



Board of Scientific Counselors

Office of Research and Development
United States Environmental Protection Agency

Second Program Review of the National Center for Environmental Research (NCER)

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Final Report of the Subcommittee
on the Review of NCER

November 19, 2002

NOTICE

This report has been written as part of the activities of the Board of Scientific Counselors (BOSC), a public advisory group that provides objective and independent counsel to the Assistant Administrator for the Office of Research and Development (ORD) of the U.S. Environmental Protection Agency (EPA). The Board is structured to provide a balanced expert assessment of the management and operation of ORD's research programs and its utilization of peer review. This report has not been reviewed for approval by the Agency; and hence, the contents of this report do not necessarily represent the views and policies of the EPA or other agencies in the federal government. Mention of trade names or commercial products does not constitute a recommendation for use.

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PREFACE

The Board of Scientific Counselors (BOSC) provides objective and independent counsel to the Assistant Administrator for the Office of Research and Development (AA/ORD) on the management and operation of ORD's research programs. The primary functions of BOSC are to: (1) evaluate science and engineering research programs, laboratories, and research-management practices of ORD and recommend actions to improve their quality and/or strengthen their relevance to the mission of the EPA; and (2) evaluate and provide advice concerning the use of peer review within ORD to sustain and enhance the quality of science in EPA.

In spring 2000, at the request of Henry Longest II, AA/ORD, the BOSC undertook peer reviews of the ORD Laboratories and Centers. This request came approximately 4 years after the initial BOSC review of the Laboratories and Centers, which was completed on April 30, 1998. Accordingly, the BOSC began the task of conducting programmatic, as opposed to scientific or technology, reviews of the Laboratories and Centers and proceeded to establish policies and procedures for conducting such reviews. The scheduled reviews occurred as follows:

- ❖ National Risk Management Research Laboratory, August 21-22, 2001, at Cincinnati, OH
- ❖ National Center for Environmental Assessment, October 10-11, 2001, at Washington, DC
- ❖ National Health and Environmental Effects Research Laboratory, October 30-31, 2001, at Research Triangle Park, NC
- ❖ National Exposure Research Laboratory, December 18-20, 2001, at Research Triangle Park, NC
- ❖ National Center for Environmental Research, January 23-24, 2002, at Washington, DC

As constructed, the Laboratory and Center reviews are expected to lead to a better understanding of the strategies employed by the respective Directors in accomplishing their missions, and to a better understanding as to how these strategies are implemented. BOSC also expects to develop a clearer perspective on how the operation of the Laboratories and Centers articulates with the strategic plan of the ORD and relates to the Multi-Year Research Plans (MYPs).

Each Laboratory and Center review consisted of two parts. The first part was a written self-study submitted to the review committee in advance of the date of its review, and the second part was a 2-day site visit conducted by the review committee. In the self-study, Directors were asked to prepare responses to questions aimed at a programmatic assessment of the organization. During the first day of the site visit, the Director made a brief presentation about the organization and was then asked to respond to questions from the review committee about the self-study document. Later, case studies were presented that reflected how the organization successfully addressed a specific issue faced by the Agency. The first day concluded with a poster session or informed interviews attended by staff scientists and other professionals. On the second day, the committee drafted a report that contained its findings and recommendations. At the end of the day, an exit interview was conducted with the Director.

All review teams were organized as Subcommittees of the BOSC and were headed by a chair and vice chair, both members of BOSC. Additional members of the Subcommittee were selected on the

basis of an appropriate technical discipline as well as having broad experience in science and research management, planning, and communication. The Chair of the BOSC attended some reviews as an ex-officio member.

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LIST OF ACRONYMS

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| AA/ORD | Assistant Administrator for the Office of Research and Development |
| BOSC | Board of Scientific Counselors |
| DOE | Department of Energy |
| EPA | Environmental Protection Agency |
| EU | European Union |
| GPRA | Government Performance and Results Act |
| InFER | Interagency Forum on Environmental Research |
| MYP | Multi-Year Plan |
| NASA | National Aeronautics and Space Administration |
| NCER | National Center for Environmental Research |
| NCERQA | National Center for Environmental Research and Quality Assurance |
| NIEHS | National Institute of Environmental Health Sciences |
| NIH | National Institutes of Health |
| NSF | National Science Foundation |
| ONR | Office of Naval Research |
| ORD | Office of Research and Development |
| PM | Particulate Matter |
| R&D | Research and Development |
| RCT | Research Coordination Team |
| RFA | Request for Application |
| STAR | Science to Achieve Results |
| USDA | United States Department of Agriculture |

1.0 EXECUTIVE SUMMARY

The National Center for Environmental Research (NCER) has a strong and dynamic research program that is well connected to the Office of Research and Development (ORD) and the Environmental Protection Agency (EPA) Program Offices. The Center's research programs are sustained by strong and creative leadership from its management and by commitment and enthusiasm among the staff. During the review, many examples and anecdotes were relayed to support this impression. The BOSC recommends that NCER document these successes and publicize the Center's effective research coordination and management strategies using several approaches. First and foremost, the completion of the NCER Strategic Plan is an opportunity for the creation of a living document where these effective strategies are showcased. Further, the strategic plan will provide a record for tracking performance metrics and accomplishments that have led to NCER's unique position among environmental research organizations. A comprehensive strategic plan also can be used to identify and distinguish the Center among other federal research institutions, justify budget requests, and demonstrate key values returned on the investment in extramural research.

Other areas of particular interest in this review were those of benchmarking and use of metrics to quantify programmatic success and impact. Benchmarking is particularly difficult given some of the unique responsibilities and programs with which NCER is involved. No single organization was identified as the most appropriate benchmark in the course of the review discussions; however, the Board of Scientific Counselors (BOSC) encourages NCER to continue to consider various comparison organizations. Similarly difficult is the issue of developing appropriate performance metrics and measures of programmatic impact. The review team recognizes the leadership and effort NCER has committed to this topic to date, and we encourage the staff to continue their search for robust, workable systems.

The enthusiasm and professionalism of the staff was impressive. NCER has made tremendous strides in forming a cohesive staff dedicated to their work, improving the work process, and creating a work environment that rewards innovation. The BOSC recommends continuous evaluation of the amount of effort needed in activities related to grant coordination and administration. In this review, the BOSC offers suggestions such as reducing and focusing the number of Requests for Applications (RFAs) and examining the necessity of weekly conference calls for the Research Coordination Teams (RCTs).

As with any review, comments and recommendations were generated by the review team. This report is based on the many positive impressions the NCER staff and programs made during the site visit, and recommendations should be interpreted as input on how the program can be enhanced. The intent of the BOSC's effort is to assist the Center in ensuring that: (1) NCER's management and decision practices are better documented in transparent processes; (2) approaches and tools for communications, measurement of successes and impact, and recruitment and retention of dedicated staff continue to improve, and (3) the Center's unique role in EPA and among the environmental research community can be better appreciated and sustained.

2.0 INTRODUCTION

The Board of Scientific Counselors (BOSC) established a Subcommittee (often referred to as the review team in this report) for review of the National Center for Environmental Research (NCER) of the Office of Research and Development (ORD) at its meetings during 2000 and 2001. The Subcommittee was established as one of five Laboratory/Center standing subcommittees for the BOSC to act as a resource for the ORD Laboratories and Centers. The Subcommittee members include Dr. James Clark (Chair), Dr. James H. Johnson, Jr. (Vice Chair), Dr. Richard DiGiulio, Dr. Mary English, Dr. Steven Goodbread, Dr. Steven Lewis, and Dr. C. Herb Ward. The Appendix provides information on the charge to the Subcommittee.

In preparing this report, the review team examined documents prepared as part of a previous BOSC review of NCER (then known as NCERQA), issued April 30, 1998. In May 2001, the BOSC submitted a new set of self-study questions to the ORD Laboratories and Centers (see Appendix B). In response to these questions, the NCER management and staff prepared a Self-Study Report, which was distributed to the Subcommittee members in August 2001, prior to a review meeting scheduled for mid-September 2001. Due to scheduling changes following the events of September 11, 2001, the NCER staff prepared an update of this report for the actual site visit and review, which was held January 23-24, 2002, at EPA offices in Washington, DC. The input for this evaluation consisted of that updated report, information gathered during overview presentations at the site visit, answers to questions posed by the review team during the site visit, and general discussions during that event.

The discussions during the public, onsite review of ORD/NCER generally followed the set of self-study questions developed by the entire BOSC for all of the ORD Laboratories and Centers. This report is organized around the BOSC questions and the NCER responses to them. The specific agenda for the meeting is included in Appendix C.

The review team would like to acknowledge the cooperation and hospitality NCER offered in the course of the review. The Self-Study Report, and the update generated in response to the delayed review held in January 2002, required considerable effort. The documents were delivered in a quality fashion and in accordance to requests made by the BOSC. The management and staff were responsive to the BOSC's questions and supplied supplemental detail and documentation that facilitated the Subcommittee's assessment.

3.0 LABORATORY REVIEW

3.1 Planning and Integration

3.1.1 How does your strategic plan articulate with the EPA-ORD strategic plan (see Table 2 of ORD plan) and with EPA's strategic plan? Please provide a copy of NCER's draft strategic plan.

The EPA Strategic Plan is developed around a series of 10 Agency-wide goals—of which 9 are directly related to ORD and NCER research programs. The ORD Strategic Plan 2000 builds on the EPA Strategic Plan and earlier ORD Strategic Plans. The ORD Strategic Plan articulates research priority areas and utilizes the risk assessment/risk management paradigm as the integrating factor. In addition, the ORD Plan articulates five broad goals.

NCER has not completed its strategic plan but has developed many of the required components: vision, mission, guiding principles, and objectives. NCER, because of its breadth of activities, supports all the ORD Strategic Plan goals and objectives and many of the goals of the EPA Plan. Therefore, NCER's task is enormous and the guidance provided by a strategic plan is of paramount importance.

Strategic plans describe the goals, performance measures, and strategies for achieving the objectives. The plan typically is composed of two parts. One part describes the process and approaches and the second part details the activities to be implemented to achieve the objectives. The processes and approaches ensure alignment with the goals and objectives of the parent organizations, create pathways to customers, and define ways to measure performance.

The BOSC commends NCER staff members for their early involvement in many of the EPA and ORD strategic planning processes that will be important parts of its own strategic plan (Research Coordination Teams and Multi-Year Plans). However, the review team encourages NCER to complete its Plan as soon as possible. Particular attention should be focused on the clear identification of customers, stakeholders, audiences, and performance measures. The first three are linked to the last, i.e. performance measures. Performance measures are linked to benchmarks.

Recommendation 1: NCER should complete the development of its Strategic Plan as soon as possible. As indicated in the BOSC review of Questions 13, 18, and 19 of the Self-Study, the Plan can serve as the corner stone for measuring the health of NCER and for determining its future resource requirements.

3.1.2 What are NCER's priorities and directions for the next 5 years? Include NCER's research portfolio and multi-year planning efforts.

ORD has created an inclusive and comprehensive planning process to define research priorities for all ORD Laboratories and Centers. NCER's multi-year planning process includes representatives from all EPA Program, Laboratory, and Regional Offices. The Multi-Year Plans (MYPs) provide the background and basis for prioritization of research projects. NCER's current research portfolio is divided into five media or subject areas unequally represented by some 36 Science to Achieve Results (STAR) program Requests for Applications (RFAs) with variable annual start, stop, and gap periods. The five media/subject areas and associated RFAs are indexed with the eight highest research priorities listed in the ORD Strategic Plan.

The BOSC review did not address the STAR RFA areas, but focused on the processes used to identify and select RFAs and specifically on how the research initiation process is managed. Specific concerns related to: (1) criteria used to select new RFAs, (2) criteria used to terminate RFAs, (3) the balance between issue-driven and futures or anticipatory research, (4) the balance between basic and applied projects, (5) how research funding is allocated between the dominant or traditional Agency needs and new or challenging paradigms, and (6) the NCER role in Agency Research Coordination Teams (RCTs).

The NCER research initiation process does not appear to be sufficiently communicated. It is clear that a great amount of personnel time and other resources are devoted to coordination, seeking Agency-wide input, and planning for annual funding cycles, but the decision is not sufficiently communicated. Such communication is especially important and strategic during periods of shrinking budgets and projected R&D shortfalls. A clear record of the research planning and prioritization process made available to all NCER personnel would encourage staff input and promote ownership of the process and facilitate transitions during staff turnover.

Some RFAs have multi-year continuing histories, while others have been short-lived or have gaps in continuity. The rationale for RFA programmatic changes was presented as being responsive to Agency needs as developed through RCT activities; however, written records tracking the research initiation process were not made available as part of the review. The NCER research program must be responsive to political realities such as the change of administration (e.g., new Assistant Administrator for ORD), and unanticipated needs (e.g., terrorism). A strategy for meeting these needs should be defined and changes in funding priorities and research program commitments should be documented.

Another issue that needs clarification and documentation is the relationship between proposal funding rates and the following: (1) quality of proposals submitted, (2) the resulting outcomes of funded proposals, and (3) sector of the research community responding to RFAs. Advance publication of RFA releases, in keeping with NCER's multi-year planning process, could help attract the highest quality investigators and allow them additional time for front-end planning and preparation of the proposal.

Recommendation 2: The communications of NCER decisions and actions surrounding research initiation and prioritization would be enhanced with the development of written documentation of the processes surrounding RFA prioritization, setting of funding levels for research topics, and initiating programmatic changes in the course of Multi-Year Plans.

The review team had a few general observations regarding NCER's research solicitation and award process. Because the topics of RFA solicitations represent the major priorities in NCER research programs, these observations are included in this section of the report. However, the material covered here was not specifically addressed as part of the response to Question 2.

NCER appears to have made progress in refining its research solicitations, more progress is needed in this regard. As discussed during sessions with management and staff, proposal reviews often are slowed due to uncertainty regarding the purpose, relevancy, or priority of research information included in an RFA. Clear, carefully targeted RFAs are essential for proposers to respond effectively, for peer reviewers to have a sense of the solicitation purpose, and for NCER staff to manage the subsequent research. To the extent possible, the solicitation should make clear what type of research and specific focus areas will be considered relevant.

Second, the review team suggests that NCER develop a strategy to determine the number of solicitations to be issued so that the number of RFAs is brought into balance with available funding. The BOSC recognizes and sympathizes with the pressures on NCER to respond to numerous research requests. However, overtaxing proposal writers in areas for which there are ultimately low success rates for funding will encourage quality programs to focus their proposal writing efforts on institutions that provide a greater funding probability.

Recommendation 3: NCER should develop a strategy to ensure that the number of RFAs is in balance with available funding.

3.1.3 How does NCER integrate research with the other ORD Laboratories and Centers according to the risk paradigm? How does NCER integrate research across and within the its Divisions according to the risk paradigm?

The STAR program supports research in the areas of effects, exposure, risk assessment, and risk management. According to a figure labeled “ORD’s Risk Paradigm,” it uses a linear paradigm that begins with risk assessment, proceeds to risk characterization, and then to risk management.

Collaboration and integration of NCER research with ORD Laboratories and Centers and with EPA Program and Regional Offices are accomplished through a variety of ways. In particular, through the structure and activities of RCTs, which are composed of representatives of ORD Laboratories, Centers, and Offices as well as EPA Program Offices and Regional Offices. There are five broad RCTs (air, water, waste, toxics and pesticides, and multi-media); there also are RCT subcommittees in special areas (e.g., global change).

ORD Research Plans are developed to identify high-priority research areas; additional is provided in the Multi-Year Plans for 16 research areas. Within the STAR program, topics for program solicitations initially are identified by the RCTs. Scientists from the Laboratories/Centers assist in refining topics, developing the solicitation texts, and recommending proposals for funding during the relevancy review (the internal review following the external peer review). RCTs also have scientist-to-scientist meetings, strategic review meetings with senior managers in ORD and EPA’s Program and Regional Offices, and weekly teleconferences. In addition, workshops are sponsored by NCER, ORD Laboratories/Centers, Regional Offices, and Program Offices.

The review team recognizes the merit of the structured, integrative process being used by NCER to identify research topics and conduct research. The process provides ample opportunity for formal and informal exchanges, especially between NCER and other ORD Laboratories, Centers, and Offices as well as EPA’s Program and Regional Offices.

The BOSC cautions, however, that the process as it has evolved may entail too much time devoted to conferring with other staff in ORD and Program Offices. For example, the weekly RCT conference calls, based on what the review team heard, might be leading to “burn-out” in some cases. Similarly, too many workshops can tax staff that is necessarily limited in size. Streamlining measures should be taken while preserving the essence of an integrative process.

Recommendation 4: There is merit in the structured, integrative process being used by NCER to identify research topics and conduct research. However, streamlining measures are needed to reduce the time demands on staff while preserving the essence of an integrative process.

3.1.4 How does NCER integrate research with Regional Offices of EPA, other federal agencies, and other research centers worldwide?

Since the last BOSC review, NCER has coordinated numerous funding efforts with other federal agencies, including the National Science Foundation (NSF), National Aeronautics and Space Administration (NASA), National Institute of Environmental Health Sciences (NIEHS), Department of Energy (DOE), Office of Naval Research (ONR), and U.S. Department of Agriculture (USDA). These STAR partnerships have been made with the goal of increasing visibility, enhancing research progress, and leveraging awardable funds. NCER states that these efforts have allowed 35 percent more grants to be awarded than with EPA funds alone. In addition, NCER and NSF established the Interagency Forum on Environmental Research (InFER), which includes more than a dozen agencies, to facilitate the exchange of information and encourage collaborative partnerships.

Interactions with EPA's Regional Offices and similar agencies around the world (mainly Japan and the European Union [EU]) largely have been limited to information exchange through joint workshops and presentations. However, other efforts include establishing joint solicitations for proposals with the EU.

The progress of NCER partnering with other federal agencies has been excellent, firmly establishing the Center as a leader in sponsoring environmental research and significantly raising its visibility. This certainly is an accomplishment for which NCER should be commended.

One area of caution, though, concerns the leveraging or commitment of funds to joint research programs. During the review process, the review team was unable to judge from available information whether the stated 35 percent increase in funded research equated to an equal increase in achieving EPA/NCER-specific goals. Because many of the partnering agencies are significantly larger than NCER, it should be clear that each program is committing funds commensurate with the benefit it receives. How such partnerships will continue or expand in the future should be addressed in NCER's Strategic Plan. This will help ensure that NCER maintains a focus on its Agency-specific goals and does not dilute its limited resources to other areas. Better documentation of NCER partnerships, including research funded, dollars committed, and goals reached, would be a valuable undertaking.

Recommendation 5: Progress of NCER in partnering with other federal agencies has been excellent, firmly establishing it as a leader in sponsoring environmental research and significantly raising its visibility. This certainly is an accomplishment for which NCER should be commended. Better documentation of NCER partnerships, including research funded, dollars committed, and goals reached, would be a valuable undertaking.

3.1.5 How has NCER incorporated social science research into its overall research program?

EPA's social science research program rests on three initiatives: valuing the costs and benefits of environmental initiatives; developing efficient, incentive-based strategies to environmental policy; and developing understanding of polluting and environmentally beneficial behavior. NCER currently has five socioeconomic solicitation areas, funded at a total of about \$3 million annually (which is less than 5 percent of its annual research budget). These areas include: (1) decision making and valuation for environmental policy, (2) valuation of human health, (3) corporate

environmental behavior, (4) market mechanisms and incentives, and (5) socioeconomic aspects of futures research.

The BOSC recognizes that NCER is constrained in its social science research initiatives by the interests of EPA, focusing primarily on economic issues as its foray into social science. The BOSC is pleased to see that, although NCER's budget for social science research is small, the Center is making progress in integrating social science into other STAR program research initiatives. NCER has solicited the assistance of the National Academy of Sciences (NAS) to help define the balance between the quantifiable and non-quantifiable social sciences integration of these initiatives. The review team identified two major ways in which NCER's social science research should be improved.

First, a broader range of social science research is needed—one that places relatively less emphasis on economics and relatively more emphasis on such disciplines as cultural anthropology, psychology, organizational psychology, political science, risk communication, and sociology. The current overriding emphasis on economics tends to stress quantifiable values and parameters and ignore less readily quantifiable but potentially more important factors.

Second, the solicitations issued by NCER should be more precise. Given NCER's review process (external peer review and then internal relevancy review), applicants need a clear sense of the type of research proposal that is likely to pass not only the first but also the second hurdle. Although this is true for all of NCER's STAR program initiatives, the problem appears to be especially troublesome for its social science research program.

Recommendation 6: Although NCER's budget for social science research is small, The Center is making progress in integrating social science into other STAR program research initiatives. A broader range of social and behavioral science research is needed, with increased focus on other social sciences to complement appropriate investments in economics.

3.1.6 How has NCER achieved/maintained a balance between human health and ecological research?

This balance is achieved through several processes, including participation by NCER in the ORD planning process through the RCTs, discussions with the ORD Science Council, and planning processes within NCER. A few years ago, the balance was shifted in response to the ORD Science Council's conclusion that NCER's research was overly human health-oriented. It also should be noted that some of NCER's research is not easily aligned with human health or ecological objectives, but is crosscutting.

The BOSC was impressed with the approaches described for determining NCER research objectives generally, and when partnering with other agencies in some efforts, including those with NIEHS in the human health arena. However, there was some concern that the current balance between human health and ecological research is somewhat arbitrary. These two areas currently receive approximately equal support, with the two areas combined comprising 86 percent of NCER's research budget. Given the far larger budgets of other agencies dealing specifically with human health (such as the National Institutes of Health [NIH], and particularly NIEHS), there was some concern that the current balance remained overly human health-oriented.

NCER should address this issue of balance more routinely, and clarify the rationale (not just methodology) for the balance selected. Moreover, this issue should be addressed both within the context of internal balance within EPA, and more globally. How do NCER's activities and balance in these areas mesh with other activities within EPA, with other U.S. research organizations, and with activities in other countries?

Recommendation 7: NCER should address the balance of human health and ecological areas more routinely, and clarify the rationale (not just the methodology) for the balance selected, addressing the context of balance within EPA, and more globally, considering EPA's contributions among other federal research programs.

3.1.7 How has NCER's research management and research program changed since the last BOSC review?

Staffing for technical Project Officers and communications has been expanded substantially. This has helped reduce the work overload noted in the last BOSC review, and has enhanced the effectiveness of communication both externally and internally. Initiatives including the development of a Web site, a journal club, a book club, a lunchtime speaker's program, special work groups, and retreats have contributed substantively to internal dialog, diversity, and career development. In terms of the research portfolio, *significant* expansion in the social science and economics areas has taken place.

The BOSC was very impressed with NCER's initiatives in this area since the last review. NCER has both expanded its staff and replaced outgoing staff with highly capable and enthusiastic individuals. The *esprit de corps* exhibited by the large array of NCER staff interviewed was very impressive. Additionally, the various activities designed to enhance internal staff communication, involvement with the NCER mission, and professional development appeared to be of great importance to NCER management and to be working very effectively. NCER has achieved commendable progress in this area, and is encouraged to continue its efforts through, for example, careful tracking of new hires to ensure their continued enthusiasm.

As discussed in Section 3.1.5 above, the review team does not agree that the efforts characterized by NCER in the realm of expansion of social sciences have been sufficient. Although the size of the program has grown, the scope is in need of greater diversity of subject areas in social sciences.

Recommendation 8: NCER has demonstrated significant progress in developing effective systems for managing its programs and motivating its staff. The BOSC encourages its continuation through, for example, careful tracking of new hires to ensure their continued enthusiasm.

3.2 Research Strengths and Challenges

3.2.1 What are NCER's unique research capabilities and strengths to accomplish its objectives?

NCER clearly plays a unique and essential role within EPA by supporting and directing extramurally funded research that directly contributes to the mission and goals of the Agency. NCER's targeted RFAs are drafted from the frequently updated MYPs and allow the program to continually meet evolving needs for environmental research. NCER's vigorous peer-review process also is a major strength for the program and somewhat unique within EPA.

Although NCER's unique qualities and capabilities are apparent and well recognized within EPA, there was concern that this may not be true with respect to other federal research programs. Based on the day-and-a-half review, the review team members agree that NCER has special and important characteristics, but these distinctions are not necessarily obvious to the outside observer. Some of NCER's unique capacities appear to be: (1) support of research needed to establish sound environmental policy; (2) support of RFAs that are targeted to specific research needs (relative to other agencies); and (3) ability to respond rapidly to evolving environmental issues. Toward ensuring the continuation, and hopefully expansion, of the NCER program, it is vital that NCER documents exactly how it differs from other related federal programs and why it can accomplish things that these other agencies cannot. These qualities are expressed in various NCER documents, but drafting a one-page document highlighting NCER's unique qualities and excellence could be extremely useful. Such a document might be targeted to policy makers, legislators, and the informed public. This document also should provide a broader valuation of NCER's uniqueness by providing specific case examples and metrics, where appropriate. NCER has proven itself to be excellent and unique—however, this message must be abundantly clear to those who can influence the program's fate.

Recommendation 9: Although NCER's unique qualities and capabilities are apparent and well recognized by those familiar with EPA, there was concern that these areas of distinction may not be appreciated by other federal research programs and legislators. It is vital that NCER document exactly how it differs from other, related federal programs and why it can accomplish things that these other agencies cannot.

3.2.2 How does NCER communicate its results within the organization, within ORD, within EPA, to outside agencies, and to the outside world?

NCER places a high degree of importance on communications and is continually developing new approaches and tools to assist movement of research findings into problem solving and setting environmental policy. There is a diversity of audiences inside and outside of EPA for these efforts. The approaches used and under consideration for publications, Web-based information exchange, meetings, and presentations were summarized in the Self-Study. There is a continuing focus on anticipating new needs and new communication tools to be developed and applied in the future.

NCER's leadership clearly recognizes the need for effective communications (and for the benefits of improved program coordination that result from such communications). As just one example of attention to high quality, the NCER staff and leadership are to be credited with an excellent effort in preparing the Self-Study Report.

Further evidence of the commitment to excellence in communications lies in NCER's enviable record of publications and information bulletins from the STAR program. NCER boasts of 24,000 "hits" on its Web site in just 1 month (July 2001). Other impressive notes were offered at the time of the review.

NCER's ambitions are impressive as well. Those ambitions include developing new techniques for information dissemination, such as "State of the Science" reports and implementation of an NCER "Newspage."

Although these achievements are clear and the plans are in place to advance further, NCER is urged to heed its own herald call as stated in the Self-Study Report:

“NCER believes that its audiences include not only its own organization, ORD, and EPA’s Regional and Program Offices, but also other agencies and professional societies, and the “outside world” of Capitol Hill, the scientific community, and the public.”

The belief is most certainly correct, and the goal of outreach to each of those audiences is noble. However, it is clear that full realization of the goal remains to be achieved. NCER’s challenge is intensified, in large part, by Congress’ mandate, as codified in the Government Performance and Results Act (GPRA).

Among its many provisions, GPRA requires: (1) that EPA develop a strategic plan (to fully integrate its scientific and regulatory functions), and (2) that the Agency devise and monitor “performance metrics” (aka, measures, statistics, etc.) that accurately inform Congress of EPA’s progress against its overall mission. The latter represents a major change in performance assessment for EPA, in that Congress has mandated that the dominant metrics be “outcomes” (e.g., direct measures of improvements in human and environmental health), not “outputs” (e.g., indirect measures such as reduced emissions, numbers of regulatory actions, etc.).

NCER, its sister Laboratories and Centers, and ORD-at-large enjoy the opportunity to contribute to the satisfaction of the GPRA-mandated goals. The review team believes that the opportunity can be exploited by: (1) intensifying communications between NCER and its many audiences, (2) initiating those communications earlier in the research planning process, and (3) straining to assure that NCER’s research results reach those who are in a position to apply them to health and/or environmental improvement. Specifics regarding the means to improve NCER’s contributions to ORD’s and EPA’s Strategic Plans are addressed elsewhere in this document; let it suffice here to focus on improved, expanded, and accelerated communications.

Maintaining the level of commitment that marks the current efforts at outreach from NCER’s research program accomplishments is absolutely critical. However, there are opportunities for earlier and more effective engagement of EPA’s Regional and Program Offices in priority setting and research planning. Moreover, in addition to improving the timing and effectiveness of communications to audiences from inside the Agency, NCER should exploit opportunities for early and frequent engagements with audiences from “outside” as opposed to spending greater time with internal discussions. Those opportunities include actively consulting stakeholders (e.g., public interest groups, business/industry, scientific and professional communities, state and local governments, etc.) as well as more aggressively reaching out to those same parties as research results become available. The latter is particularly important, in that it is often the receivers of NCER’s research results who actually implement the improvements to health and the environment.

NCER should continue to expand its proactive program of education and outreach to be sure that the results of NCER-funded research take their proper role in guiding EPA’s regulatory programs, and that Congress exercises its duties in oversight and support.

Increasing sophistication among the public, citizen and private advocacy groups, and others assures that pressures will increase on NCER to be ever-more effective and quantitative in accounting for the value returned on NCER’s research investments. Anticipating the nature and focus of such demands will position NCER favorably to support the Agency in completing its mission.

Recommendation 10: NCER’s leadership clearly recognizes the need for effective communications (and for the benefits of improved program coordination that result from

such communications), as evidenced by the enviable record of publications and information bulletins from the STAR program, number of “hits” on its Web site, and ambitions to develop new tools. The ambition of outreach to each of the important and diverse audiences is noble. However, it is clear that full realization of the goal remains to be achieved, and working toward such a goal will have a large impact on personnel in terms of the nature and amount of effort NCER has to mount. NCER can best achieve its goals by: (1) intensifying communications between NCER and its many audiences, (2) initiating those communications earlier in the research planning process, and (3) straining to assure that NCER’s research results reach those who are in a position to apply them to health and/or environmental improvement.

NCER should continue to expand its proactive program of education and outreach to be sure that the results of NCER-funded research take their proper role in guiding EPA’s regulatory programs, and that Congress exercises its duties in oversight and support.

3.2.3 Where does NCER need to improve? What are the problems and challenges that NCER faces in the next 5 years?

NCER identified four areas for improvement: (1) communication of research results, (2) increasing science focus of Project Officers, (3) enhancing integration with other ORD Laboratories and Centers, and (4) documenting research accomplishments.

NCER has conducted an earnest self-assessment in this area. These areas are of sufficient importance that NCER and the review team incorporated them into discussions surrounding other self-study questions. Communication of research results and documenting research accomplishments are addressed in detail in Sections 3.2.2, 3.3.2, and 3.4.3 (Questions 10, 14, and 19). The area of integration is discussed in Sections 3.1.2 through 3.1.4 and 3.4.2 (Questions 2-5, and 17). Increasing the science focus of the Project Officers is addressed in Sections 3.1.7 and 3.4.3 (Questions 8, 18, and 19). The findings and recommendations on these topics are presented in those sections of this report.

3.2.4 What were the three to five most serious problems identified in the first BOSC review? How have you responded to these problems and the BOSC recommendations related to them?

In the Self-Study Report, NCER reviewed its progress in addressing four serious problems identified in the last BOSC review.

NCER has adequately addressed three of the four problems. The remaining problem is the need to “...to develop a strategic plan and management plan to assist with identification of priority issues and directions for research funding...” NCER is still lacking a Strategic Plan. The Center should proceed with development of the Plan as soon as possible.

3.3 Performance

3.3.1 What other research organizations (U.S. or international) are similar in purpose and operation? How does NCER’s performance compare to theirs (benchmarking)?

NCER has not specifically compared its mission to that of other research organizations. It currently participates with several other agencies on interagency coordination groups. Additionally, it has

studied processes at other agencies as a means to improve or develop processes for implementation at NCER. A previous study involved the peer review process at NSF and a current study is reviewing the communication of research results.

NCER's mission is not exactly the same as any other agency. Its mission is a "mixed bag" and includes attributes of a regulatory agency, science agency, and education agency. It is driven by some of the same motivations of a profit and not-for-profit organizations. The breadth of the activities conducted by NCER precludes a perfect match of benchmarks with other organizations. Therefore, an innovative paradigm is needed to identify its benchmarks.

NCER's vision is to "become the NIH of environmental research." Therefore, NCER should examine the benchmarks of NIH that are consistent with NCER activities and adopt them. In terms of its support of regulation development, agencies within the Departments of Commerce, Interior, and Agriculture with regulatory development missions are recommended starting points. NSF also is recommended as an agency for comparison because of its similar research and education mission. The Office of Management and Budget's Director, Mitchell Daniels, described NSF as one of the "...true centers of excellence in this government...where more than 95 percent of the funds you provide as taxpayers go out on a competitive basis directly to researchers..."

Recommendation 11: NCER's lack of performance measures is linked to the absence of a strategic plan and a single agency to provide a benchmark for comparison. NCER should complete its Strategic Plan and develop benchmarks by gathering benchmarks from a variety of agencies whose activities intersect those of NCER.

3.3.2 Identify and discuss five cases where there has been a need for NCER research by stakeholders outside of EPA (e.g., other federal agencies, state agencies, businesses, citizen groups, or other organizations).

Virtually all of the activities under the STAR program address the needs of one or more stakeholders (e.g., other federal agencies, state agencies, businesses, citizen groups, or other organizations). The five examples cited by NCER in the Self-Study Report are examples of a particular need or interest by one of more stakeholder groups outside of EPA: (1) Technology for a Sustainable Environment, (2) Small Business Innovation Research (SBIR) Program, (3) Environmental Monitoring and Public Access for Community Tracking, (4) NCER's Particulate Matter (PM) Research Program, and (5) Water and Watersheds Program. Each program is discussed with emphasis on stakeholder involvement, technical accomplishments, and NCER outreach and coordination efforts.

These five examples provide material insight into the extent that NCER programs can focus on priority areas of research of interest to EPA while meeting the concerns and interests of entities outside the Agency. The text identifies a diversity of stakeholders and environmental issues that are involved in NCER research programs and demonstrates the breadth of activities, issues, and clients NCER research has addressed.

NCER scientists and administrators are noticeably proud of achievements under the SBIR and Experimental Program to Stimulate Competitive Research (EPSCoR) programs (see Self-Study Report, pg. 3). Although strongly asserted that "many EPA-sponsored SBIR technologies have been successfully commercialized," no specific statistics on the nature, significance, or consequences of the commercial developments were offered. Stewardship tracking and reporting of these types of

accomplishments are crucial to the Agency's self-management (through feedback to assist in refining plans and programs) as well as with NCER's, ORD's, and EPA's communications efforts.

Although the write-up of these case studies was not a specific topic of discussion during the review, this information provided useful background that was brought up as part of other discussions. We encourage NCER to continue to maintain project planning and management approaches that allow integration of broad stakeholder interests and priorities.

Recommendation 12: NCER programs can focus on priority research areas of interest to EPA while meeting the concerns and interests of entities outside of EPA. NCER is encouraged to continue to maintain project planning and management approaches that allow integration of broad stakeholder interests and priorities.

Stewardship tracking and reporting of program, like SBIR and EPSCoR, accomplishments are crucial to the Agency's self-management (through feedback to assist in refining plans and programs), as well as with NCER's, ORD's, and EPA's communications efforts. NCER is encouraged to develop and communicate metrics to quantitatively measure their impacts.

3.3.3 Identify and discuss five cases where there has been a need for NCER research in Program Offices or Regions of EPA. Include two to three examples where this need has been effectively met, and two to three where it has not. Why or why not?

NCER's research priorities are determined through an extensive process that incorporates input from Program Offices and alignment through RCTs. The process ensures that highest priority research needs are addressed, and ultimately leaves lower priority research areas underfunded, or not funded. Three case studies of effective work within EPA were presented: (1) PM research for the Office of Air and Radiation; (2) establishment of 12 centers and numerous individual investigator grants in working with the Office of Children's Health Protection; and (3) work with the Office of Transportation and Air Quality to develop solicitations and fund projects addressing automotive engine emissions. Two case studies addressing disappointments expressed by Program Offices in working with NCER both are focused on budget limitations: (1) minimum response from a single solicitation on emissions from hazardous waste incinerators; and (2) recognition by the Office of Air that lower priority research areas were going unfunded.

The text accompanying these positive and less successful cases provided sufficient examples of how the processes in place to plan and prioritize NCER research activities are applied. The review team gained an appreciation on how the Agency's Offices can respond to positive outcomes in funding decisions, leading to greater interactions with Program Offices. This text also provided insight into how EPA Program Offices may respond to funding proposals with less than positive outcomes.

The responses written up for these case studies were not specific topics of discussion during the review, but the information was applied and discussed in other contexts. In particular, aspects of the PM and Children's Health projects were part of the discussions and examples used to make various points throughout the review. NCER initiatives to develop state-of-the-science reviews for various topics, such as those relevant to acid rain as mentioned in this portion of the response, also were singled out for discussion.

Recommendation 13: The case studies presented indicated that budget limitations were the cause of a research program not meeting the expectations of a Program Office (sponsor). NCER is admonished to be cognizant of others barriers (e.g., a too narrowly defined project that overlooks chronic health impacts) that also can contribute to a sponsor's expectations not being met.

3.4 Success and Measures of Performance

3.4.1 How does NCER measure the efficacy and results of the Center's performance? Target indicators? Show quantitative measures of performance.

The question of measurement and metrics of efficacy and results has been an ongoing area of consideration at NCER. A number of evaluations have been undertaken using various sources of expertise and ideas. In spite of these efforts, no universally accepted, highly quantitative approach has been put forth to provide measures of performance that are workable within the broad scope of NCER research programs. Traditional metrics have been applied (numbers of publications and indicators of their quality, Web site hits, etc.) with success, but have left NCER wanting for more diverse and more focused measures to evaluate programmatic success. Application of the GPRA results have been the most effective approach used to date.

The discussion around this topic during the review was intense, far-reaching, and touched on creative (yet ephemeral) solutions. Unfortunately, the discourse generated among NCER and the review team failed to provide significant resolution to this "sticky" area during the course of the review.

NCER is commended for its leadership in searching out existing systems used by various research programs, and for its sponsorship of various efforts designed to identify new approaches that might capture accomplishment and impact of robust research programs, such as those at NCER. This is an important area for NCER, and ORD, to consider, and is a challenge of sufficient importance to justify allocation of additional personnel time and research funds.

Although the review team did not come up with specific approaches or solutions, the discussions did identify the nature of focus and specificity the BOSC members believe are required to meet the challenge of documenting the impact of the NCER programs. For those problem-driven areas, the system must provide a means to document the degree of success associated with obtaining a solution, and how that solution was applied within regulatory policy. The metrics must allow NCER to respond to the questions "did we get an answer, and if so, were we able to apply what we learned." For core research, the same measures may apply, but the time lapse until implementation or application may be greater. The goal of the metrics should be to document successes and identify unsuccessful efforts as well. The data can be used to streamline activities, benchmark against other research programs, and justify the value of NCER programs as well as documenting results.

In addition to tracking accomplishments and impacts of large research areas such as the STAR grants and research centers, NCER should have a set of metrics that apply to the other types of research programs it sponsors. For example, the fellowship program and innovative grants are important components of NCER activities. The Center has some statistics on these recipients now. Perhaps there are ways to enhance the data such as tracking fellows through their careers. NCER could survey Principal Investigators and graduate students at the middle and end of their careers on where specific grants made a difference in their careers, or where small or focused funding efforts

turned into advances in environmental problem-solving. The metrics for all NCER programs should allow inputs and quantitation of accomplishment or significance with consideration of an extended time horizon.

Recommendation 14: NCER has a demonstrated leadership role in seeking to develop metrics for quantitative evaluations of research quality and impact. We concur that this is a significant area, and is a challenge of sufficient importance to justify allocation of additional personnel time and research funds.

Metrics for all NCER programs should allow inputs and quantitation of accomplishment or significance with consideration of an extended time horizon.

3.4.2 How do you use research results to set research priorities, plan research, and discharge NCER's mission?

NCER has a significant role in the research planning process ORD has developed over the years. Information on results from State-of-Science Reviews and STAR program can be presented during a number of telephone calls, meetings, and reviews held at varying frequencies and stages throughout the comprehensive planning process. The finalization and implementation of the MYPs are another venue for ensuring that results from NCER research programs are integrated into ORD priorities and performance goals. A variety of approaches are used to communicate research results, particularly useful examples are the NCER Multipagers and the annual NCER planning meeting.

In the course of the discussions, the review team gained an understanding of the comprehensive research planning process now being practiced at EPA, ORD, and NCER. The team also developed an appreciation of the amount of time that is committed to this effort. *The diagram* included in the Self-Study Report (in response to this question) was particularly helpful in gaining an understanding of the overall process, NCER's opportunities to participate, and how the research priorities are established.

There appears to be a number of strategic opportunities and quality tools used to feed NCER research results back into the EPA research planning process, providing a means to impact the establishment of research priorities and integration with EPA's mission. Based on discussions during our review, this process is effective but may not yet be optimized. The BOSC encourages NCER to continue the search for additional communication tools as well as efficient processes to disseminate research results. The efforts and means used to apply research findings as part of setting future priorities and to track implementation by EPA are sufficiently important that they should be addressed in the NCER Strategic Plan, which is still in development.

Although the diagram and the text in the review document specifically addressed the STAR program, the review team thought it was important to mention that NCER research activities beyond the major programs of STAR grants and research centers should be included in the efforts to influence research planning. In the course of our discussions, it became apparent that some NCER staff spend a significant amount of time on conference calls and in communications with the Program Offices and the RCTs as part of NCER program area coordination. It may be time to examine the efficiency with which the research planning and coordination efforts are carried out within ORD, in order to free up staff time (both inside and outside of NCER).

Recommendation 15: NCER and ORD have provided a number of strategic opportunities and quality tools that can be used to feed NCER research results back into the EPA research planning process, providing a means to impact the establishment of research priorities and integration with EPA's mission. It appears that this process is effective but may not yet be optimized, pending more efficient communication and time-management considerations.

3.4.3 Are the human resources at NCER's disposal appropriate for its mission, goals, and objectives? Does NCER have the appropriate mix of workforce, facilities, and infrastructure to plan, implement, and communicate its results?

NCER believes it needs to further augment its staff to meet the important role of communications in and outside of the Agency. The Center also recognized the need to redistribute the types of work among its employees. NCER considered the current facility adequate to meet its needs but indicated there is no room for expansion.

The assessment provided by NCER accurately reflects the assessment of the review team. A critical need exists to augment the NCER staff with specialists in the area of communications. The review team believes trained communications professionals will be required in order to establish and implement an efficient and effective communications program. As stated by NCER, this should free up the "...Project Officers, i.e., [NCER's] scientific staff to be fully involved in all aspects of the grants for which they are responsible..." Additional infrastructure—space, computers, internet access, etc., will be required as well.

Recommendation 16: NCER is doing a good job with its current resources and recognizing its needs. As NCER shifts the responsibilities of staff, the following suggestions apply:

- ❖ **Link resource type and quantity to activities defined by the Strategic Plan;**
- ❖ **Address the role of needs for specialty skills in the area of communications;**
- ❖ **Develop innovative approaches to solve paperwork bottlenecks that currently are personnel intensive (the digital processes at NSF and other agencies are recommended starting places); and**
- ❖ **Develop performance measures for internal and external communication plans.**

4.0 CONCLUSIONS AND RECOMMENDATIONS

In the course of the review, it was evident that NCER has a strong and dynamic research program that is well connected to ORD and EPA Program Offices. The Center's research programs are sustained by strong and creative leadership from its management and by commitment and enthusiasm among the staff. During the review, many examples and anecdotes were relayed to support this impression. The BOSC recommends that NCER spend some time documenting these successes and their effective research coordination and management strategies using several approaches. First and foremost, this is an opportunity for the NCER Strategic Plan to become a place where effective strategies and relationships are laid out. Further, it can be an instrument for written documentation of the approaches, performance metrics, and accomplishments that have led to NCER's unique position among environmental research organizations. A comprehensive Strategic Plan could be used to identify and distinguish the Center among other federal research institutions, justify budget requests, and demonstrate key values returned on the investment in extramural research.

Many of the comments and recommendations identified in this report, and summarized below, can be related to some aspect of a strategic plan. Because of the NCER leadership role in developing and supporting the ORD Strategic Plan, we find it somewhat ironic that the Center's Strategic Plan was not completed. The BOSC agreed that the ongoing development of ORD's MYPs and other changes in the Agency planning process provide a strong rationale for deferring finalization of NCER's Strategic Plan. Nevertheless, discussions during the review convinced the review team that many of the questions raised surrounding the unique values, contributions, integrative approaches, and outreach opportunities NCER has developed for ORD and EPA could be addressed and documented in a strategic plan.

Other areas of particular interest in this review were those of benchmarking and use of metrics to quantify programmatic success and impact. These areas are particularly troublesome given some of the unique responsibilities and programs with which NCER is involved. We understand the Center has to expand its view of model agencies used for benchmarking, because of the diversity of projects NCER sponsors to address both problem-driven and core research. Environmental research is being funded through a variety of mission-driven and nonmission-driven agencies and institutions within the public and private sectors. No single unit was recognized as the appropriate benchmark in the course of our discussions, and we encourage NCER to continue to seek out appropriate approaches to benchmarking. Similarly troublesome was the issue of developing appropriate performance metrics and measures of programmatic impact. The BOSC recognizes the leadership and effort NCER has committed to this topic to date, and encourages the staff to continue their search for robust, workable systems.

The enthusiasm and professionalism of the staff impressed the review team. NCER has made tremendous strides in forming a cohesive staff dedicated to their work, improving the work process, and creating a work environment that rewards innovation. We did observe that there are additional opportunities to re-evaluate the amount of effort needed in activities such as the RCTs, where weekly conference calls may be overly burdensome. Also, a critical assessment of the number of RFAs offered each year, together with efforts to better define their scope, priority, and significance could achieve reductions in administrative burdens and streamline review processes.

NCER and ORD have made significant strides in addressing areas identified for improvement during the previous self-study assessment and BOSC review. This includes the research integration efforts that are evident through the RCT and development of MYPs. Integration and leveraging of NCER research programs with other federal agency programs have been highly successful with respect to the dollars expended. No evidence of the extension of goals and objectives was presented. Increased funding for areas of social science has occurred, but a broader range of social science research is needed, with less focus on economics

The list of recommendations below reflects positive impressions the NCER programs made with the review team, and the BOSC's views of how this successful program can be enhanced. The intent of this listing is to assist the Center in ensuring that: (1) NCER's management and decision practices are better documented in transparent processes; (2) approaches and tools for communications, measurement of successes and impact, and recruitment and retention of dedicated staff continue their progress in effectiveness, and (3) the Center's unique role in EPA and among the environmental research community can be better appreciated and sustained.

4.1 Specific Findings/Recommendations Pertaining to Planning and Integration

Recommendation 1: NCER should proceed with development of its Strategic Plan as soon as possible. The plan can serve as the cornerstone for measuring the health of NCER and determining its future resource requirements.

Recommendation 2: The communications of NCER decisions and actions surrounding research initiation and prioritization decision processes would be enhanced with the development of written documentation of the processes surrounding RFA prioritization, setting of funding levels for research topics, and initiating programmatic changes in the course of MYPs.

Building on some successful efforts to date, additional effort is needed to refine and focus RFA solicitations to ensure that proposers, reviewers, and EPA staff understand the scope and focus of the research area to be addressed and its importance.

Recommendation 3: NCER should develop a strategy or model to gauge the balance between the number of RFAs issued and available funding.

Recommendation 4: The structured, integrative process being used by NCER to identify research topics and conduct research has considerable merit. However, streamlining measures should be taken to reduce the time demands on staff while preserving the essence of an integrative process.

Recommendation 5: Progress of NCER in partnering with other federal agencies has been excellent, firmly establishing it as a leader in environment research and significantly raising its visibility. This is certainly an accomplishment for which NCER should be commended.

Recommendation 6: Although NCER's budget for social science research is small, NCER is making progress in integrating social science into other STAR program research initiatives. A broader range of social science research is needed, in addition to the focus on economics.

Recommendation 7: NCER should address the issue of research balance of human and ecological areas more routinely, and clarify the rationale (not just the methodology) for the balance selected.

This should address the context of balance within EPA, and more globally, considering EPA's contributions among other federal research programs.

Recommendation 8: NCER has achieved commendable progress in developing effective systems for managing its programs and motivating its staff. The BOSC encourages its continuation through, for example, careful tracking of new hires to ensure their continued enthusiasm.

4.2 Specific Findings/Recommendations Pertaining to Research Strengths and Challenges

Recommendation 9: Although NCER's unique qualities and capabilities within EPA are apparent and well recognized by those familiar with EPA, there was concern that other federal research programs and legislators may not appreciate these areas of distinction. It is vital that NCER document exactly how it differs from other, related federal and non-federal programs and why it can accomplish things that these other agencies cannot.

Recommendation 10: NCER's leadership clearly recognizes the need for effective communications (and for the benefits of improved program coordination that result from such communications), as evidenced by the enviable record of publications and information bulletins from the STAR program, numbers of "hits" on its Web site, and ambitions to develop new tools.

The ambition of outreach to each of the important and diverse audiences is noble. However, it is clear that full realization of the goal remains to be achieved, and working toward such a goal will have a large impact on personnel in terms of the nature and amount of effort NCER has to mount.

NCER can best achieve its goals by: (1) intensifying communications between NCER and its many audiences, (2) initiating those communications earlier in the research planning process, and (3) assuring that NCER's research results reach those who are in a position to apply them to health and/or environmental improvement.

NCER should continue to expand its proactive program of education and outreach to be sure that the results of NCER-funded research take their proper role in guiding EPA's regulatory programs, and that Congress exercises its duties in oversight and support.

4.3 Specific Findings/Recommendations Pertaining to Performance

Recommendation 11: NCER's lack of performance measures is linked to the absence of a strategic plan and a single agency to provide a benchmark for comparison. NCER should complete its Strategic Plan and develop reference points by gathering benchmarks from an eclectic group of agencies whose activities intersect those of NCER

Recommendation 12: NCER programs can focus on priority areas of research of interest to EPA while meeting the concerns and interests of entities outside the Agency. We encourage NCER to continue to maintain project planning and management approaches that allow integration of broad stakeholder interests and priorities.

NCER has a realistic perspective on how the availability of funds can positively or negatively affect interactions with and opinions expressed by EPA Program Offices. Although dollars may drive the basis of most interagency interactions, it would be prudent to maintain vigilance on the nature of all interactions to ensure that no other barriers to cooperation arise.

Recommendation 13: The case studies presented in the Self-Study Report indicated that budget limitations were the cause of a research program not meeting the expectations of a Program Office (sponsor). NCER is admonished to be cognizant of others barriers (e.g., a too narrowly defined project that overlooks chronic health impacts) that also can contribute to a sponsor's expectations not being met.

4.4 Specific Findings/Recommendations Pertaining to Measures of Success and Future Needs

Recommendation 14: NCER has a commendable leadership role in seeking development of metrics for quantitative evaluations of research quality and impact. This is a significant area, and is a challenge of sufficient importance to justify allocation of additional personnel time and research funds.

Of significance among the review team's discussion was that metrics for all NCER programs should allow inputs and quantitation of accomplishment or significance with consideration of an extended time horizon.

Recommendation 15: NCER and ORD have provided a number of strategic opportunities and quality tools that can be used to feed NCER research results back into the EPA research planning process, providing a means to impact the establishment of research priorities and integration with EPA's mission. It appears that this process is effective but may not yet be optimized, pending more efficient communication and time-management considerations.

Recommendation 16: NCER is doing a good job with its current resources and recognizing its needs. As the Center shifts the responsibilities of staff, the following are offered as suggestions:

- ❖ Link resource type and quantity to activities defined by the Strategic Plan;
- ❖ Develop innovative approaches to solve paperwork bottlenecks that currently are personnel intensive (the digital processes at NSF and other agencies are recommended starting places); and
- ❖ Develop performance measures for internal and external communication plans.

APPENDIX A: Subcommittee Charge From the BOSC Executive Committee

The BOSC Executive Committee charged the NCER Subcommittee to:

- ❖ Serve as standing subcommittee of the BOSC to advise and perform peer review of the activities of NCER on a regular basis
- ❖ Review NCER with regards to efficiency in management and administration, with focus on communications, personnel policies and human resources, research portfolio planning and target indicators for measuring effectiveness
- ❖ Communications is a special area of emphasis for ORD and the BOSC in 2001
- ❖ Review NCER Strategic Plans and understand how they integrate with the ORD and EPA strategic plans
- ❖ Discuss Center activities in Multi-Year Plan development

APPENDIX B: Self-Study Questions Submitted to NCER

Planning and Integration

- ❖ Question 1: How does your strategic plan articulate with the EPA-ORD Strategic Plan (see Table 2 of ORD Strategic Plan) and with EPA's strategic plan? Please append your draft strategic plan.
- ❖ Question 2: What are your organization's priorities and directions for the next five years? Include your research portfolio and multi-year planning efforts.
- ❖ Question 3: How does your organization integrate research with the other Labs and Centers of EPA-ORD according to the risk paradigm?
- ❖ Question 4: How does your Center integrate research across and within the Divisions of your own organization according to the risk paradigm?
- ❖ Question 5: How does your Center integrate research with regional offices of EPA, other federal agencies, and other research centers world-wide?
- ❖ Question 6: Specifically, how have you incorporated social and behavioral science into your research program?
- ❖ Question 7: How have you achieved/maintained a balance between human health research and ecological research?
- ❖ Question 8: Specifically, how has your research management and research program changed since the last BOSC review?

Research Strengths and Problems

- ❖ Question 9: What are your unique research capabilities and strengths to accomplish your objectives?
- ❖ Question 10: How do you communicate your results within the organization, within ORD, within EPA, to outside agencies, and to the outside world?
- ❖ Question 11: Where do you need to improve? What are the problems and challenges that you face in the next five years?
- ❖ Question 12: What were the 3-5 most serious problems identified in the first BOSC review? How have you responded to these problems and the BOSC recommendations related to it?

Performance

- ❖ Question 13: What other research organizations (U.S. or international) are similar in purpose and operation?
- ❖ Question 14: How does your performance compare to theirs (benchmarking)?

- ❖ Question 15: Identify and discuss five cases where there has been a need for your Center research in program offices of regions of EPA. Include 2-3 examples where this need has been effectively met and 2-3 examples where it has not. Why or why not?
- ❖ Question 16: Identify and discuss five cases where there has been a need for your Center research by stakeholders outside of EPA (e.g., other Federal agencies, state agencies, business, citizen groups or other organizations).

Measures of Success and Future Needs

- ❖ Question 17: How do you measure the efficacy and results of your organization's performance? Target indicators? Metrics of success? Show quantitative measures of performance.
- ❖ Question 18: How do you use research results to set new research priorities, plan research, and discharge your mission?
- ❖ Question 19: Are the human resources at your disposal appropriate for your mission, goals, and objectives?
- ❖ Question 20: Do you have the appropriate mix of work force, facilities, and infrastructure to plan, prioritize, implement, and communicate your results?

APPENDIX C: Agenda for BOSC Subcommittee Review Meeting

**U.S. Environmental Protection Agency
Office of Research and Development (ORD)
Board of Scientific Counselors (BOSC)
Subcommittee Review of the National Center for Environmental Research
Review Agenda
Ronald Reagan Building
1300 Pennsylvania Avenue, N.W.
Glacier Bay Conference Room
Room Number 81102
Washington, D.C.
January 23-24, 2002**

Wednesday, January 23, 2002

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|-------------------------|--|
| 9:00 a.m. - 9:15 a.m. | Welcome, Introductions, Disclosures, James Clark, Chair, NCER Subcommittee |
| 9:15 a.m. - 10:45 a.m. | Overview of NCER: Mission/programs, strategic plans/priorities/changes, progress since last review Peter W. Preuss, Director, NCER |
| 10:45 a.m. - 11:00 a.m. | Break |
| 11:00 a.m. - 12:30 p.m. | Self-Study Report: Q/A with NCER Management Team |
| 12:30 p.m. - 1:30 p.m. | Lunch (on your own) |
| 1:30 p.m. - 2:30 p.m. | Self-Study continued |
| 2:30 p.m. - 2:45 p.m. | Public Comment |
| 2:45 p.m. - 3:15 p.m. | Break |
| 3:15 p.m. - 4:15 p.m. | Meet with Junior/Senior Scientists |
| 4:15 p.m. - 5:15 p.m. | Subcommittee Discussions/Impressions |
| 5:15 p.m. | Recess |

Thursday, January 24, 2002

9:30 a.m. - 10:30 a.m. Follow-up/clarifications with Center Director et al

10:30 a.m. - 10:45 a.m. Break

10:45 a.m. - 11:00 a.m. Public Comment

11:00 a.m. - 12:00 p.m. Subcommittee Writing Session

12:00 p.m. - 1:00 p.m. Lunch

1:00 p.m. - 2:30 p.m. Exit Interview with NCER Director/Management Team

2:30 p.m. Adjourn

APPENDIX D. NCER Self-Study Report