

**NATIONAL CENTER FOR ENVIRONMENTAL RESEARCH (NCER)  
STANDING SUBCOMMITTEE****Face-to-Face Meeting Summary  
July 24–25, 2007****Tuesday, July 24, 2007****Welcome and Overview**

*Dr. Martin Philbert, University of Michigan, NCER Standing Subcommittee Chair*

Dr. Martin Philbert, Chair of the Board of Scientific Counselors (BOSC) National Center for Environmental Research (NCER) Standing Subcommittee, welcomed Subcommittee members, U.S. Environmental Protection Agency (EPA) attendees, and members of the public to the first face-to-face meeting. A list of the participants is attached to this summary.

Dr. Philbert is Professor and Senior Associate Dean of Research at the University of Michigan School of Public Health. His expertise is in nanotechnologies for the early detection of brain tumors. He requested that the other Subcommittee members introduce themselves.

- ✧ Dr. Dennis Clifford is a Professor and Director of Environmental Engineering at the University of Houston. His expertise is in drinking water treatment—particularly inorganic contaminants and radionuclides.
- ✧ Dr. Alan Hansen is Manager of Tropospheric Studies in the Environmental Sector of the Electric Power Research Institute (EPRI). EPRI is a nonprofit research group that primarily does contract-based extramural research. Dr. Hansen is an expert in air quality measurements and modeling.
- ✧ Dr. Sallie Keller-McNulty is Dean of Engineering and Professor of Statistics at Rice University. Her research focus involves statistics, data integration, risk assessment, and risk modeling. She also worked at Los Alamos National Laboratory on environmental restoration projects under EPA regulation and spent 2 years managing a statistics program at the National Science Foundation (NSF) at the time of the first EPA collaboration on the Water and Watersheds Program.
- ✧ Mr. David Rejeski is Director of the Foresight and Governance Program and the Project on Emerging Nanotechnologies Program at the Woodrow Wilson International Center for Scholars. Mr. Rejeski's expertise is in science policy; he has worked with EPA under cooperative agreements and has served on the Agency's Science Advisory Board (SAB).

- ✧ Dr. Seth Tuler is a social scientist who focuses on risk assessment and decisionmaking at the Social Environmental Research Institute (SERI). His work centers around public involvement in risk assessment and decisionmaking and the method by which science is incorporated into science policy deliberations.
- ✧ Dr. Adam Finkel is a Professor at the University of Medicine and Dentistry of New Jersey's (UMDNJ) School of Public Health. He is a visiting professor at Princeton University's Woodrow Wilson School of Public and International Affairs. He spent 12 years as a government scientist at the Occupational Safety and Health Administration, has served on the SAB, and is currently on a National Academies committee for an EPA-funded project on improving risk analysis.
- ✧ Dr. Katherine McComas was present by telephone. She is an Assistant Professor in the Department of Communication at Cornell University.
- ✧ Two members of the Subcommittee, Dr. David Baker and Dr. Kenneth Ramos, were unable to attend the meeting.

Dr. Philbert read the following Charge Question, which had been modified since the Subcommittee's teleconference on July 13, 2007:

*What steps can NCER take to more effectively engage the external scientific community to better craft a forward-looking portfolio and meet evolving Agency needs?*

- ✧ *Regarding NCER's niche in ORD and in the greater environmental federal research and development, what can it do to more flexibly address emerging issues and technologies and provide timely responses to rising scientific needs of the Agency?*
- ✧ *What advice can be offered on ways to measure and improve the effectiveness of NCER's communication so that decisionmakers will make greater use of the Center's products?*
- ✧ *What metrics are most useful for measuring the impact of NCER's work?*

Dr. Philbert then divided the Subcommittee into three workgroups. These groups will work together during breakout discussions (scheduled for Day 2); they also will work together in future meetings. The three workgroups include:

- ✧ Drs. Tuler, Finkel, and Ramos (Dr. Ramos was not present at this meeting)
- ✧ Drs. McComas (by telephone), Hansen, and Clifford
- ✧ Drs. Philbert and Keller-McNulty and Mr. Rejeski.

There will be opportunities for Subcommittee members to collaborate across workgroups and add to each other's recommendations. In addition, Dr. Philbert noted that workgroups can convene privately after the conference as long as no more than one-half of the Subcommittee members are present.

### **Administrative Procedures**

*Ms. Susan Peterson, Designated Federal Officer (DFO) for the NCER Standing Subcommittee, Office of Research and Development (ORD), EPA*

Ms. Susan Peterson, the Designated Federal Officer (DFO) for the NCER Standing Subcommittee, provided an overview of administrative issues. The BOSC is a federal advisory committee that provides independent, scientific peer review and advice to EPA's Office of Research and Development (ORD). The BOSC NCER Standing Subcommittee was established by the BOSC Executive Committee to review the management of NCER and appropriateness of the Center's science. There are eight members and two consultants on the Subcommittee. The members are listed on the BOSC Web Site at <http://www.epa.gov/osp/bosc>. The Subcommittee has been asked to respond to a Charge Question and to provide a report for the Executive Committee's deliberation. The Executive Committee has the authority to evaluate the Subcommittee's report, revise it as necessary, and submit it to ORD. The role of the BOSC is to provide advice and recommendations to ORD; the rights of decisionmaking and program implementation remain with the Agency.

Ms. Peterson stated that this is the first face-to-face meeting of the BOSC NCER Standing Subcommittee. The Subcommittee convened for one teleconference before this meeting on July 13, 2007. A second teleconference is planned for late summer. The date is not yet determined but will be published in the *Federal Register*.

As Subcommittee DFO, Ms. Peterson acts as a liaison between the Subcommittee and EPA. She is responsible for ensuring that this meeting complies with the Federal Advisory Committee Act (FACA) requirements. She reviewed the relevant FACA rules, as follows:

- ✧ All FACA meetings on substantive issues—whether in person, by phone, or by e-mail—that include at least one-half of the Subcommittee members must be open to the public. Issues that are solely administrative or preparative in nature are exempt from this requirement. A *Federal Register* notice must announce all meetings 15 calendar days in advance. The *Federal Register* notice for this Subcommittee meeting was published on July 5, 2007.
- ✧ The DFO and Subcommittee Chair must approve the agenda and attend all meetings. The Chair must recognize members of the Subcommittee or EPA, other than presenters, to speak at the meeting. Notes are being taken by a contractor (SCG), and the meeting minutes must be certified by the Chair within 90 days of the meeting. Once certified by the Chair, the minutes are posted on the BOSC Web Site. All documents provided to the Subcommittee must be made available to the public.
- ✧ To ensure that all appropriate ethics requirements have been satisfied, each Subcommittee member files a standard government financial disclosure form. These reports are reviewed by the appropriate EPA officials. In addition, all Subcommittee members have completed their required annual ethics training.

Ms. Peterson said that the Subcommittee has received a large volume of background materials from EPA. This was necessary to provide the members with a thorough overview of ORD and NCER and can be used as reference material in future meetings. Ms. Peterson requested that

members complete and submit their homework forms before the end of the meeting on July 25, 2007. These forms must include all time spent reviewing documents or preparing written materials prior to and following the Subcommittee meeting. Members are not to include meeting time. Ms. Peterson also requested that the Subcommittee members submit their travel vouchers to her before the end of the meeting.

There were three requests from the public for copies of the agenda. There will be an opportunity for members of the public to make comments during the meeting (2:00 p.m., July 24, 2007). Comments from the public will be limited to 3 minutes each.

### **ORD Research Planning**

*Thomas Barnwell, NCER, Senior Science Advisor*

The first presentation was delivered by Mr. Thomas O. Barnwell, Jr., and was titled “ORD Research Planning: How Do We Decide What Extramural Research To Support?”

Mr. Barnwell summarized the phases of the federal budget (slide 2): (1) formulation of the President’s Budget; (2) Congressional action; (3) program execution; and (4) program evaluation. The entire process takes approximately 21 months. He explained that ORD is involved during the first 4–5 months. ORD begins developing a proposal and then enters a negotiation stage within EPA after which the proposal is submitted to the Office of Management and Budget (OMB). Congress reviews the proposal and appropriations are enacted from the President’s Budget. Mr. Barnwell said that the budget may be constrained by EPA’s Strategic Goals and primary enabling legislation (slide 3).

Mr. Barnwell stated that EPA’s mission is to “protect human health and safeguard the natural environment—air, water, and land—upon which life depends.” He added that ORD provides the scientific foundation to support the Agency’s mission. Program offices—located in Washington, DC, and Research Triangle Park (RTP), NC—are responsible for the regulatory agenda of the Agency. There also are 10 regional offices around the country that implement and execute the regulatory agenda and interface with the state agencies. Mr. Barnwell also described the components of ORD, noting that NCER implements the extramural agenda for all of the other parts of ORD (slide 4).

Mr. Barnwell listed the research areas planned for the Fiscal Year 2008 budget (slide 5). He then described the numerous decision inputs that feed into ORD research (slide 6); these include programs and regions, the EPA Strategic Plan, the Administration’s priorities, Congressional mandates, BOSC reviews, the SAB, the National Academies, other external advice, stakeholders, National Program Directors (NPDs), the Science Council, and the Executive Council. Likewise, there are numerous evaluation inputs that provide research direction; these include feedback from program and regional offices, BOSC program evaluations, the National Academies, other advisory bodies, and Program Assessment Rating Tool (PART) reviews. Mr. Barnwell then showed a timeline titled “Planning and Budgeting Activities: 1 Oct. 2006 – 30 Sept. 2007” (slide 7). He explained that the planning process is extensive, involved, and difficult to alter, although it receives input from different sources that may induce small changes. Dr. Philbert asked what happens under a continuing resolution. Mr. Barnwell replied that the result would be a continuation of last year’s budget. Dr. Philbert next asked what happened during the evaluation

phase. To this, Mr. Barnwell responded that the process would be delayed, but emphasized that the evaluation phase would apply to the previous year's budget.

Mr. Barnwell then presented a slide titled "Setting Research Priorities and Planning: Annual Planning Cycle" (slide 8). He described the circular process from NPD and Research Coordination Team (RCT) recommendations to the submission of the budget to the Agency. (The RCTs include representatives from ORD laboratories and centers and others in the Agency.) He indicated the components that feed into the Multi-Year Plans (MYPs), including scientist-to-scientist meetings, program reviews, advisory panel recommendations, regional planning meetings, and strategic reviews. The MYPs, which typically set research agendas for 4–5 years, are used in discussions with the Executive Council to develop proposals and determine both the strategic directions for ORD and the extramural research programs at NCER.

Dr. Hansen presumed that the RCTs have knowledge in priority planning, which Mr. Barnwell confirmed. Dr. Keller-McNulty asked how external feedback contributes to planning. Mr. Barnwell replied that external feedback contributes at the level of the MYP; however, the development of the budget is, by mandate, a confidential process internal to EPA.

Mr. Barnwell reiterated that the MYP shapes the research agenda and is the planning tool used to define high-priority science questions. The MYP considers the strategic direction of the Agency and how NCER can contribute; it also describes how the research contributes to the strategic goals and tries to define the significant outputs. MYPs provide information to assist and support research decisions and in determining accountability of performance. MYPs also provide information to be used in PART reviews by OMB. MYPs are used to communicate research plans within ORD and with stakeholders and clients. Mr. Barnwell suggested that Subcommittee members consult <http://www.epa.gov/osp/myp.htm> for more information about MYPs. In the slide titled "Multi-Year Plans Exist in a Hierarchy of Plans," Mr. Barnwell indicated that the MYP follows strategic EPA Government Performance and Results Act (GPRA) goals, ORD strategic plans, and ORD research strategies, but precedes laboratory/center implementation plans, divisional research plans, and divisional research outputs (slide 10). The next slide depicted the circular process of MYP development and review. Mr. Barnwell pointed out the processes of program design and management, program evaluation, using evaluation results for program improvement, and mid-cycle reviews. Mr. Barnwell then presented a logic diagram (slide 12) that defined the research program and how resources ultimately lead to long-term outcomes with policy development occurring as a step along the process.

Mr. Barnwell posed the question, "What kinds of metrics are important for looking at performance?" He mentioned that NCER currently uses bibliometric analysis, and more details about these analyses will be discussed in subsequent presentations. Dr. Philbert asked whether NCER has an accurate method of determining how research publications affect policy. Mr. Barnwell replied that NCER is working on a data mining tool for that application, and further details will be presented later in the meeting.

Mr. Barnwell also included a set of slides (17–19) titled "Proposed Strategic Directions for ORD and NCER" for the Subcommittee to review. Mr. Rejeski asked how EPA handles something that does not specifically fit into the strategic directions. Dr. Barnwell replied that NCER's Exploratory Research Program is one way to address such issues. In addition, programs turn over

regularly, and new initiatives within the government shift Agency priorities. Congress also advises EPA on what initiatives it should pursue. This has led to increased focus on nanotechnology and decreased focus on ecosystems research. Mr. Rejeski asked if laboratories also have a discretionary fund. Dr. Gary Foley, Director of NCER, responded that the budget EPA submits to Congress is sectioned into categories with corresponding work plans. EPA cannot deviate from the budget categories without Congressional approval. Within the budget categories, there is some flexibility regarding implementation. In this case, there is discretion, because work may be conducted in a laboratory or through extramural grants. Mr. Rejeski presumed that NCER would prefer to have more discretion. Dr. Foley responded that NCER does not see it as a problem; the Center provides input to the planning process, and when the Congressional budget is received, NCER's work is arranged within the budget constraints.

Dr. Hansen suggested that there are two ways for NCER to approach emerging issues: the first is through discretionary budget shifts and the second is through the Exploratory Research category, which was designed specifically to identify emerging issues. He asked how much of the research budget is used to fund Exploratory Research. Mr. Barnwell replied that approximately 10 percent (\$5 million) of the extramural program budget is dedicated to Exploratory Research. Dr. Clifford asked why there was no mention of earmarks, or special political changes to the process. He also asked if earmarks are deducted from the total budget. Dr. Foley responded that earmarks are mandated on top of the budget, rather than cutting into it, for the most part. Dr. Clifford asked if it was true that these mandates can bypass the complex budget process to get attention for topical issues. Mr. Barnwell emphasized that the administration is not in favor of Congress earmarking funds, but affirmed that on occasion, Congress may require work on an area that bypasses the competitive grants process. Dr. Keller-McNulty asked whether earmarks result in an internal budget reallocation or a budget increase. Mr. Barnwell replied that, in NCER's case, the earmarked money is added to the budget. He clarified that if there is a general reduction in Congressional appropriations, NCER must share the general reduction with the earmarks.

### **NCER Research Planning and Peer Review**

*Dr. Bronda Harrison, NCER, Acting Division Director for Peer Review*

Dr. Bronda Harrison's presentation was titled "The NCER Process: From RFA to Award." Her first slide was a detailed timeline of the eight-step process for NCER to issue an award. The process from RFA to award was depicted as a table (slide 2) and included the length (in weeks) of each step. Cumulatively, the process takes 17 months. Dr. Harrison then described the NCER programs: fellowships; People, Prosperity, and the Planet (P3); Small Business Innovation Research (SBIR); regular grant programs; and competed centers. She emphasized that there is great potential for collaboration in the grant programs and competed centers.

Dr. Harrison then provided an overview of the process for preparing Requests for Applications (RFAs). The objective of this step is to narrow the research direction; this is accomplished by circulating the draft RFA through NCER, ORD, the Office of Resource Management and Administration (ORMA), the Office of Grants and Debarment (OGD)/Grants Competition Advocates (GCA) office, and the Office of General Counsel for recommendations. After this lengthy process, the RFA is published on the NCER Web Site and on <http://www.grants.gov>. The NCER grant decisionmaking process begins after the RFA is "open" for 90 days. The

decisionmaking process incorporates separate external and internal reviews and includes a 90-day peer review process. Dr. Harrison mentioned that the peer review panels are an incredible resource of experts who are knowledgeable about and committed to NCER. She asked the Subcommittee if they could recommend additional ways to use this resource.

Dr. Harrison described the fluctuation of application numbers from 2003 through 2006 (slide 9). She noted that 2,500 to 3,000 applications are typically reviewed per year but pointed out that Science To Achieve Results (STAR) fellowship funding was terminated in 2003 and fellowships dropped precipitously (STAR funding was restored in 2004).

Dr. Harrison noted that NCER has adjusted the process of accepting or declining applications to fit the needs of the Agency. Applications are submitted to an administrative review to ensure that applicants did not take advantage of the grant process. Beyond this review step, the peer review panel is responsible for determining which applications are competitive. The peer reviewers' two-fold charge is: (1) Does the application fit the RFA? (2) If so, is the application of high scientific merit? Evaluation criteria are included in the RFA, so applicants can better understand the basis for the panel's decisions. Applications not recommended for funding by the panel are automatically declined.

Peer review panelists are selected based on the expertise needed to judge applications for a particular RFA. NCER intentionally chooses panels that are diverse with regard to professional levels, regions, races, and work settings. Dr. Harrison emphasized that positive dynamics result from diverse panels. She mentioned also that the peer review panel is not under FACA rules; specifically, consensus is not an objective of the panel. Once applications are scored, only those with "excellent" and "very good" scores are recommended for funding.

The next step in the review process is the programmatic, or relevancy, review; this stage accounts for the relevance of the research with respect to Agency priorities. Dr. Harrison mentioned that NCER has had to incorporate a lot of new policies into their review process, but in each case, the updated review criteria were made transparent to applicants through the RFA.

The relevancy review is followed by the official decision review, which is intensive and critical to the process. This step is chaired by the decision official, Dr. Foley. Dr. Hansen asked when in the process proposals are reconciled with the amount of money available. Dr. Harrison responded that the Project Officer (PO) knows how much money is available, and funding decisions are based on a rank order listing of applicants. Dr. Hansen asked how NCER decides whether to accept more applicants at lower overall funding levels. Dr. Chris Saint, Acting Director of NCER's Environmental Engineering Research Division, responded that Subdirectors usually make this decision by compiling the results of the internal review, determining an order of applications, and establishing the funding level based on the solicitation. The decision of how many applicants to fund is finalized by the Center Director. Dr. Philbert asked whether a reduction in funding level corresponds to a reduction in the expectation of the research objectives; this was affirmed.

Mr. Rejeski asked how the award amount has changed. Dr. Harrison said that 10 years ago, the average grant was \$450,000 for 3 years. That increased for a period when NCER was funding a number of centers. She did not know the current funding level; Mr. Barnwell added that the type

of work being proposed—for instance, doing surveys versus collecting data in field experiments—affects the funding amount.

Dr. Harrison explained that the OGD must approve the award; before then, it is considered an award recommendation. This approval step involves a large amount of paperwork and dialogue between the PO and the applicant. At this point, if there is a budget adjustment, the applicant can revise his/her proposal. At this stage, all policies and regulations must be carefully addressed.

Dr. Hansen commented that the review process is very intensive, and he speculated that it probably evolved into its current form over time as administrative processes became more complex. He asked whether NCER had reexamined it lately to assess if it had grown unwieldy. Dr. Harrison responded that the review procedure must fulfill EPA and government policies. She also mentioned that the longer open period for RFAs is to the investigators' benefit. Dr. Philbert responded that there also is a long postapplication period that delays disbursement of grants to applicants. Dr. Clifford asked if unsolicited grant applications are ever funded. Dr. Harrison replied that they are declined without review.

### **NCER Programs**

*Dr. Chris Saint, NCER, Acting Director for the Environmental Engineering Research Division*

Dr. Saint titled his presentation “Research Sponsored by the National Center for Environmental Research.” It focused on projects that NCER has funded over the past 5 years and topics related to ongoing programs.

NCER's research is managed through different programs. The largest program, STAR, encompasses competitive, targeted grants managed through RFAs, exploratory grants, graduate fellowships at Master's and Ph.D. levels, competed research centers, and P3, which are small grants for undergraduates and graduates who propose sustainability studies. In addition to STAR, NCER research is managed through the Greater Research Opportunities (GRO) program, which is intended to strengthen the environmental capacity of institutions that receive limited federal funding and have a large minority population; earmarked centers; the Experimental Program to Stimulate Competitive Research (EPSCoR), which also targets institutions with less federal funding; and SBIR, which issues contracts to small businesses with the intent of commercializing products in the environmental sciences.

Statutory authority describes the laws that enable EPA to act legislatively and allow NCER to issue grants and do research in various topic areas. The fundamental statutory law is the Federal Grant and Cooperative Agreement Act. In addition to authorizing NCER to disburse grants, it also limits the breadth of grant topics (slide 3). Dr. Saint described NCER's priority research areas over the past 5–10 years (slides 4–13). He emphasized the following:

- ✧ Particulate Matter (PM) and Air Pollution—a number of multidisciplinary research centers are focusing on the linkages between human health and PM sources and its components; this includes work on susceptibility, mode of action (MOA), and dose response. In this category, a series of epidemiological studies also have been conducted to assess the cardiopulmonary effects of long-term PM and air pollution exposures. In addition to these human studies, NCER also continues to support a program studying the physiochemical properties of PM in

the environment, including sampling, measurement, and analysis of coarse and fine particulates, and the characterization of sources, size distribution, chemical composition, transport, and fate.

- ✧ Clean and Safe Water—research in this category is focused on identifying and quantifying human pathogens in drinking water. This is a high priority for the Agency’s drinking water regulatory programs. NCER also has focused extensively on the ecology of harmful algal blooms. This year, water research at NCER is shifting toward decisionmaking for source water protection.
- ✧ Safe Products and Pesticides—this category involves long-term programs on endocrine disrupting chemicals (EDCs), biotechnology research, standard operating procedures for analyzing genetically altered foods, and computational toxicology research. The research on EDCs focuses mainly on toxicity and exposure but also includes efforts for characterizing endocrine-active hormones released from concentrated animal feeding operations.
- ✧ Global Change Research—progress is being made toward understanding the possible consequences of global change on human health, ecosystems, and social well being. The objective is to provide stakeholders and policy-makers with tools for responding to global change risks such as sensitivity of air quality to climate change and future global emissions (slide 8). One challenge is assessing and managing cumulative risks of global change. Dr. Hansen asked if the focus was on adaptation to global climate change; this was affirmed.
- ✧ Human Health Research—this program has centered on gene-environment interactions, sensitive subpopulations, measurement technologies for cumulative risks/biological markers, and outcome indicators for evaluating the effectiveness of regulatory programs (i.e., whether a regulatory decision has affected human health). This research category is rather broad, encompassing environment, social stresses, biodiversity, and human health. The program primarily strives to promote a better understanding of environmental exposures, initial impacts on human body mechanisms, and eventual disease to help risk assessors and policy-makers reduce uncertainty in their measurements by increasing data input.
- ✧ Ecosystems Research—this category focuses on assessing the effects of environmental stresses on ecological resources at varying geographic and organizational levels. Dr. Hansen asked whether this research presumes that there are ecological thresholds, and Mr. Barnwell confirmed that it did.
- ✧ Science and Technology for Sustainability—this program aims to encourage new technologies such as green chemistry, green engineering, and other technologies that can enable sustainable industrial processes. Recently, ORD has begun a collaborative program intended to allow stakeholders and investigators to work together to identify new technologies and decisionmaking tools for sustainability. This category also includes the P3 program, which will be fully described in a separate presentation.
- ✧ Economics and Decision Sciences—this program is intended to assist EPA managers in understanding the costs and benefits of proposed actions and optimizing and enforcing compliance actions. It assesses the effectiveness of government programs aimed at changing

environmental behavior (e.g., reducing emissions, recycling, etc.). This category also supports research to investigate market mechanisms and incentives as tools for environmental management.

- ✧ Exploratory Research—for the past 5 years, this program has mainly focused on the environmental and human health effects of nanomaterials; it also has begun to support research on fate and transport of nanomaterials. Exploratory research has traditionally been a part of NCER's program. Over time, however, RFAs announced under this category have become more focused on nanotechnology.

Dr. Saint then described the programs that have declined in funding and will be removed from the NCER portfolio in the near future:

- ✧ Sustainability (excluding P3) has been eliminated from the most recent budget.
- ✧ Economics and Decision Sciences will be gradually removed in the next few years.
- ✧ EDCs will not be funded in the next FY.
- ✧ Exploratory Research is being used to support nanotechnology. This was an NCER decision, because nanotechnology was deemed of sufficient importance to warrant the shift of funds from Exploratory Research.

The Subcommittee asked how the decisions were made to remove these topics from the portfolio. Dr. Saint replied that NCER did not choose to eliminate Exploratory Research from the portfolio, but decided to shift funds to nanotechnology. The Subcommittee advised maintaining the Exploratory Research category and instituting an independent nanotechnology category. They emphasized that it is important to have discretionary funds for emerging research. Dr. Saint responded that, at the moment, there was not enough funding. Dr. Hansen asked whether the declining programs accomplished their original objectives, and if not, what effort would be made to develop new programs to help accomplish those objectives (if they are still considered important). Dr. Saint replied that NCER will be evaluating the effectiveness of these programs through PART reviews, BOSCOM reviews, SAB reviews, and so on. Whether or not they will be replaced will be determined during the budget planning process.

Dr. Saint described how these categories had declined in funding. The Ecosystems Program had a budget of \$21 million dollars in 2004, but was eliminated in 2005. Sustainability had \$3 million dollars in 2006 and had \$1 million in 2007; this will be allocated to P3. Economics and Decision Sciences decreased from \$3 million to \$0 in the 2008 budget, EDCs funding was reduced from \$4.5 million in 2005 to \$3 million in 2006 to \$1 million in 2007; the category will not be funded in 2008. Exploratory Research retains approximately \$5 million, but this funding will be used for nanotechnology.

Dr. Saint then introduced the topic of partnerships, which NCER has been very aggressive in developing with other agencies. These partnerships include: (1) jointly managed solicitations, in which funding is pooled but grants are funded individually in terms of rules and timeframes; (2) collaborative agreements with scientists within EPA; and (3) jointly funded research grants.

These partnerships maximize the level of funds that can be used to address a research question. In addition, NCER funds various meetings and workshops with other agencies.

Dr. Philbert asked Dr. Saint to speak about cultural differences in terms of grant awards and what each agency reaps from the partnership. Dr. Saint agreed that different agencies have different policies, so NCER partnerships always begin by developing a Memorandum of Understanding (MOU). Solicitations are issued simultaneously with similar language, peer review is conducted by one of the agencies (rather than a joint review), and NCER and its collaborator conduct internal reviews and make decisions. In terms of the benefit to each agency in the partnership, Dr. Saint used the example of the Children's Health Centers. In this case, the partnership was mutually beneficial at all stages; ultimately, they were able to issue 14 grants when NCER had planned originally to issue only 1. The Subcommittee asked Dr. Saint to list other instances where NCER worked with the private sector. He mentioned an exposure assessment partnership with the American Chemistry Council in which they funded seven research projects instead of the original three. NCER also worked with the American Waterworks Association on a joint solicitation on arsenic. In these cases, the external community was suspicious that the private-sector collaborator may have influenced the results of the research. In general, NCER believes that partnerships reduce uncertainty and duplication of effort. He noted, however, that it is sometimes difficult to ensure that members of a potential partnership have sufficiently overlapping research interests. Mr. Rejeski asked whether records exist for these partnerships. Dr. Saint replied that there are records and he would make them available to the Subcommittee. He added that in the late 1990s and early 2000s, there was a peak in partnerships. Mr. Rejeski asked whether the partnerships arise through random staff contacts or through formal partnership searches. Dr. Saint responded that there was an NCER staff member who was involved in finding partnerships, but he has retired. NCER is trying to find someone else who will fulfill that role.

Dr. Saint explained that NCER measures success and results officially through Annual Performance Goals (APGs) as part of GPRA, but NCER also goes beyond that in its evaluations. For instance, NCER is developing a bibliometric analysis program, which it hopes to make mainstream within ORD. NCER also will develop various metrics to track publications that emerge from research that the Center has funded. The current metrics rank highly cited papers and "hot" papers (i.e., highly cited in high impact journals). NCER also is developing a data mining tool to better evaluate how the research funded by the Center is applied to regulatory decisionmaking. Dr. Philbert commented that the majority of publications that contribute to decisionmaking are not the same papers that are in high impact journals. He asked if there is a metric in place to account for that. Dr. Saint responded that NCER currently uses the traditional impact analyses (i.e., no special metrics for regulatory impacts), and Mr. Myles Morse, NCER Webmaster, added that NCER is still in the early stages of data mining. NCER's goal is to create a tool that successfully monitors citations according to their needs. As the data mining tool advances, the analysis can be reworked.

Dr. Philbert mentioned that there is typically a lag between the primary data and consequent rulemaking. Mr. Morse responded that they are going back to the inception of NCER and checking all of the papers that have resulted from NCER-funded research. Dr. Saint said that bibliometric analysis, the process of tracking the number of citations/papers that are being produced, has proved important in NCER and ORD, and various BOSC reviews have expressed

enthusiasm about this analysis. NCER has a high citation rate for its papers and programs, and this method allows NCER to compare publication yields from year to year and from program to program. Other agencies have used NCER's method as a standard for bibliometric analysis, and several bibliometrics are being used in PART reviews.

Dr. Saint reiterated that the data mining tool is designed to accurately assess the research impact with regard to consequent decisionmaking, rulemaking, and regulatory processes within EPA. The data mining tool searches documents and inventories associated with rulemaking in the Agency looking for citations of research funded by ORD (grouped by research program or RFA). The data mining tool is being refined to focus on true rulemaking as opposed to communications associated with rulemaking. NCER also is in the process of developing a keyword search function and transferring the data mining tool to a more amenable software format. Dr. Saint showed one example of a test that Mr. Morse and his group had run on the Human Health Program. It indicated the rulemaking documents that cited NCER research. Dr. Hansen commented that this data mining tool also might be useful to examine whether there is an inherent bias in the citations that appear in rulemaking documents.

Dr. Saint stated that NCER makes a Center-wide effort to communicate, particularly during the solicitation and pre-award phases. They use mailing lists to send mass e-mails about solicitations and the availability of funding. NCER also publicizes solicitations in a government-wide database and sends targeted information by e-mail, the postal service (to a lesser extent), and Web logs. When NCER is about to make awards, the communications staff at NCER develops press releases, fact sheets, and brochures, as well as Web articles. When awards are made, NCER notifies Congress and regional offices. NCER also increases public exposure through "big check events"; these are reserved for major centers or programs that are capable of stirring public interest.

NCER also communicates through magazine articles, newsletters (distributed through ORD), various Web Sites, grant summaries, and multi-grant synthesis reports. The most sophisticated of these is the "State-of-the-Science" report, which assesses how NCER results have contributed to an entire body of science. Dr. Tuler asked for examples of State of the Science reports, and asked whether NCER tracks how these reports are used. Dr. Saint replied that NCER has prepared State-of-the-Science reports on Biomarkers and Sustainability. He added that few of these reports are created because they are expensive and time consuming. Currently, the effects of State-of-the-Science reports are not formally tracked.

Dr. Hansen asked why some of the STAR progress reports are missing from the NCER Web Site. Dr. Saint responded that NCER had improved at publishing reports to the system. He noted that more recent grants are more comprehensively reported. He added that NCER requires a report in the terms and conditions of the grant. Grantees must report their progress in the form of annual reports and final summaries. These are promptly published to the NCER Web Site.

Dr. Saint mentioned that NCER continues to improve its communications efforts. NCER is planning a quarterly research magazine, multimedia pieces, fellowship conference videocasts, an expo and promotional video for the P3 Program, and regional and national SBIR workshops for outreach to small businesses. NCER also upholds communications with client offices by meeting regularly to discuss specific research projects, especially when solicitation writing teams are

working together to develop RFAs. Some senior researchers and NCER POs are involved extensively in writing the MYPs and work directly with NPDs. NCER also holds a series of regional science seminars.

NCER has several ways to receive input and provide information to the scientific community. Soon after grants are awarded and research programs begin, NCER communicates investigators' research plans and objectives to the Center's clients and provides details of what the grants intend to accomplish. Dr. Saint mentioned that NCER continually looks for ways to improve collaborations between EPA scientists and investigators. One way of doing this is through progress review meetings in which EPA scientists and investigators can present their progress to clients.

### **Review of NCER's Role and Contributions – Air Program**

*Dr. Dan Costa, ORD, Air Program NPD*

Dr. Philbert introduced Dr. Daniel Costa, the NPD of the Clean Air Research and Development Program.

Dr. Costa first discussed resources in the Air Program, stressing that NCER spans all areas of the program. He indicated that in FY 2007, the Air Program had 171.1 science-based full time equivalents (FTEs). Dr. Costa also mentioned that the Air component of the STAR Program has a \$17 million budget of which \$4 million goes toward the atmospheric sciences, and the remaining resources fund health research. The non-STAR resources total approximately \$14 million. Dr. Costa added that the Air Program budget has remained stable.

Dr. Costa explained how the Air Program establishes research priorities (slide 3). He said the National Research Council (NRC) established two subcommittees identified research priorities for PM and air quality management. The NRC recommendations provided input in developing a research plan. The program also considers input from the RCTs (representing clients), SAB, BOSCO, program staff, meetings, and the public.

Dr. Costa said that the Air Program's 2007 MYP is in revision, and that the PM, Ozone, and Air Toxics Programs have been integrated into one MYP. Dr. Costa emphasized that the Air Program continues to strive to fulfill its two essential long-term goals (slides 5–7); these goals embody the core of the Program: (1) reduce uncertainty in the science that supports standard-setting and air quality management decisions; and (2) reduce uncertainties in linking health and environmental outcomes to air pollution sources.

The APGs of the Air MYP (2008–2012) address five scientific issues:

- ✧ Supporting development of National Ambient Air Quality Standards (NAAQS) and other air quality regulations.
- ✧ Support for implementation of air quality regulations.
- ✧ Pursuing a multi-pollutant approach.
- ✧ Identifying source-to-health linkages.
- ✧ Assessing health and environmental improvements due to past Agency activities.

Dr. Costa then discussed “Near Roadway Effects,” which addresses the exposure metrics based on the distance a person lives from a road. This is an important issue in the regional offices and began in 2006 with a voucher program to develop initial pilot projects. The Air Program is currently conducting pilot experiments in Las Vegas, NV; Detroit, MI; and Raleigh-Durham, NC. Dr. Costa stressed that these studies are very goal intensive and attempt to look across multifaceted issues to address scientific problems from multiple angles. The Program plans to evolve the Near Road Program from 2007 to 2011 by starting with emission characterization and atmospheric assessments and ultimately conducting exposure assessments to determine health outcomes. This initiative is the prototype of “source-to-health” approaches. Financially, \$1 million will be shifting to Near Roads, and NCER will develop a Near Road RFA.

Dr. Costa reiterated that NCER is fundamental to this process, mainly by allowing the Air Program to access an interested community. NCER programs also have contributed 1,100 publications (to the total 2,000) and a number of those are highly cited. In bibliometric analyses, NCER programs typically have the highest scores (in particular, the epidemiology publications are very strong). Dr. Costa said that overall, NCER’s Air Research Program is fundamental to the success of ORD’s air research initiative.

Dr. Costa stated that the NCER RFAs respond to policy and client needs. Currently, the Office of Air and Radiation (OAR) is investigating air quality interactions as the new frontier. The Air Program strives to be multidisciplinary at every level, including writing and reviewing RFAs and meeting with grantees and extramural staff. They actively look for overlapping research opportunities. Dr. Costa stated that the Air Program is fortunate to have a highly engaged and responsive group, but he suggested that the Subcommittee help to make NCER leadership more prominent at meetings. He also stressed that the Air Program needs more recognition in the science community. Finally, he noted that the Subcommittee might suggest ways to make the NCER Web Site more user-friendly.

Dr. Costa summarized his presentation by stating that NCER is a key factor in the success of ORD. He holds NCER in high esteem, highlighting the Center’s outstanding science, great team approach, flexibility, and general desire to get the job done.

Dr. Tuler commented that the Air Program appears to be functioning well and asked for a clarification of their challenges. Dr. Costa agreed that the Air Program is regarded as a success within ORD, but mentioned that any suggestions that could increase timeliness of the Air Program’s response to issues would be favorable. He added that once the Air Program integrated across PM, Ozone, and Air Toxics and established health and exposure campaigns, the Program improved. Dr. Costa also mentioned that the Program is lacking in funding, the staff is aging, and there will be a sizeable retirement pulse in the near future. The Air Office will need strong and flexible intramural and extramural programs to succeed with a new group of staff members.

**Review of NCER’s Role and Contributions – Human Health Research Program**

*Dr. Hugh Tilson, ORD, Human Health NPD*

Dr. Philbert then introduced Dr. Hugh Tilson, the NPD for the Human Health Research Program. Dr. Tilson stated that the Human Health Research Program is one of many in ORD that deals with human health. The Human Health Risk Assessment, Particulate Matter and Toxics,

Endocrine Disruptors, and Drinking Water Programs also have human health components. The Human Health Research Program is distinct because it is a multimedia Program that spans air, water, pesticides, and so on. Moreover, it tends to deal with longer range problems for which a better understanding of the scientific basis is needed.

Dr. Tilson presented a Venn diagram of long-range issues that the Human Health Research Program has addressed (slide 4):

- ✧ *Use of Mechanistic Data and Risk Assessment.* The Program will use ORD's methods, models, and data to reduce uncertainty in risk assessment. They also are focusing on methods to identify MOA.
- ✧ *Cumulative Risk.* Humans are constantly exposed to a "soup" of chemicals. Therefore, it is necessary to provide information to risk assessors with regard to the characterization of cumulative risk and risk assessment. Toward that end, a portion of the Human Health Research Program deals with biomarkers, developing source-to-effect models to determine exposure in a cumulative risk assessment, and providing information (e.g., animal data, statistical models) for ongoing risk assessments. They also are focusing on community risk—the interaction of chemical stressors and nonchemical environmental stressors within a community.

Dr. Philbert asked how much of the research is related to cancer. Dr. Tilson responded that only 20 percent is cancer-based. Instead, the Human Health Program focuses the majority of its research on reproductive, endocrine, and pulmonary dysfunction. He added that the cancer component primarily deals with drinking water contaminants.

- ✧ *Susceptible Subpopulations.* This long-term issue is associated with life stage. Young children and the elderly may be differentially sensitive to chemical or environmental stressors. The Human Health Research Program investigates the biological basis of this differential and identifies the critical phases of development. One major effort in this category is childhood asthma research.
- ✧ *Evaluation of Risk Management Decisions.* This research thrust is evolving very quickly and investigates how prior risk management decisions have affected human health.

Dr. Philbert asked whether there is a substantial difference between STAR and the intramural Human Health Research Program. Dr. Tilson responded that the difference is categorical. For example, exposure research with children is not easily accomplished through the Human Health Research Program, but information can be attained through STAR instead. Children's Centers are a fairly large part of STAR and they have the capacity and capability to investigate research questions that the intramural component of the Human Health Research Program cannot address. These Centers primarily deal with issues related to childhood asthma, effects of cumulative exposures, neurodevelopmental disorders, and disparities among communities. The Centers have been prolific in producing information, and the results are being used to support risk assessment and risk management decisions. Moreover, STAR can integrate issues being studied by the Human Health Research Program with interdisciplinary programs. Dr. Tilson noted that about 60 percent of the resources in the Human Health Research Program are derived from STAR.

Dr. Tilson then listed five ways in which NCER contributes to the Human Health Research Program (slide 6):

- ✧ Participating in the ORD planning process.
- ✧ Developing RFAs that complement ongoing intramural research.
- ✧ Hosting workshops and scientist-to-scientist meetings to promote communication.
- ✧ Identifying means to determine impact of research products.
- ✧ Producing high-quality research products.

Dr. Tilson stated that one very important decision-making group is the RCT, which he depicted in diagrammatic form (slide 7). The RCT includes the NPD (RCT Leader), Assistant Laboratory Directors (ALDs), program and regional office representatives, as well as staff from ORMA and the Office of Science Policy (OSP). The functions of the RCTs include annual research planning, MYP development, and communication.

Dr. Tilson stressed that NCER now consistently develops RFAs that align with Human Health themes. Years ago, it was often difficult to connect proposals in STAR with research being conducted intramurally; that has changed. Now there are 14 different RFAs for MOA research, a few for biomarkers, several related to children's health, and others for environmentally induced effects of diseases.

### **Public Comment**

At this point, Dr. Tilson's presentation was interrupted to allow for public comment. Ms. Peterson called for public comments, and no members of the public offered comments.

### **Review of NCER's Role and Contributions – Human Health Research Program (continued)**

*Dr. Hugh Tilson, Human Health NPD, ORD*

Dr. Tilson noted that communication with the external scientific community is an important issue. In the past, approaches designed to engage the scientific community and the intramural researchers concurrently were not a high priority. During the past 2–3 years, however, NCER has actively included Human Health Research Program topics in meetings with other groups. NCER also sponsors scientist-to-scientist meetings, annual meetings with the Children's Research Centers, and STAR grantees' meetings. Moreover, NCER is including more intramural researchers in the planning of RFAs. One example is the fact that the Center is in the process of planning a workshop for community-based risk assessment; this is a complicated issue that is far too complex to study intramurally.

Dr. Tilson then discussed measurement of impact—particularly, how publications are being used. Examples of how impacts are being identified include the publication of summary reports, work with the National Center for Environmental Assessment (NCEA) to develop a database of ORD MOA research, and participating on an interagency workgroup s to evaluate the ability of the Children's Centers to impact public policy.

The outputs of ORD are scientific publications, which can be assessed for quality of research by bibliometric analysis. NCER now routinely provides bibliometric analysis results for both STAR research and intramural research for all research programs, including the HHRP. NCER also is working with the NPDs to develop data mining tools to assess how publications are used to support regulatory decisions. This includes assessing how the scientific community uses the products (i.e., in publications) and categorizing how research is actually being used by the Agency.

Dr. Tilson stated that STAR researchers are prolific. Since 1999, STAR grantees have generated approximately 1,400 of a total of 2,300 publications and have made high-quality scientific discoveries with many potential applications (slide 16). Dr. Tilson said that it also was important to identify scientific issues and bring them into the planning process; this includes issues that are important to the external scientific community. Dr. Tilson said that this process has improved over the past 3 years, and workshops and scientist-to-scientist meetings have contributed to communication and collaboration.

Dr. Hansen asked if effectiveness could be judged using an interview process. This would involve asking the client which NCER products influenced their regulatory decision. Dr. Tilson replied that such a process is in place in other ORD programs, but the Human Health Research Program has not yet established a survey. Such a survey is currently being developed and is scheduled to be used early in 2008. He added that NCER is going through documents of other organizations that do risk assessment and is looking into cases in which EPA research was used to support key decisions in risk assessments. Initial findings suggest that about 30–50 percent of risk assessments involve EPA data in a crucial way and 30-40 percent of those cases involve STAR research.

Dr. Philbert asked whether it is easy for clients to identify products generated by NCER. Dr. Tilson responded that less than 10 percent of NCER-supported publications would include both an NCER grantee and an intramural researcher. In cases where there was no intramural researcher listed as a co-author, it would be difficult at times to determine if the publication was an EPA-supported product. Dr. Philbert then asked whether grantees are required to acknowledge their source of funding. Mr. Barnwell said that the acknowledgment should be in the publication, but in some cases, grantees acknowledge multiple sources of funding.

### **Other NCER Programs**

A series of short presentations on NCER's other programs are described below.

*Ms. April Richards, NCER*

Ms. April Richards gave an overview of EPA's SBIR Program. This is a federal set-aside program that awards contracts to small (500 or fewer employees), for-profit U.S. businesses to engage in research and development (R&D). SBIR's goal is to promote commercialization; rights to new technologies are retained by the business.

Ms. Richards stated that 2.5 percent of the federal R&D budget is allocated for the SBIR Program; most of which is funded by the Department of Defense (DOD). SBIR money supports

EPA's mission by encouraging the development and commercialization of technologies that will solve high-priority environmental problems. These problems are identified by EPA regions and Program Offices.

SBIR funds research in two phases: concept and development. SBIR also will support verification of a technology, but companies must find other sources of funding to commercialize the technology. It is hoped that the technology will be used to an environmental benefit.

Ms. Richards mentioned that the SBIR Program's annual budget was approximately \$6–7 million. She emphasized that NCER receives a large number of proposals, despite the small budget (more than 400 for the past 6 years). The SBIR Program success rate parallels STAR—between 10 and 15 percent of proposals pass Phase I, but the success rate is a bit higher in Phase II.

Ms. Richards then discussed the structure of the funding phases. Phase I begins with a proof of concept. A company is awarded \$70,000 for 6 months. If the technology is functional, then the company becomes eligible for Phase II. This phase involves technology development with a focus on commercialization. Companies receive a base award of \$225,000 for 2 years, which can be increased if the company can secure third-party funding or if the awardee opts for verification testing.

Ms. Richards stated that the annual cycle of awards proceeds as follows: (1) a solicitation is issued from March to May; (2) applications undergo peer review in September; (3) relevancy review begins in December; and (4) Phase I awards are made the following February. Phase II solicitations are open to companies that successfully prove their technology concepts in Phase I.

SBIR offers many different topics to small businesses, including nanotechnology, innovation in manufacturing, rebuilding, waste-to-energy, disaster debris management, and homeland security. In the future, NCER may narrow the topics because the budget can no longer support all of them. Ms. Richards directed the Subcommittee to the SBIR Web Site for more information (<http://www.epa.gov/ncer/sbir>). She added that NCER is developing an SBIR-specific keyword search feature.

Ms. Richards mentioned that she had considered the Charge Question, and with respect to SBIR, the objective is to engage the small business community. Because SBIR is aimed at commercialization, it is imperative that NCER fund companies capable of developing a product for which a market exists. The proposed technology must be both scientifically and commercially sound. The SBIR Program, therefore, must target research that addresses an immediate need.

Ms. Richards stated that the metrics of success for the SBIR Program involve case studies. She said that it is *ad hoc*, but once companies complete their SBIR contracts, it becomes difficult to track them any other way. A booklet of such studies was provided to members of the Subcommittee. Ms. Richards mentioned that SBIR-funded businesses have been awarded patents and have created technologies that now are regarded as industry standards. She noted that businesses do not always take a linear path to commercialization, but can have success through follow-on funding from other sources or crossover success in a different industry. Dr. Philbert

asked whether NCER documents the nonlinear paths. Ms. Richards responded that they currently are documented through published success stories.

Mr. Rejeski asked how SBIR review panels for SBIR proposals are created because reviewers need marketing expertise in addition to technical expertise. Ms. Richards responded that they choose people from the private sector, and she agreed that the commercialization plan and strategy for marketing the product are weighed heavily in the proposal evaluation. She mentioned that the SBIR Program also employs a contractor to do niche analyses on SBIR-funded technologies; this helps businesses find appropriate markets.

*Ms. Mary Wigginton, NCER*

Ms. Mary Wigginton described NCER's P3 Program. Her presentation was titled "P3—People, Prosperity, and the Planet—Award: A National Student Design Competition for Sustainability." Since the inception of P3, Ms. Wigginton has been responsible for publications and outreach. She spoke on behalf of the Program Director, Ms. Cynthia Nolt-Helms.

Ms. Wigginton stated that P3 was launched in 2004 with more than 40 partners from industry, government, non-governmental organizations (NGOs), and professional societies. It was named for the three "pillars of sustainability" defined in the 1987 document "Our Common Future: The World Commission on Environment and Development." P3 addresses sustainability challenges with an annual RFA in the following areas:

- ✧ Agriculture
- ✧ Built Environment
- ✧ Materials and Chemistry
- ✧ Energy
- ✧ Information Technology
- ✧ Water.

In the RFA, P3 also encourages applicants to infuse sustainability principles into the academic curricula of their universities.

Ms. Wigginton stated that applications come from colleges and universities, but P3 is unique because proposals are based on student-led teams. Teams are awarded a Phase 1 grant of \$10,000 for the academic year—this gives the student teams a period of 1.5 semesters to complete their projects. At the end of the academic year, teams bring their projects to Washington, DC, to be judged by a panel of National Academy of Engineering (NAE) members. The NAE panel recommends 6 projects to receive the Phase 2 grant of \$75,000. This allows students to further test, implement, or commercialize their research products. Dr. Hansen asked if P3 tries to link teams with NGOs or commercial partners. Ms. Wigginton replied that NCER is currently working on that.

Ms. Wigginton recommended that the Subcommittee members review the list of student projects on the P3 Web Site (<http://www.epa.gov/ncer/p3>). She reiterated that the P3 Program encourages teams that are student-led and interdisciplinary. Teams should report on how their projects benefit people, prosperity, and the planet; how sustainability concepts have been integrated into

their schools' curricula; and/or how their research products have been used as an educational tool. She noted that the student teams present their research projects on the National Mall—this is similar to the U.S. Department of Energy's Solar Decathlon. She added that the students benefit from the unique experience of discussing their projects with world famous engineers at the base of the Capitol. This format also promotes public exposure to the principles and importance of sustainable design. Ms. Wigginton stated that a side benefit of P3 is small business development. In the past 3 years, the P3 Program has led to four startup businesses.

Ms. Wigginton then summarized communication and outreach efforts within P3. She noted that NCER is always trying to encourage more proposals—one metric for success is the number of proposals received in a given year. In fall 2006, P3 received approximately 40 percent more applications than they did in 2005. They employ standard communications through the NCER Web Site and mailing lists. The National Mall expo also helps to communicate to future participants. The P3 staff has found, through informal surveys, that most students learn about the P3 Program from faculty. To better promote outreach directly to students, NCER is preparing a promotional videocast for the upcoming RFA. In addition to increasing the number of student participants, NCER has incrementally increased the number of nonprofit organizations and government exhibitors. P3 also has enjoyed extensive media coverage at the local and national levels. Ms. Wigginton stated that, although numbers of P3 grants are low, the Program has inspired broad national participation after just three grant cycles. Students from 41 states have participated, and P3 hopes to have every state represented by next year.

Ms. Wigginton described a few P3 success stories and showed samples from various universities of technologies that have been used at national laboratories or have led to startup companies. She stated that P3 is in the process of building a "where are they now" compendium of all participants.

Ms. Wigginton noted that P3 would like the BOSC Subcommittee to offer recommendations on increasing the number of proposal submissions—the Program's goal is to enhance the caliber of projects and increase the size of the expo to ultimately cover the entire National Mall with sustainable design projects. She stated that P3 also wants to find more active roles for the 40 partners who helped them launch in 2004. Also, NCER is trying to match government agencies and nonprofit organizations with the projects that emerge from P3; they expect that this would increase the funding they can award to Phase 2 projects. Ms. Wigginton stated that the P3 team just received an EPA gold medal for its work, so NCER is confident that the Program is valuable to EPA.

Dr. Keller-McNulty asked about the size of P3. Ms. Wigginton responded that there is one full-time Program Manager; in dollars, P3 totals \$1.3 million. Dr. Philbert asked why the P3 expo is planned concurrently with Earth Day. Ms. Wigginton answered that this draws more people from the public into the event. She added that last year, the event occurred in the same week as Earth Day, and passersby asked whether EPA was doing anything for Earth Day. Moreover, it is a time when environmental issues get media attention.

*Ms. Stephanie Willett, NCER*

Ms. Stephanie Willett spoke about NCER's fellowship programs. Her presentation was titled "ORD Fellowship Programs: Investing in Good Science and Good People." Ms. Willett is Team Leader for the academic Fellowship Program. She stated that NCER has been awarding fellowships since its inception in 1995.

Ms. Willett described the two academic fellowship programs managed by NCER: the STAR Graduate Fellowship Program and the GRO Fellowship Program. The primary objective of these programs is to support students who are going to obtain an advanced degree in an environmentally related field. A secondary objective is to generate useful research from the students. Ms. Willett explained that for both STAR and GRO, there are generally 16 research topics included in the annual RFAs (slide 2). Typically, they receive applications in all of the areas every year, although some topics are more popular than others. STAR graduate fellowships have been issued since 1995; annually, the Center awards between 69 and 128 fellowships (69 in 2007; ~1,400 total). The level of support is the same for each student—up to \$111,000, which includes a stipend of \$20,000, a research budget of \$5,000, and up to \$12,000 toward tuition. The STAR fellowship budget is approximately \$7–10 million. Ms. Willett stated that the National Academies review is included in the packet of materials distributed to the Subcommittee. It indicates that STAR fellowships are very valuable. Additional success stories are listed on the NCER Web Site. The STAR Fellowship Program is in high demand with far more applications than can be funded. NCER awards approximately 7–10% of the applications it receives.

The GRO Fellowship Program funds both graduates and undergraduates. It targets smaller to mid-sized universities that receive \$35 million or less in R&D funds. The GRO Program awards about 15 fellowships annually (approximately 140 total). GRO fellowship recipients receive the same level of support as STAR fellows. The GRO fellowship annual budget is \$1.5 million or less. In the GRO Program, a very low percentage of applicants receive funding, and the Program continues to struggle with how best to distribute the limited funds. The undergraduate component of GRO is a \$41,500 total award, which includes forward funding of the last 2 years of undergraduate tuition and a mentored internship at an EPA facility. The undergraduate GRO budget is small, but the program has been very successful with research output. The research categories funded are very general, and undergraduates are not required to do independent projects; the funding is to support them as they focus their interests in the environmental field. Ms. Willett commented that NCER does not receive many applications from undergraduates. She added that a recent BOSC review has helped the Program to identify some reasons for this. The challenges include a lack of direction, confusion over who to target (i.e. parents, students, or professors), and a lack of incentive for the mentor. Also, the Program initially tried to target small universities and minorities, but there has not been a large enough response from these demographics.

Ms. Willett stated that the fellowship programs recently underwent a BOSC Subcommittee review, and the Subcommittee concluded that the fellowships are very worthwhile. The BOSC report included 20 recommendations, and both the review and ORD's formal response to it can be found on the BOSC Web Site. One recommendation was to specifically find out how fellows have impacted the scientific community. Preliminary results from a bibliometric analysis of the publications of the 1995–1996 fellows indicate that they are highly cited, one-third are published

in high impact journals, and 20 were hot papers. These fellows also have been issued 13 patents and submitted 31 patent applications. The Fellowship Program plans to develop further metrics.

Ms. Willett then listed the action items they received from the BOSC review that the Program intends to implement over the next 1–2 years. The Subcommittee asked Ms. Willett to discuss other fellowship programs operating within NCER. She mentioned the American Association for the Advancement of Science (AAAS) Environmental Energy and Natural Resources fellowship program as an example. She said that EPA does work in collaboration with AAAS (among other federal agencies) and occasionally young Ph.D. scientists work on EPA projects for 1–2 years. She added that anecdotally, nearly 100 percent pursue environmental careers and some of them work for the federal government. Ms. Willett also mentioned a Public Health Fellowship Program in which Masters in Public Health graduates work at EPA for 1–2 years.

Ms. Willett then described the EPA Marshall Scholars Program. She stated that the Program was in its infancy. Fellows are selected through the Marshall Program, and after they finish their work there, EPA offers them a bridge fellowship with additional support. The first candidates are just beginning work at EPA. Ms. Willett added that advice regarding how to mesh this fellowship and professional development efforts into NCER would be very helpful.

Dr. Clifford asked about a graph showing no STAR funding in 2002 (slide 4). Ms. Willett affirmed that there was no fellowship funding that year; at that time, environmental impacts were becoming important research thrusts, and EPA was not able to respond efficiently, so the program was moved to NSF. The decision was reversed the following year. Mr. Barnwell added that NSF was establishing a major education initiative at the time, and money was moved from EPA to NSF to support it.

Dr. Finkel asked whether anyone was funding curriculum development so that new studies could reach students and motivate them to stay in the field. Ms. Willett responded that there is an EPA Office of Education, but it may be lacking in its outreach to high school students. Dr. Keller-McNulty commented that she was puzzled about the decline in applications and in the number of proposals receiving excellent ratings when they were concomitantly seeing more students majoring in environmental engineering. Ms. Willett speculated that it was a reflection of EPA policies in general or a lack of ecosystems-related funding. She added that within the last two RFA cycles, changes have been made to the standard RFA language; now projects have to be related to EPA's mission and this might be confusing or discouraging to students. In addition, the uncertainty in the funding might be a factor. Dr. Philbert asked what proportion of applicants comes from schools of public health or medical schools. Ms. Willett estimated that 25–30 percent of applicants consist of students from these schools—this number has remained stable. Dr. Keller-McNulty asked whether the RFAs were being marketed differently to different disciplines. Ms. Willett replied that the solicitations are marketed equally to everyone, so the message must be perceived differently. She suggested that the BOSC Subcommittee could provide advice to help balance how NCER targets students from engineering and health-related fields.

## **Subcommittee Working Time**

### *NCER Standing Subcommittee*

Dr. Philbert recommended that the Subcommittee revisit the Charge Question in light of the presentations and begin to prepare questions and formulate recommendations for NCER. The Subcommittee discussed the Charge Question bullet by bullet.

*What steps can NCER take to more effectively engage the external scientific community to better craft a forward-looking portfolio and meet evolving Agency needs?*

✧ *Regarding NCER's niche in ORD and in the greater environmental federal research and development, what can it do to more flexibly address emerging issues and technologies and provide timely responses to rising scientific needs of the Agency?*

Dr. Finkel commented that, while NCER obviously could not fund everything that external scientists found interesting, he worried that NCER risks determining its priorities without enough external input. He mentioned that investigators might choose not to submit proposals for NCER's RFAs if the investigators believe that NCER is targeting the wrong or inappropriate question. Alternatively, Dr. Finkel said that NCER might funnel investigators into categories that may not address the most useful priorities; the investigators in turn agree to work on these issues because otherwise they would not be funded. Is there any way for NCER to mold its RFAs based on an assessment of what external scientists are already investigating? He asked, from a broader point of view, how priorities are set. When NCER prepares an RFA, does the Center base its research initiative on supply or demand?

Mr. Rejeski asked whether interesting science is discussed through incidental contacts at meetings or through a formal dialogue and specific documents. In addition, the presenters stated that BOSC and SAB reviews "and other external advice" leads to the development of RFAs. The Subcommittee would like clarification on the source of this external advice. Dr. Philbert reminded the Subcommittee that there are fundamental differences between research programs run by regulatory agencies and programs run by research organizations. Dr. Finkel noted that priorities should be set from regulatory needs with appropriate and informed input from the public. Dr. Philbert asked Dr. Finkel how he would model such a system. Dr. Finkel responded that a grassroots initiative that allows investigators essentially to be funded for the work that they are already doing could benefit the Agency. He added that it would be difficult to accomplish because every investigator would want his/her own research to be funded. Dr. Keller-McNulty said that the Subcommittee does not have enough information about how NCER is currently obtaining/implementing information for prioritization.

Dr. Keller-McNulty stated that the Subcommittee's Charge is not to review NCER's choices but instead to look more at the process it uses to make these choices. The Subcommittee has been asked for ways in which NCER can effectively engage the scientific community, so the Subcommittee should craft recommendations based on the Charge and what we have gathered from the information that was provided to us. Dr. Philbert agreed and said that the job is not to help with priority setting, but instead to address the process. Dr. Finkel stated that assessing NCER's decisionmaking process is important, but he heard many times that NCER wants to reduce uncertainty, and reducing uncertainty is a step toward setting priorities. In terms of

decision theory, NCER would want to reduce the uncertainties that contribute to precarious, error-prone decisions. Moreover, NCER cannot reduce uncertainty until it is quantified. Toward that end, the Subcommittee would need information about NCER's specific challenges to assist in decisionmaking. Dr. Finkel added that, in addition to spending money controlling problems, some money should be put toward studying and understanding the problems. He noted that EPA characteristically encounters this caveat; the Agency does not believe that the research should support specific decisions because they think that decisionmakers, risk assessors, and researchers communicating too early may lead to political corruption of the process. He added that without communication, however, the result is a complete disconnect.

Mr. Rejeski stated that EPA sees science as a means to support the Agency. He thinks that during the past 25 years, the science has advanced beyond the Agency, and ultimately, the science will redefine the Agency (in terms of the programs). EPA has not determined how to regulate nanotechnology, and that will stress the other program areas. He recommended that EPA become more informed by external scientists who are on the cutting edge. Mr. Rejeski added that it is a problem because many of EPA's priorities were set 20 years ago. NCER says it wants a forward-looking program, but then removes the Exploratory Research component. In addition, the National Nanotechnology Initiative (NNI) gave EPA \$5 million, which the Agency could have set aside for nanotechnology research so that the Exploratory Program could be retained. Mr. Rejeski acknowledged that exploratory research had many problems—particularly in determining metrics of success. He noted that he talked with EPA years ago to see if it would be useful to study successful exploratory research programs, such as Bell Laboratories or Xerox, to see how they were structured, staffed, and assessed. The Subcommittee agreed that Exploratory Research should not be held to the same standard as regular, targeted research; however, the Exploratory Research identified nanotechnology as an emerging issue, and it is now a very important component at NCER. Dr. Keller-McNulty mentioned that NSF encourages investigators to use 10 percent of their funding for exploratory research.

Dr. Tuler asked whether the \$5 million for nanotechnology was given to NCER or EPA. Mr. Rejeski responded that he did not know, but it was a Congressional appropriation. Dr. Keller-McNulty mentioned that she did not believe Congressional mandates (earmarks) could be carried out without internal reallocation of funds. Dr. Philbert added that in the case of unfunded mandates, reallocation would be required. Dr. Keller-McNulty said that NCER needs to clarify its budget shifts. There have been many, and it is difficult to understand why this is occurring and how NCER engages the community in response to budget shifts. She particularly wanted to know why Ecosystems Research was removed from NCER's portfolio. Dr. Hansen added that most of the programs that are being removed from the portfolio are high-priority research areas.

Dr. Finkel asked if programs are completely eliminated when they are removed from NCER, or if they are merely picked up by a different group within EPA. Dr. Philbert responded that, even if this was the case, it would mean that the program was being shifted from extramural to intramural. For instance, the Air and Human Health Programs in ORD are complemented by NCER, which has the capability to foster diverse and complex research. Dr. Hansen recommended that the Subcommittee consider NCER's position. The Center has been fighting the budget battle for nearly a decade. From NCER's perspective, the main concern is budget, and the Subcommittee saw that reflected in the presentations. Dr. Philbert responded that the challenge is to think of innovative ways of getting more accomplished with less money. Dr.

Keller-McNulty said that NCER had shown innovation through tremendous partnership growth. Dr. Philbert added that the Subcommittee does not mean to criticize NCER, but they are frustrated over trying to find where they can provide helpful and substantive input.

Mr. Rejeski brought up the rumor that 30 percent of EPA's senior scientists will retire in the next 5 years. If that is the case, how does that impact NCER? Will the empty slots be filled? If so, will NCER recruit aggressively? He noted that they will be dealing with new scientific issues, so they will need to hire people with different types of expertise? Dr. Tuler added that Dr. Costa had mentioned that NCER personnel were well integrated; is that the case with other programs? Dr. Keller-McNulty added that it was disconcerting to hear about the layers of review after an RFA was issued. In thinking about this, she wondered who NCER considers to be the external scientific community. Do they consider community engagement at the development phase of an RFA? Even though the Center may be succeeding at good peer review, it may be missing opportunities to communicate with the scientific community before the peer review. NCER receives BOSCO, SAB, and National Academies reviews, but NCER's engagement of the external scientific community was not well detailed in the presentations. It would be helpful to get more information about the mechanisms by which grants are funded externally. It seems that a great deal of scrutiny is incorporated into the funding process at EPA.

Mr. Rejeski noted that there is an enormous amount of scientific chatter at the National Institutes of Health (NIH) and NSF; at NCER, communication seems to be limited to the program offices. Historically, EPA did not have a strong extramural program, because the Agency issued contracts instead of grants. When they needed more research, they boosted their extramural program and started communicating with scientists. EPA, however, is very different from a curiosity-driven research program, and still carries the vestige of contract-based research. Dr. Finkel suggested that EPA does not assess the external research because the Agency thinks that no one understands its mission better than EPA does. EPA knows what Congress wants it to do, and the Agency knows the deadlines. He suggested that the agenda supersedes the industry, but added that decisionmaking has to flow from real decisions.

Dr. Finkel commented that there is no reason why NIH and NSF workshops could not be made into a "hybrid" meeting with regulators. In this manner, regulators could talk with scientists and together they could develop a set of priorities and ultimately an RFA. Dr. Finkel stated that NCER mentioned a research thrust toward cumulative risk; similarly, it should institute a cumulative organization of the regulations. The problem may be that regulators do not want the advice of the external community.

Dr. Tuler mentioned that in the beginning of the presentations regarding bibliometric analysis, NCER representatives discussed counting. Dr. Tuler said that it is not always meaningful to count (i.e., how many times a paper has been cited). He noted that the data mining effort may yield useful information. Dr. Hansen added that he thought interviews were a good idea. Dr. Philbert responded that interviews can be time-intensive, and perhaps NCER avoids interviews because OMB believes they are not as quantifiable. Dr. Keller-McNulty added that, if they are using bibliometric analyses to communicate to decisionmakers, the decisionmakers likely do not understand their significance. Dr. McComas (by teleconference) noted that it is important to know NCER's challenges before the Subcommittee can help improve their decisionmaking. It is necessary for NCER to narrow down its shortcomings, and list the audiences the Center is trying

to reach. Dr. Keller-McNulty mentioned that this information might exist in the 2003 report that was included in the packets. Mr. Rejeski added that it appears NCER functions in “broadcast mode,” in which every Program has a Web site, but there is little dialogue or input into the system. Instead, it is like an isolated regulatory body. The 2003 report includes recommendations of what NCER should do and cites model companies, but it does not indicate how NCER has changed since then. The Subcommittee would appreciate a list of the recommendations that NCER has/has not executed successfully. There was a letter from 2005 that mentioned NCER’s progress toward responding to the 2003 report, and the Subcommittee would like an update. Moreover, the 2003 report was targeted to all of ORD, rather than NCER specifically.

Dr. Philbert announced a change to the agenda. The discussion of the Charge would be continued on Day 2 at 9:00 a.m. before the Subcommittee breaks into workgroups. Ms. Barbara Klieforth added that a lot of the questions that the Subcommittee discussed during this period were answered or at least relevant to the information that was provided in their packets. She added that NCER will follow up on additional questions that were not answered in the packets. Dr. Philbert reminded the Subcommittee members that their recommendations will be in the form of a Letter Report to the BOSC. Because it is a Letter Report, the Subcommittee’s recommendations must be succinct and streamlined.

### **Wednesday, July 25, 2007**

#### **Subcommittee Working Time (continued)**

##### *NCER Standing Subcommittee*

Dr. Philbert recommended that the Subcommittee revisit the second and third bullets in the Charge Question before breaking into individual workgroups.

- ✧ *What advice can be offered on ways to measure and improve the effectiveness of NCER’s communication so that decisionmakers will make greater use of the Center’s products?*
- ✧ *What metrics are most useful for measuring the impact of NCER’s work?*

Dr. Hansen reiterated that a direct way to assess how decisionmakers view NCER’s products is to interview them. He does not know of any additional ways to go beyond the bibliographic search in terms of measuring impact. Dr. Tuler stated that the effectiveness of NCER’s communications with its decisionmakers depends on what decisionmakers want to know and how they are going to use the information. He did not think he had enough information on this to provide advice to NCER. He asked if NCER could provide information—besides anecdotal stories—on what the decisionmakers want to know. Dr. Tuler added that one of the things that NCER wanted to know was how information was brought into the rulemaking. He agreed that it would be useful information, but said that it would be indirect because publications might not be directly reflected in the rules. Dr. Finkel stated that interviews may be something for NCER to consider; they do not have to be resource-intensive. Dr. Finkel added that EPA already may have conducted informal interviews.

Mr. Rejeski noticed that the Charge Question involves crafting a forward-looking portfolio, but he stated that the number of people interested in forward-looking portfolios is very small; most

are focused on satisfying their daily goals. He suggested that it was important for the Agency to identify who wants to advance beyond the status quo. He recommended that the interviews be directed at the forward-looking members of the staff. Dr. Philbert agreed that the forward-looking portfolio and the evolving Agency needs are different from most people's day-to-day considerations at EPA but said that the Charge Question is focused on engaging the external community. Dr. Hansen added that the Agency generally responds to rulemaking and therefore is not forward looking. He would consider Exploratory Research as a forward-looking program, but he does not understand how NCER's entire portfolio could be defined as forward looking.

Dr. Finkel suggested that the "forward-looking" term depends more on someone identifying cutting-edge issues and then deciding how EPA can incorporate them into its programs. He said that timely, reactive responses are more likely to be the goals of NCER. In other words, after a decisionmaker identifies a new research thrust, how can NCER approach it? Dr. Finkel sees the forward-looking term to mean adapting quickly to the portfolio. He added that the key is figuring out how NCER can track new rules that were proposed or new priorities that were articulated in response to its extramural, exploratory work. Mr. Rejeski said that roadmapping is employed in other agencies. He asked if the Subcommittee could recommend connecting private-sector scientists with NGOs and government scientists to understand the problems they will encounter in the next 10–20 years.

Dr. Keller-McNulty said that the last two bullets on the Charge Question do not necessarily mesh with the first bullet. Moreover, when thinking about how NCER can better communicate with decisionmakers, she emphasized that decisionmakers are not the only people within EPA that should be targeted. If EPA could craft a forward-looking plan in which science guided the Agency, it would need to communicate that to Congress and to people who could help define the budget and restructure the Agency. The decisionmakers could be scientists and rulemakers across the nation. Dr. Keller-McNulty asked if NCER had defined its audience and how it currently approaches external communication.

Dr. Clifford stated that the 2003 *ad hoc* Subcommittee was formed to "examine how effectively research [products] funded by EPA's ORD currently are communicated within and beyond the Agency and how they might be more effectively communicated, and to help ORD more effectively disseminate these research products, explain their significance, and assist others inside and outside the Agency to employ them." Dr. Clifford noted that the Subcommittee's conversation appeared to be addressing the same objective. He reiterated that a 2003 workshop was held, a report was written, and EPA responded to the report. EPA also appointed a Director of the Office of Science Communication within the Agency. Dr. Clifford suggested that the Subcommittee first determine what EPA has changed since the 2003 report. He also noted that the report lists audiences, means of communication, and presentations by laboratories and agencies within ORD.

Dr. Tuler added that if NCER wants to be broadly responsive to decisionmakers, many of which are in EPA, then the Center would have to understand the broader roadmapping at EPA and let that filter into NCER's ideas about its own strategic plan and where it wants to focus. The Subcommittee agreed a teleconference about the communications plan at NCER would be beneficial.

Dr. Clifford asked if the MYP explains how external advice was incorporated into strategic planning. The Subcommittee is concerned with how inputs determine future plans or communications. Moreover, the Charge Question essentially asks the Subcommittee to recommend ways for NCER to become more responsive and more flexible in responding to external advice. Dr. Clifford noted that the Charge is to help plan NCER's future strategic direction rather than assess its past and present.

Dr. Tuler asked what other exploratory projects have emerged and been funded over the past few years. It would be useful if the Subcommittee had a list of Exploratory Research grants, how NCER identified what it wanted to pursue, and how those choices progressed. Dr. Keller-McNulty suggested that nanotechnology is probably NCER's most forward-looking program. It might be interesting to do a case study of how this program evolved. Mr. Rejeski added that the other forward-looking program is computational toxicology.

Dr. Philbert asked if NCER, as a research arm of a regulatory body, needs to be cutting edge or just leading edge. Dr. Keller-McNulty responded that NCER needs to be cutting edge so that it can understand new technologies and how they can affect the environment and human health. Mr. Rejeski asked about the process by which EPA approaches the task of finding and funding emerging research. The unplanned spontaneous interactions are important—how could they be formalized? Dr. Philbert asked whether NCER should involve its staff in external meetings or if the Center should host its own meeting. Dr. Hansen replied that the payoff would be greater for NCER to sponsor a meeting because it would benefit from the synergism of NCER's entire staff with other external scientists. Dr. Keller-McNulty asked whether NCER scientists have the budget to travel to professional meetings. Ms. Klieforth (NCER) stated that the Subcommittee was describing something very similar to NCER's scientist-to-scientist workshops. NCER tries to make them as wide reaching as possible, and NCER scientists also are encouraged to attend workshops with other agencies. Moreover, NCER invites EPA scientists and external scientists to its meetings. Dr. Hansen responded that the scientist-to-scientist workshops seem to be about communications rather than collaborations. Ms. Klieforth noted that NCER recently sponsored a meeting on Innovative Methods in Drinking Water; one-half of NCER's investigators attended and discussed cutting-edge science with academic and private-sector scientists. Dr. Hansen agreed that NCER has a lot of experience conducting workshops with specific objectives, but he was suggesting a meeting with a broader scope. Dr. Keller-McNulty said that scientists from Rice University attended the Drinking Water meeting, and they found that EPA scientists and others in the field were brought together constructively. Dr. Hansen suggested that the focus of a meeting could be a very broad discussion of emerging problems. Dr. Clifford said that scientists will communicate ideas regardless of the meeting's focus. Dr. Keller-McNulty commented that NCER scientists may already be accomplishing that.

Dr. Tuler asked how NCER defined its external scientific community. Does it include other branches of EPA? Does it include people at national laboratories and those who work for other government agencies? On the other end, who are the audiences that NCER targets? If a list exists, the Subcommittee might be able to extend the list and suggest new ways for NCER to reach out to its audiences. Dr. Philbert commented that each bullet of the Charge Question involves the words "metric" or "measure." This is a caveat because the Subcommittee does not know quantitatively what NCER is doing or how it is being done. Dr. Keller-McNulty asked whether the communication processes for the forward-looking programs were the same as the

communications processes for programs supporting traditional regulatory issues. Dr. Philbert responded that Dr. Keller-McNulty's question relates to the previous question of "who are the decisionmakers?" The communication processes and messages have to be the same, and the audiences have to be appropriate.

Dr. Tuler asked whether NCER can tell Congress directly about a new process or initiative. Ms. Klieforth responded that Congress must invite NCER, which happens when they learn about a new development from the external community. NCER cannot address Congress directly. Mr. Rejeski asked if Congress was actually aware or concerned about NCER crafting a forward looking portfolio. Ms. Klieforth affirmed this, and said that people are worried about the loss of the Exploratory Research Program and about the shrinking budget. There is constant concern that the programs are not communicating sufficiently or that they need to be more responsive to the Agency.

Dr. Finkel wondered if there would be any regulation that prevented EPA from receiving seed money from SBIR contract awardees that had gone on to commercialize their technologies. Dr. Keller-McNulty said that businesses under such a regulation would probably protest that they are already providing seed money for future grants through taxes. Dr. Finkel expressed his concern that RFAs are being written without contacting the external community that is already engaged in similar research for advice on targeting the most useful questions. He wondered if scientists could respond to RFAs with recommendations on how to change them rather than just applying and being rejected because their research—although it addresses the right question—does not align completely with EPA's mission. Dr. Keller-McNulty commented that there did not appear to be a shortage of good proposals coming into EPA. Clarity of focus is actually helpful, but it is necessary that they have the right focus. Dr. Finkel responded that he wonders whether EPA prepares RFAs in an insular manner or with the proper input. He was not trying to suggest that NCER's RFAs are written in a process where no one communicates. What might engage the scientific community is to have the people who are actually conducting the research advise EPA on which questions to ask. Dr. Philbert responded that the Exploratory Research Program is very important in those cases, and if an exploratory research thrust becomes a priority, a separate program can be created. Dr. Keller-McNulty agreed that the loss of the Exploratory Program created a problem with flexibility. Dr. Finkel asked if an unsolicited application had ever been accepted. Mr. Barnwell responded that unsolicited proposals are not accepted, but proposals that do not exactly align with a particular RFA may be transferred for consideration under a different RFA. Dr. Finkel asked if NCER looks at the unsolicited proposals for insight into future RFAs. Dr. Barnwell responded that they do not, but such unsolicited proposals are rare. Mr. Rejeski asked whether NCER could give prizes as an added incentive to respond to EPA's mission.

Dr. Tuler asked for a better way to address the current policy problems and anticipate future ones. He added that policy questions are different from scientific questions that might ultimately contribute to policy. He noted that policy is not only determined by scientists but by other members of the community.

Dr. Philbert reiterated that the mission of NCER is to serve the extramural needs of ORD; it is essentially a granting organization that also awards fellowships. P3, SBIR, and STAR are very open to outside influence. Dr. Hansen asked how NCER could improve its approach to formulating topics. Dr. Finkel responded that it is difficult because NCER serves the needs of the

Agency as EPA defines them, but those definitions might be flawed. This returns to the issue about reducing uncertainty. Can NCER anticipate what the Agency needs? Dr. Hansen said that the term “reducing uncertainty” is used very often, but he would like to see some examples.

*Workgroups met to discuss specific portions of the Charge Question and then reconvened to report their conclusions.*

Drs. Tuler and Finkel examined the following portion of the Charge:

- ✧ *Regarding NCER’s niche in ORD and in the greater environmental federal research and development, what can it do to more flexibly address emerging issues and technologies and provide timely responses to rising scientific needs of the Agency?*

Dr. Finkel stated that the workgroup talked about the broad question of whether improvements could be made in the dialogue among NCER and the other programs and elsewhere in the Agency to interactively identify the areas of research to target. They focused also on progressing from an RFA’s theme to the research questions that would be addressed. It was agreed that a teleconference with NCER is necessary to better understand how, irrespective of formal mechanisms, interactions with scientists occur. Does NCER assess the scientific community to see what research is going on that could be made relevant to EPA? If so, to what extent are such assessments done? How do these contribute, if at all, to subsequent RFAs?

Dr. Finkel added that he would like to know what disciplines, within a very broad definition of science, are in NCER’s purview. For example, are the social sciences, economics, and decision sciences included? Dr. Clifford mentioned that NCER had already provided a bulleted list of its scientific disciplines. Dr. Finkel said he would rather receive a short list of the disciplines that are viewed as the core of NCER, what NCER is no longer funding, and what is being phased down. Dr. Philbert suggested that Drs. Finkel and Tuler compose a list of topics, and NCER could respond whether the topics are in the Center’s scientific purview.

Drs. Hansen and Clifford examined the following portion of the Charge:

- ✧ *What advice can be offered on ways to measure and improve the effectiveness of NCER’s communication so that decisionmakers will make greater use of the Center’s products?*

Drs. Hansen and Clifford referred to the 2003 BOSC report on communications within and beyond the Agency to examine how results are communicated and disseminated inside and outside the Agency. Dr. Hansen noted that there were many recommendations in the 2003 report, and EPA issued a formal response in which the Agency named an Associate Administrator to ORD and a Director of the Office of Science Communications (OSC) at ORD. In the report, NCER’s audiences were mentioned (Table 1); they ranged from internal staff to the scientific community. The response letter only referred to the program office; however, it gave the impression that it was the sole audience. In the presentations from Day 1, information about how NCER responded to the 2003 report’s recommendations was lacking.

The response letter also indicated that EPA had set up a liaison between OSC and NCER. The Subcommittee would like to know who that individual is, where he/she resides (i.e., NCER or

OSC), and whether this person has responded to the recommendations. Drs. Hansen and Clifford also wondered whether the audiences listed in Table 1 were in priority order. Feedback from the audiences is implied, but is feedback *ad hoc*, or is there a conscious effort to solicit feedback and incorporate it into the research plan? Drs. Hansen and Clifford added that they were very impressed with NCER's database; they hoped that it includes prior, current, and planned research. They stressed that it would be beneficial to compile one major database so that investigators could access NCER's list of current, active grants, RFAs, and past information (e.g., STAR reports). They would like to know the status of the comprehensive data mining application in terms of capabilities and content.

Drs. Philbert and Keller-McNulty and Mr. Rejeski examined the following portion of the Charge:

✧ *What metrics are most useful for measuring the impact of NCER's work?*

Dr. Philbert said that they saw examples of metrics, demographic searches, etc., but they still did not know if a coherent metrics portfolio existed; it seemed doubtful. They also asked whether, when developing the metrics, NCER is benchmarking other programs, such as applied research programs in the government, to try to link research to results. Mr. Rejeski suggested that NCER refer to the Department of Defense's industrial technology program for guidance and look at private-sector metric systems. They recommended that NCER consider clusters of metrics that respond to the needs of various stakeholders.

The Exploratory Research Program warrants a revival; NCER could set up a system in which the metrics for the Exploratory Research Program are separate from those of targeted research programs. These metrics could include quality of proposals, hot papers that emerge, or whether work had wider environmental policy impacts. Dr. Keller-McNulty added that it could be viewed as a carefully structured, unsolicited proposal program with a specific set of criteria. She emphasized that if NCER lacks a way to put new ideas into a budget (i.e., through Exploratory Research), then the Center will be unable to develop a forward-looking portfolio.

The Subcommittee also listed alternative metrics: resources spent or used (as opposed to profit-related metrics), short-term versus long-term metrics, and benchmarking. Dr. Tuler recommended books by the author Jim Collins for more information on how to measure progress.

Dr. Philbert stated that if the Subcommittee wants to recommend reinstating the Exploratory Research Program, the members should propose a strong model for its success. Dr. Keller-McNulty asked about the structure of the former Exploratory Research Program. Mr. Barnwell responded that it solicited applications in broad areas like chemistry and geology; over time, it became more focused. Dr. Philbert asked whether there was a mechanism to hold over money for a year so that NCER could fund the Exploratory Research Program every other year. Dr. Barnwell responded that this would be possible. The Subcommittee recommended referring to the program as an innovative research program that corresponds to a general mandate and promotes forward thinking. NCER then could list criteria for funding, so that the grant applications would not technically be unsolicited, but they would be very open in scope. NCER also could require pre-proposals so that the Center could rapidly screen the potential research that could be funded. NCER would need to create an apolitical peer review panel, so that the

research projects could be funded fairly. Additionally, NCER could start the program at a low funding level to assess how it would succeed.

### **Future Discussion/Future Business**

*Dr. Martin Philbert, Subcommittee Chair*

The Subcommittee asked that NCER respond to the following:

- ✧ Clarify what external advice is incorporated into the MYPs and strategic plans. How are external inputs engaged?
- ✧ Explain whether the \$5 million that was earmarked by Congress in the NNI went to EPA or NCER. If NCER received the earmark, why was \$5 million moved from Exploratory Research to fund nanotechnology?
- ✧ Provide more background on budget trends.
- ✧ Provide staffing numbers and personnel information. What percentage of staff is likely to retire in the near future? How will NCER's portfolio be managed with new staff members?
- ✧ Arrange for a teleconference during which the Subcommittee can learn more about the communications aspects of NCER.
- ✧ Explain why ecosystems research was eliminated (NCER may not have been involved in this decision).
- ✧ When a program is eliminated from NCER, is there a way to determine to what extent similar or identical work is being covered elsewhere in the Agency (e.g., with ecosystems research)?
- ✧ Provide a list of NCER's decisionmakers both within and outside of EPA.
- ✧ Describe the practices that were adopted and sustained since the 2003 BOSC Communications Report.
- ✧ Provide a list of NCER's audiences. This was given in the BOSC *Ad Hoc* Subcommittee Report, but the Subcommittee requests an updated list.
- ✧ Clarify strategic planning and its contrast to the MYP (versus media planning).
- ✧ Provide a list of the Exploratory Research projects that were funded in recent years. What else has emerged from the Exploratory Research Program?
- ✧ Describe who NCER considers to be the external scientific community.
- ✧ Is there a rule against requiring companies that have been funded by government contracts to return a percentage to the government as seed money for future contracts?

- ✧ Provide examples of the Agency's evolving needs.
- ✧ Does NCER award prizes for innovation? This could maintain alignment with Agency goals.
- ✧ How does EPA assess what other scientists, social scientists, and engineers are studying?

Dr. Philbert thanked everyone at NCER for taking the time to prepare and give their presentations. The Subcommittee generally applauded the forward-looking approach of NCER, and the members look forward to helping the Center reach its goals. Dr. Philbert also thanked the Subcommittee for reading through the work packets and offering advice.

Ms. Peterson stated that the second teleconference for the Subcommittee is tentatively scheduled for late summer.

### **Adjournment**

The meeting was adjourned at 11:50 a.m.

### **Action Items**

- ✧ NCER will respond to the Subcommittee's questions listed in the "Future Discussion/Future Business" section (above).
- ✧ Dr. Harrison asked the Subcommittee to think of other ways to use the NCER peer review panels; they are a knowledgeable resource available to NCER.
- ✧ Dr. Saint requested that the Subcommittee help NCER establish more partnerships and collaborations.
- ✧ Ms. Richards asked that the Subcommittee recommend ways to better engage the small business community and help SBIR target research that addresses an immediate need.
- ✧ Ms. Richards requested that the Subcommittee devise additional metrics of success for SBIR-contracted businesses both during Phases I and II and after the contract is completed.
- ✧ Ms. Wigginton requested that the Subcommittee help P3 to identify ways to increase the number of proposal submissions.
- ✧ Ms. Willett asked that the Subcommittee recommend ways to improve NCER's fellowship outreach, particularly to undergraduates.
- ✧ Dr. Philbert asked Drs. Tuler and Finkel to prepare a list of scientific topics in an effort to determine what topics fall within the purview of NCER.

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**APPENDIX A: Meeting Agenda****NCER STANDING SUBCOMMITTEE  
FACE-TO-FACE MEETING  
AGENDA  
July 24–25, 2007****Tuesday, July 24, 2007**

|                                |   |  |
|--------------------------------|---|--|
| <b>9:00 a.m. – 9:30 a.m.</b>   | <b>Registration</b>   |  |
| <b>9:30 a.m. – 9:40 a.m.</b>   | <b>Welcome and Opening Remarks</b><br>- Introductions<br>- Overview of Charge                           | Dr. Martin A. Philbert,<br>Chair, NCER Standing<br>Subcommittee                                |
| <b>9:40 a.m. – 9:45 a.m.</b>   | <b>DFO Remarks</b><br>- Administrative Issues   | Ms. Susan Peterson,<br>Office of Research and<br>Development                                   |
| <b>9:45 a.m. – 10:30 a.m.</b>  | <b>ORD Research Planning</b><br>- Discussion and Q&A  | Mr. Thomas Barnwell, Jr.<br>NCER Senior Science Advisor  |
| <b>10:30 a.m. – 11:00 a.m.</b> | <b>NCER Research Planning<br/>and Peer Review</b><br>- Discussion and Q&A Review                        | Dr. Bronda Harrison,<br>NCER Acting Division Director<br>for Peer Review                       |
| <b>11:00 a.m. – 11:15 a.m.</b> | <b>Break</b>  |  |
| <b>11:15 a.m. – 12:30 p.m.</b> | <b>NCER Programs</b><br>- Discussion and Q&A  | Dr. Chris Saint,<br>NCER Acting Director for<br>Environmental Engineering<br>Research Division |
| <b>12:30 p.m. – 1:30 p.m.</b>  | <b>Lunch</b>  |  |
| <b>1:30 p.m. – 2:00 p.m.</b>   | <b>Review of NCER's Role &amp;<br/>Contributions – Air Program</b><br>- Discussion and Q&A              | Dr. Dan Costa,<br>ORD National Program Director  |
| <b>2:00 p.m. – 2:30 p.m.</b>   | <b>Review of NCER's Role &amp;<br/>Contributions – Human Health<br/>Program</b><br>- Discussion and Q&A | Dr. Hugh Tilson,<br>ORD National Program Director  |
| <b>2:30 p.m. – 2:45 p.m.</b>   | <b>Public Comment</b>   |  |

NCER STANDING SUBCOMMITTEE JULY 24-25, 2007 FACE-TO-FACE MEETING AGENDA

**Tuesday, July 24, 2007 (continued)**

|                              |   |   |
|------------------------------|---|---|
| <b>2:45 p.m. – 3:00 p.m.</b> | <b>Break</b>  |   |
| <b>3:00 p.m. – 3:45 p.m.</b> | <b>Other NCER Programs</b> <ul style="list-style-type: none"><li>- SBIR</li><li>- P3</li><li>- Fellowships</li><li>- Discussion and Q&amp;A</li></ul> | Ms. April Richards, NCER<br>Ms. Mary Wigginton, NCER<br>Ms. Stephanie Willett, NCER |
| <b>3:45 p.m. – 5:00 p.m.</b> | <b>Subcommittee Working Time</b>  | NCER Standing Subcommittee  |

**Wednesday, July 25, 2007**

|                                |   |   |
|--------------------------------|---|---|
| <b>9:00 a.m. – 11:00 a.m.</b>  | <b>Subcommittee Working Time</b>  | NCER Standing Subcommittee                                      |
| <b>11:00 a.m. – 12:00 p.m.</b> | <b>Future Discussion/Future Business</b> <ul style="list-style-type: none"><li>- Identify Additional Needs</li><li>- Schedule Second Teleconference</li></ul> | Dr. Martin A. Philbert,<br>Chair, NCER Standing<br>Subcommittee |
| <b>12:00 p.m.</b>              | <b>Adjournment</b>  |   |