom asked participants to e-mail any additional comments or suggestions regarding ORD communications to her or Ms. Hamilton as soon as possible.

- ✧ Ms. Campbell will incorporate revisions to the minutes of the January BOSC meeting and send them to Ms. Hamilton.

- ✧ Additional nominations for BOSC membership (along with resumes) should be sent to Ms. Hamilton via e-mail by May 31, 2003.

- ✧ Members of the Nominations Subcommittee will review the resumes of the BOSC nominees. Dr. Johnson will schedule several conference calls in June for the members to discuss the list of candidates. By the end of June, the Nominations Subcommittee will have developed a short list of nominations. This short list will be distributed to the BOSC Executive Committee in July.

- ✧ Ms. Hamilton asked the BOSC members to refer those nominees who have questions regarding the BOSC to the Web site. Dr. Johnson suggested posting a list of frequently asked questions and their answers on the BOSC Web Site (www.epa.gov/ord/edrlupvx/bosc/ index.htm).

- ✧ Once approved by the Executive Committee, Ms. Hamilton will submit the short list of candidates to Dr. Gilman for review. He will submit his recommended list to the EPA Deputy Administrator for final selection. Dr. Schnoor suggested that the Executive Committee schedule a closed conference call in July to discuss the short list developed by the Nominations Subcommittee. By July 31, the list should be submitted to Dr. Gilman so that it can be submitted to the Deputy Administrator by mid-August and new members can be invited to the September meeting.

- ✧ The Communications Ad Hoc Subcommittee will develop a draft report by mid-June. Dr. Bostrom will schedule a Subcommittee conference call before September. She will distribute a draft report to the Executive Committee members in early August so that they have time to review it before the September meeting.

- ✧ BOSC members will review the Report on the Environment when it becomes available and provide comments at the September BOSC meeting.

- ✧ Dr. Farland will discuss with Dr. Preuss the type of feedback he is seeking from the BOSC with regard to the Report on the Environment and get back to Dr. Schnoor with some guidance. One focus of the review will be the ecological indicators.

- ✧ Ms. Hamilton will distribute copies of the Report on the Environment to the Executive Committee members prior to the September meeting.

- ✧ In his homeland security presentation at the September meeting, Mr. Oppelt should address coordination with other federal agencies.

- ✧ Dr. Farland will invite someone from the Department of Homeland Security to the September meeting to address what the Department is doing to eliminate unnecessary overlap and ensure that nothing falls through the cracks.

- ✧ Dr. Farland agreed to provide a brief update on the Multi-Year Plans at the September meeting.

- ✧ Ms. Hamilton will notify BOSC members of upcoming ORD events (e.g., workshops, briefings) that might be of interest to the Board.

- ✧ Dr. Schnoor agreed to make some final revisions to the common themes letter and asked the members to provide any additional comments as soon as possible so the letter could be finalized and submitted to Dr. Gilman and the Laboratory/Center Directors. Ms. Campbell agreed to incorporate Dr. Schnoor's revisions to the common themes letter and submit it to Ms. Hamilton for submission to Dr. Gilman.

- ✧ ORD will provide responses to the BOSC concerning the PM Research Program review report, the five Laboratory/Center review reports, and the measures of success letter (dated January 2003).

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