Environmental Remediation Sciences Division

Responses to:

REPORT TO THE

BIOLOGICAL and ENVIRONMENTAL ADVISORY COMMITTEE (BERAC)

BY THE

COMMITTEE OF VISITORS

FOR THE REVIEW OF THE

ENVIRONMENTAL REMEDIATION SCIENCES DIVISION

December 2004

The Environmental Remediation Sciences Division (ERSD) received a draft final version of the Committee of Visitors report on December 6, 2004. That report was posted on the DOE Office of Science Office of Biological & Environmental Research in late December 2004. The management and staff of BER/ERSD would like to formally thank the Committee of Visitors for the time and effort that each of them committed to this activity. BER seeks to support high quality research that furthers the mission of DOE and to do this in a manner that is open, fair and scientifically robust. The COV comments and suggestions are given substantial consideration and the responses and programmatic changes described in this document are intended to implement that guidance.

The following is a formal response to the comments and suggestions raised by the Committee of Visitors. The responses are presented in the order that the comments appeared in the COV report. Appropriate section and subsection titles are used to orient the reader. For the sake of clarity, comments in the COV report are reproduced in italics. The ERSD responses to each comment follow in plain text. Similar comments are made in several places by the COV. Except where noted, the response is repeated. While somewhat verbose, this alleviates the need to read the entire document in order to understand a given response.

The responses to the Committee of Visitors suggestions generally consist of changes that can be, or already have been, implemented under existing resources and staff levels. However, in a limited number of cases, the COV suggestions will be difficult to implement under the current conditions. These cases are identified and partial or alternative approaches are described. In addition, there are comments that have application beyond this Division (and in some cases, beyond BER). These topics are identified as such and will be addressed at the level of the Program Office and/or Office of Science.

List of acronyms used in this report:

AGU	American Geophysical Union
ASM	American Society for Microbiology
ACS	American Chemical Society
AAAS	American Association for the Advancement of Science
BER	DOE Office of Biological and Environmental Research
CA	Cooperative Agreement
CCRD	BER Climate Change Research Division
CENR	NSTC Committee on Environment and Natural Resources
COV	Committee of Visitors
DOE	United States Department of Energy
EMSI	Environmental Molecular Sciences Institute
EMSL	Environmental Molecular Sciences Laboratory (PNNL, Richland, WA)
EMSP	Environmental Management Science Program
EPME	E-government Corporate R&D Portfolio Management Environment
ERSD	BER Environmental Remediation Sciences Division
FWP	Field Work Proposal (national laboratory request for funding)
FY	Fiscal Year
IIPS	Industry Interactive Procurement Systems
IMSC	Information Management in the Office of Science
IPA	Intergovernmental Personnel Act
NABIR	Natural and Accelerated Bioremediation Research Program
NSF	National Science Foundation
NSTC	National Science and Technology Council
ORISE	Oak Ridge Institute for Science and Education
OSTI	DOE Office of Scientific and Technical Information
OSTP	White House Office of Science and Technology Policy
PART	Program Assessment and Rating Tool
PeerNet	ORISE on-line proposal tracking and review system
PI	Principal Investigator
PNNL	Pacific Northwest National Laboratory
RIMS	Research Information Management System
SC	DOE Office of Science

SREL	Savannah River Ecology Laboratory (SRS, Aiken, SC)
SRO	DOE Savannah River Operations Office
SRS	Savannah River Site (Aiken, SC)
UGA	University of Georgia
USGS	United States Geological Survey

Executive Summary

In general, the solicitation and review processes work well, and the current program managers appear dedicated to the ultimate success of the programs in terms of fundamental research contributing to DOE's long-term mission and goals for environmental remediation and restoration. Many of the perceived problems or shortfalls predate the current management. The current management needs to be given the resources, tools, and mandate necessary to continue to enhance the value of the investments that have been made.

ERSD appreciates the support of the Committee of Visitors. The Division agrees that it is in a developmental period as it works to integrate four disparate programs that were developed over different time frames, with a range of missions and goals. The Division feels that it has a mandate from its management to implement changes necessary to "enhance the value of the investments that have been made". Efforts and changes are now underway and may be in place as soon as FY06 that will make important strides toward this goal.

The ERSD program managers appear to be very dedicated and highly competent, but all members of the COV expressed concern about the tremendous workload of each of these individuals. They do not have adequate time to interact constructively with funded investigators or potential applicants. In particular, the fact that there is only a single support person to assist with the entire ERSD program means that the program managers are diverted from focusing on scientific issues and program development in order to spend too much time on all aspects of the paperwork that accompanies the scientific investment, as well as on administrative functions that should more appropriately be handled by support staff members. To maintain the excellent quality of the programs, it will be essential to recruit and retain both additional technical staff and additional support staff of the highest possible caliber. This is a critical issue that merits the attention of SC management at the highest levels

Again, the ERSD appreciates the support of the COV comments and agrees that the current level of staffing and staff workload limit the ability of Program Managers to fully manage the science for which they are responsible. It would benefit not only the programs, but also the technical staff themselves to be able to focus their scientific expertise on the management of their research portfolios, rather than on its administration. The addition of support staff would not only relieve some of the administrative burden currently shouldered by technical staff, but would also help to improve the quality of files, records and documentation as mentioned in subsequent comments. Interim steps implemented since the COV visit include shared responsibility for review of Selection Statements by Program Assistants within BER. This step was implemented as a temporary measure as BER works to reconsider support staff functions.

Although the members of the panels of peer-reviewers appear to be appropriately selected, the COV strongly recommends that the panel expertise, and the range of opinion presented, be augmented through the use of mail reviews. Such reviews should be incorporated for each application that is evaluated.

While review systems can always be improved, the ERSD strongly supports the past work of its review panels. The scientists have provided their time and expertise to assist the program in selecting high quality research science. Nevertheless, the ERSD agrees

with this comment in principal and will work to implement the recommendation. While a larger and more diverse set of opinions for each proposal would certainly benefit the program, the time and effort needed to recruit, supply and monitor additional reviews will increase the previously noted administrative load for program managers. Ideally, and following the NSF model, mail reviews would be conducted prior to panel reviews so that the input from these additional reviewers is considered by the assembled panel. The logistics of managing this second review effort without lengthening significantly the overall time from submission to notification will also need to be evaluated. Identifying, recruiting and monitoring review panels is a critical, but difficult and time consuming part of the proposal review process. Identifying potential panel members with appropriate expertise in extremely focused areas while avoiding conflicts of interest is a challenging task. Balancing the recommendation to expand the number of reviewers with subsequent COV recommendations to consider the diversity of reviewers may be difficult to accomplish given the current staffing situation. ERSD will develop plans to implement mail review and will test those plans on a review conducted in FY05.

The COV believes it would be very useful if the research programs supported by BER were to set goals for, and keep records of, funding demographics in terms of underrepresented groups, junior scientists, and new investigators/independent viewpoints. If at all possible, all of SC should follow the example of NSF and collect such information at the time each application is submitted in a way that can be included in a statistical database without being included in the tracking folder.

BER does not have permission to request, on a voluntary basis, information on the age or ethnicity of investigators who submit a proposal in response to program-specific solicitations. Hence, the information to compile demographic statistics from individuals submitting proposals to the program is not and will not be available.

The COV recognizes that the EMSP and SREL have only recently been transferred to BER from EM. Nevertheless, it is critical that ERSD develop and implement a strategic plan for the integration of all efforts supported by the Division. While integration of EMSP with NABIR may seem most obvious, EMSL and SREL could play important roles in the future through the facilitation of laboratory and field measurements, respectively. In addition, there are programs both in DOE and other federal agencies that are directly relevant to the ERSD. Communication and coordination with these programs should be maintained and, where appropriate, joint planning and program implementation should be carried out to optimize the use of ERSD resources and to leverage investments of other agencies. Advice should continue to be obtained through workshops, BERAC, and other organizations including the National Academy of Sciences

The ERSD agrees with the COV's recommendation and currently is engaged in internal discussions on ways to integrate the two research programs (i.e., EMSP & NABIR). It is also agreed that all of the Division's elements should be more fully integrated. Mechanisms for improving the integration of research programs and facilities into the overall ERSD mission are detailed in subsequent responses to those programs.

ERSD agrees that communication and coordination within DOE and with other federal agencies is a necessary and beneficial component. ERSD plans to continue existing

collaborations and to actively pursue additional possibilities as funding and staff workload permit. ERSD currently collaborates in the following areas:

- ERSD has significant interactions with the Office of Environmental Management (EM), particularly in the context of the EM Science Program. Representatives of EM have participated in proposal reviews and have reviewed the most recent solicitation for EMSP. ERSD also is involved in initial discussions that would result in an integrated research program, funded by both ERSD and EM to advance the science and technology needs for long-term stewardship.

- ERSD co-funds three Environmental Molecular Sciences Institutes (EMSI's) with the National Science Foundation. These multi-year, multi-million dollar collaborations examine some of the most important molecular-level questions associated with environmental management issues.

- ESRD funds the Environmental and Molecular Sciences Laboratory, a national user facility that has pioneered the development of collaborative work environments for multidisciplinary study of biological, chemical and physical processes. The facility has hosted over 6000 scientists from academia, research laboratories and industry who use the advanced equipment, facilities, and capabilities in environmental spectroscopy, high field magnetic resonance, high performance mass spectrometry and molecular computing.

- ERSD represents DOE on the Interagency Working Group on Environmental Biotechnology. This working group currently funds a number of research projects on phytoremediation. ERSD continues to be a major partner and financial supporter of this effort.

- ERSD represents DOE on the Interagency Steering Committee on Multimedia Environmental Models (ISCMEM). This committee originates from a Memorandum of Understanding among ten Federal Agencies to facilitate cooperation and coordination in the research and development of multimedia environmental models. In FY05, ERSD will take its turn as chair of ISCMEM.

- ERSD is an active participant in the OSTP, National Science and Technology Council, Committee on Environment and Natural Resources (CENR) Subcommittee on Toxics and Risk Assessment.

- ERSD co-funds workshops and meetings with a number of other agencies and organizations. Examples of such collaboration include the NSF-DOE workshop, "Water: Challenges at the Intersection of Human and Natural Systems;" DOE-NRC Workshop entitled "Frontiers in Soil Science Research," and the BER/BES/RW workshop "Development of Radionuclide Getters."

With regard to the COV process

ERSD views the following comments as input to BER in general. The guidance and recommendations provided will be incorporated in the planning process for Divisions scheduled for subsequent COV review.

> *BER management should strongly consider presenting guidelines for non-disclosure at the beginning of the COV meeting. Although non-disclosure is implied in the Conflict of Interest form signed by COV members, this should be explicit and include a non-disclosure signature page. Further, peer-reviewers (whether they be panel reviewers or mail reviewers) need to be informed that their reviews may be disclosed to individuals other than the BER program staff, such as members of COVs.*

ERSD agrees with this recommendation regarding non-disclosure and notifying reviewers of potential future examination of their reviews by outside panels. ERSD will incorporate such notification into all future review panels.

> *It would be helpful to begin the breakout sessions for programs such as NABIR and EMSP with summary presentations of the goals of the program; the highlights of the program-sponsored research; what the program managers feel are the most important research results to date; what surprising or unexpected findings have resulted; how previously-funded research has contributed to changes in the program objectives or goals; and a detailed self-evaluation of the program – what do the program managers think are the successes/failures/challenges?*

ERSD agrees with this recommendation and appreciates the guidance provided by the COV to improve the educational/briefing approach for future committees.

> *Detailed statistics as to the percent of applications funded, relative to the total number of applications received, would be valuable. Similarly valuable would be data as to the number of new (relative to the specific research program) investigators funded for each solicitation as opposed to the number of investigators who are either the recipient of renewal awards or who have (or had) other projects funded by the program.*

This recommendation is viewed as having scope beyond this Division. However, ERSD will approach this question within BER and evaluate the feasibility of releasing success rate information after funding of projects submitted to solicitations is completed.

> *The individual files should be examined in advance and flagged for missing documentation (reviews, progress reports, etc.) so that the COV does not have to spend inordinate amounts of time seeking missing papers.*

ERSD recognizes that all files were not complete and that records could have been better organized within files. It should be noted that significant time and effort was expended in reviewing and updating the nearly 500 files that fell within the timeframe established for this review. Many of the files (i.e., EMSP projects begun through FY03) were developed by a different DOE Office (EM) and differed significantly from SC-style funding files. The Division's policy, beginning with the FY05 awards is to create and maintain files in

a standardized manner, including a checklist attached to each file listing critical project documents and requiring initials and dates that the documents were filed.

In the list of grants provided, all of the investigators on any given project should be listed, not just the lead investigator and the lead institution. When this information is not available, it is not possible to assess the extent of funding for specific investigators or groups of investigators.

ERSD agrees and recognizes that the current spreadsheet-based system used to track projects within the Division is deficient in this area. The Division is working to implement a more comprehensive tracking system. Currently, the grant tracking system is fractionated with many different systems (e.g., RIMS, PeerNet, IMSC, IIPS, ePME, ERSD web-based database and ERSD Excel spreadsheet) tracking different aspects of the process. This Division will work with the other divisions in BER as well as with the team developing the next generation award tracking system to identify the best approach. At a minimum, the ERSD system will be improved before the next awards are made to include identification of multiple investigators.

With regard to program management:

The COV believes it would be very useful if the research programs supported by BER were to set goals for, and keep records of, funding demographics in terms of underrepresented groups, junior scientists, and new investigators/independent viewpoints. If at all possible, all of SC should follow the example of the National Science Foundation (NSF) and collect such information at the time each application is submitted in a way that can be included in a statistical database without being included in the tracking folder

BER does not have permission to request, on a voluntary basis, information on the age or ethnicity of investigators who submit a proposal in response to program-specific solicitations. Hence, the information to compile demographic statistics from individuals submitting proposals to the program is not and will not be available.

It would be very useful if a timeline/document page were affixed to every application by ESRD staff. This document should contain a check-off list for all critical milestones of the application process. All correspondence and/or decisions pertaining to the application should be noted on this list. Where possible, materials in a file should be organized in chronological order to facilitate a rapid understanding of the status of an application both by a program manager and by other parties such as a COV.

National Laboratory and university funding actions have historically been handled quite differently. That resulted in very different levels of documentation in the project folders of university and national laboratory awards. Following the COV report to the CCRD, BER instituted policies that now require the same levels of documentation between these two types of actions. In ERSD, each lab jacket (i.e., the folder containing documentation of projects funded at National Laboratories) has two checklists attached to the outside of each folder. These checklists track all actions associated with the initiation of a project (e.g., proposal, reviews, selection statement, FWP, etc) as well as its continuation (e.g., progress reports, renewal orders, publications, etc). Each step of the process is to be

documented in the folder with the date of entry and initials of the program manager. This system will be implemented for all funding actions (i.e., grants & awards) made by this Division in all future solicitations. The centralization of this process by a dedicated Program Assistant would undoubtedly improve this situation.

In general, the solicitation and review processes work well, and the current program managers appear dedicated to the ultimate success of the programs in terms of fundamental research contributing to DOE's long-term mission and goals for environmental remediation and restoration. Many of the perceived problems or shortfalls predate the current management. The current management needs to be given the resources, tools, and mandate necessary to continue to enhance the value of the investments that have been made.

No response needed.

Although the members of the panels of peer-reviewers appear to be appropriately selected, the COV strongly recommends that the panel expertise, and the range of opinion presented, be augmented through the use of mail reviews. Such reviews should be incorporated for each application that is evaluated.

While review systems can always be improved, the ERSD strongly supports the past work of its review panels. The scientists have provided their time and expertise to assist the program in selecting high quality research science. Nevertheless, the ERSD agrees with this comment in principal and will work to implement the recommendation. While a larger and more diverse set of opinions for each proposal would certainly benefit the program, the time and effort needed to recruit, supply and monitor additional reviews will increase the previously criticized administrative load for Program Managers. Ideally, and following the NSF model, mail reviews would be conducted prior to panel reviews so that the input from these additional reviewers is considered by the assembled panel. The logistics of managing this second review effort without lengthening significantly the overall time from submission to notification will also need to be evaluated. Identifying, recruiting and monitoring review panels is a critical, but difficult and time consuming part of the proposal review process. Identifying potential panel members with appropriate expertise in extremely focused areas while avoiding conflicts of interest is a challenging task. Balancing the recommendation to expand the number of reviewers with subsequent COV recommendations to consider the diversity of reviewers may be difficult to accomplish given the current staffing situation. ERSD will develop plans to implement mail review and will test those plans on a review conducted in FY05.

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The ERSD agrees that the current level of staffing and staff workload limit the ability of Program Managers to fully manage the science for which they are responsible. It would benefit not only the programs, but also the technical staff themselves to be able to focus their scientific expertise on the management of their research portfolios, rather than on its administration. The addition of support staff would not only relieve some of the administrative burden currently shouldered by technical staff, but would also help to improve the quality of files, records and documentation as mentioned in subsequent comments. Interim steps implemented since the COV visit include shared responsibility for review of Selection Statements by Program Assistants within BER. This step was implemented as a temporary measure as BER works to reconsider support staff functions.

NABIR

In general, the process of solicitation, review, and funding for NABIR follows a traditional grants process. However, what may be unusual relative to processes used at other funding agencies is the extent to which program managers are empowered to define the research portfolio through the formulation of the solicitation, structuring of the review panel, and selection of the approved projects within the allocation of available resources to keep NABIR focused, on target, and true to its goals. The COV believes that this is important to NABIR being able to achieve its goals, but it is unclear as to whether or not submitting investigators are aware of this full range of management of the program.

As a mission-driven research sponsoring organization, BER assigns significant programmatic responsibility to the program-level administrators to implement the long-range plans for accomplishing these missions and across BER programs. This is similar to the manner in which research programs are implemented at other mission oriented agencies. This responsibility (and concomitant authority) is exercised with discretion. ERSD program managers include a mixture of federal employees (2.5) and IPA's (1). In addition, ERSD staff includes both an IPA and a detailee from national laboratories. Use of rotating, temporary staff (IPA's and detailees) brings new ideas and approaches to the Division and its research program. This team, in consultation with other BER colleagues and the Division Director collectively develop solicitations, assemble review panels and make final funding decisions. Solicitations are developed internally by this team of professionals. However, the themes and objectives of the solicitations are based on broad input from the funded community (programmatic workshops and PI meetings) as well as from the broader scientific community (participation at national and international meetings including AGU, ASM, ACS, AAAS, etc). The criteria for selecting proposals are based on scientific merit as evaluated by panels of independent peer reviewers. Significant efforts are made to empanel groups of respected, knowledgeable and unconflicted experts. The highest ranked proposals are funded while selection of proposals from the lower ranks of fundable proposals is influenced by available funding and programmatic considerations, including: balance of technical areas (program element, contaminants, bacterial species, etc) and providing opportunities for high-risk/high-payoff research.

Explaining the ERSD approach to project selection and funding has been an important topic of an ongoing series of meeting held between ERSD staff and investigators over the past four months. Meetings at national laboratories, universities and PI meetings have provided a forum for ERSD program managers to interact with current investigators and interested scientists. This effort will be continued by encouraging ERSD program managers to represent the program throughout the country. It is felt that these efforts are (and will continue to be) responsive to the COV concern that submitting investigators be made more "aware of this full range of management of the program."

Metrics for assessing the success in meeting the objectives of the NABIR research elements have not been established, and it is therefore very difficult to say definitively that NABIR funded research has resulted in expected outcomes. Although the 2001 Strategic Plan for NABIR is well written with defined goals, it has neither strategies for implementation nor metrics to assess progress as the different phases are implemented. Progress reports submitted by PIs need to be more reflective of outcomes generated, beyond simply the number of publications generated. It would be useful if a template were developed for such progress reports that specifically requests the information needed to assess research progress

ERSD agrees with the recommendation to develop implementation strategies and progress metrics for NABIR specifically. ERSD feels that the Division should have an inclusive set of such measures for the overall program. ERSD currently supports several strategic plans (i.e., ERSD, NABIR, FRC, EMSL) as well as a system to measure progress toward quarterly, annual and long-term goals (Program Assessment and Rating Tool - PART). As a result of the relatively recent formation of ERSD and integration of its research programs and facilities, these planning tools are not yet integrated. In the context of the COV recommendation that ERSD work to more fully integrate its current portfolio, ERSD proposes to develop an integrated strategic plan that encompasses both the research program and facility aspects and that this strategic plan include annual and long-term metrics that would support the needs of the PART system. This plan will be developed in the context of the DOE budget planning process as opportunities arise to modify the structure of the Division and its research program. The plan will take into account programmatic reviews, both recently completed and planned for the near future, by BERAC for its programs. This holistic, integrated approach should result in a more transparent program with readily identified goals and progress metrics.

With respect to progress reports, ERSD agrees that a standardized set of minimum requirements should be established and disseminated, without constraining projects to a one-size-fits-all format for reporting progress. ERSD will work with other BER program managers to develop appropriate guidance over the next six months. Once that guidance is reviewed by BER, it will be disseminated as required guidance to current and future PI's. ERSD will encourage program managers to emphasize the monitoring of project progress and to follow up with PI's when questions arise.

Milestones should be generated for the component research programs, and these should be monitored for completion. Contingencies for course correction should be included in program planning to allow each NABIR program element to be responsive to discoveries and developments in real time.

ERSD agrees with these statements and will work to balance a clear, well-designed long-term plan with the need to respond to advances in science or changes in the environmental remediation needs of the Department. This balance will be reflected in the development of a Division-wide strategic plan as described above. It is anticipated that the integrated strategic plan would be completed by the end of CY 2005.

A relatively small cadre of investigators appears to reap the majority of the NABIR funding. Individual PIs are the recipients of multiple awards, and there are several cases where numerous awards are made to a single institution. While this is clearly a reflection of the expertise of individual scientists and of institutional commitment to supporting research in a given area, the COV is concerned that the NABIR program is becoming inbred and that it does not have sufficient exposure to a diversity of approaches. Potential PIs not fully familiar with the NABIR goals may have difficulty deciphering solicitations and thus may be needlessly excluded from competition. The program should increase its outreach to new (to NABIR) researchers. In addition to ensuring clarity and openness of solicitations, the program should consider providing funding for seed/pilot projects to "new" investigators.

The comment regarding the diversity of NABIR PI's was based on a table developed by the COV that is not included in the final report since it divulges otherwise confidential information concerning the identity of peer reviewers. That table listed the names of NABIR Principal Investigators and Review Panel members who either submitted or reviewed proposals between 1998 and 2004 (all PI's from 1998-2004, Reviews of five solicitations from 2000-2004). ERSD evaluated that table and provides the following summary statistics:

Total names of PI's and Reviewers	223
Number of PI's	117
PI's with 1 funded project	*69 (60%)*
PI's with more than 1 funded projects	*39 (33%)*
PI's with more than 2 funded projects	*9 (7%)*
Number of reviewers	127
Reviewers who served on one review panel	*106 (83%)*
Reviewers who served on more than one review panel	*21 (16%)*
Reviewers who served on more than two review panels	*1 (<1%)*
Names that appeared as both PI's and Reviewers	21

Most importantly, ERSD is sensitive to concerns "that the NABIR program is becoming inbred and that it does not have sufficient exposure to a diversity of approaches." This comment strikes to the heart of a research program and will be considered carefully in future ERSD solicitations. ERSD recognizes the need for the program to openly and fairly solicit and fund the highest quality research directed to the needs of the DOE environmental remediation mission; and to be perceived as having done so by the broad scientific research community. ERSD will continue to work to expand its ranks of

investigators through broad dissemination of solicitations; by actively advertising the program and its accomplishments through national meetings. However, this effort is currently limited by a decreasing research budget for ERSD. Program managers are encouraged to attend national meetings and ERSD strongly encourages investigators to attend annual PI meetings for the various programs, and provides additional travel support to investigators. The Division also recognizes the importance of the peer-reviewed literature by encouraging the publication of high quality science in respected international journals (and requesting acknowledgement of its support in such publications).

ERSD recognizes that a few investigators and institutions have received multiple awards over the past six years. That success is the result of a fair and open peer review process. In the time-frame evaluated, 60% of the investigators had a single funded project. Most of the 40% that were funded two or more times represent renewal projects where the scientific merit and progress were deemed to be worthy of additional funding by peer review. As mentioned previously, ERSD program managers exercise their discretion in very few cases with all funding decisions being predicated on peer review guidance. Therefore, it is important to evaluate the selection of peer review panels. The table above shows that in the five solicitations between 2000 and 2004, ERSD used 127 reviewers of which, more than 80% received no NABIR funding between 1998 and 2004. ERSD will continue to work to diversify and expand its review panels.

ERSD is always open to funding seed/pilot projects and to encouraging "new" investigators. The Division currently funds several such pilot projects; such actions are generally based on recommendations from the review panel. As mentioned previously, funding decisions are based on scientific merit as evaluated by panels of independent peer reviewers. As a mission-directed research program, ERSD feels strongly that it must fund projects that most fully respond to the solicitation and represent the most meritorious science. Nevertheless, in situations where program managers must exercise professional judgment in the selection of project, considerations such as programmatic relevance, opportunities for young investigators or investments in high risk research are considered.

> *The NABIR program already funds suites of projects that hold the promise of synergism and leveraging of available resources, but their "added scientific value" has not been clearly demonstrated. Depth of understanding of a single microorganism or process may in some instances not be as valuable to real-world field processes as breadth of understanding encompassing broader ecological components. Some of the purely lab-oriented studies may be too narrow in scope to be truly "integrative," and there is too little iteration and integration between laboratory and field research. Further, budgetary constraints apparently led to the elimination of the original System Integration, Prediction, and Optimization element, further reducing efforts that are critical if NABIR is to achieve its full potential.*

ERSD is committed to development of clear scientific goals and research implementation strategies that encourage the appropriate use and integration of scientific disciplines and experimental approaches. As part of this commitment, and following the guidance of its BERAC subcommittee, ESRD will expand the role of field research within the program. Two calls for large-scale, field-based research programs are proposed to be released in

FY05 and be funded in FY06. Achieving ERSD's scientific goals will result in a combination of relatively small, specialized, single investigator, laboratory-based research projects and complex, multidisciplinary, large-scale research projects needed to test hypotheses and concepts, address questions that arise during the course of the research, and place new findings in the context of natural environment. The challenge of this plan will be to maintain the appropriate interdisciplinary and experimental balance and to develop the synergy among projects that will result in the "added scientific value" sought by the COV. ERSD will monitor this balance and encourage synergy as an ongoing part of the project selection process, by continuing the tradition of annual PI meetings and support for collaboration between and among investigators and by encouraging program managers to track progress within and among their projects.

> *There appear to be "favored bacteria" and entrenched approaches that may not be sufficiently open to external scrutiny or opposite viewpoints. Additional independent investigators should be encouraged in studies that bring new approaches and additional, metabolically different bacterial strains to the mix; this will be critical for assessing whether current approaches are too narrow or are misdirected.*

While not in agreement with this observation, ERSD recognizes the perception that the NABIR research portfolio is dominated by "favored bacteria." Some dissimilatory metal-reducing bacteria such as *Geobacter*, and *Shewanella* strains were obvious and available choices as microbial models early within the NABIR program. Many of NABIR's laboratory-based studies have documented the metabolism of these organisms in great detail. However, as the program has matured and the focus has started to shift from primarily laboratory-based research to microbial processes stimulated *in situ* (i.e., field research) there has been a corresponding shift in the focus away from individual organisms and more towards communities of microorganisms found in contaminated sediments. While this has been an evolving trend, there was a significant shift in this direction with NABIR's FY05 awards. These more recently funded projects were outside the scope of the COV, but include *in situ* field studies and the study of other organisms known to occur within contaminated sediments. That said, ERSD will continue to strive to include a diversity of opinion, approaches and microbial models in order to achieve the best available science for solving DOE contamination problems.

> *The committee believes that NABIR researchers need to stay focused on the broader, original goals of NABIR rather than on the narrower focus of fate and transport of metals and radionuclides. For example, there appears to be under-recognition of the importance of co-contaminants in microbial processes affecting the target elements. On the one hand, NABIR needs to remain focused; on the other hand, microbial activity is greatly influenced by the full suite of compounds present in the environment, and this needs to be considered in detail.*

In the conceptualization of the NABIR program the stimulation of *in situ* biological processes was not limited to radionuclides and metals but included all contaminants in the subsurface. This was at a time when the NABIR program was envisioned to be twice its present size (i.e., funding budget). The current focus on radionuclides and metals was a narrowing of focus associated with a decreased budget. ERSD does recognize that co-contaminants indeed do affect microbial activity and also, to a certain extent, microbial community composition. Rather than excluding co-contaminants, the FY04 NABIR

solicitation included the statement that, “The effects of co-contaminants, such as nitrate, complexing agents, (such as EDTA) and chlorinated solvents, (such as trichloroethylene and carbon tetrachloride) on the behavior of radionuclides and metals in the subsurface is also of interest to the NABIR program.” In addition, the NABIR program has made progress in describing the effects of co-contaminants found at contaminated sites (e.g., extensive research involving nitrates at the FRC), and recognizes that more could be done. ERSD will continue to emphasize willingness to fund issues of co-contamination in its solicitations.

> *The appearance of a small cadre of investigators is further reinforced by the significant use of funded PIs from the program serving as peer reviewers of applications submitted to elements of the NABIR program from which they do not receive funding. Since the fields of environmental and geomicrobiology/engineering have grown since the inception of NABIR, there are many more reviewers available than was once the case. NABIR needs to invite broader review of programs from non-NABIR-funded researchers, international researchers, United States Geological Survey (USGS) scientists, and members of professional societies. One way to achieve this broader review is to complement panel reviews with mail reviews from additional experts.*

As mentioned previously, the data collected by the COV for the NABIR program does not support the contention that NABIR funds “a small cadre of investigators”, nor does it support the contention that funded PI’s make up a “significant” portion of review panel members. However, the ERSD recognizes that this perception exists, recognizes the underlying recommendation for a broadly distributed program and will continue to work to implement the recommendation. As discussed previously in more detail, ERSD will require that program managers expand their efforts to identify and acquire external reviewers using the sources and mechanisms suggested by the COV. ERSD recognizes young investigators are a potential untapped source of expertise and will work to include more such reviewers in future panels, benefiting both the review process and expanding the cadre of scientists who are aware of the program.

> *Having separate review panels for each NABIR element may hinder the original concept of integration and cross-fertilization of research between the elements. There needs to be some assessment of the funded projects as to progress both within and across each element.*

It is the responsibility of the program managers, working together, to make judgments of the relative, programmatic importance and progress of projects across elements. The job of the review panel is to independently evaluate the scientific merit (and, in the case of renewal applications, the progress) of each proposed project. Subdividing the program into elements allows both the review panel and the program manager to focus on a limited area of science. Given that the start dates of NABIR projects are staggered, different elements (and sometimes even projects within an element) will come up for review at different times. NABIR uses “one-time” panels targeted to the specific needs of the proposals in hand rather than standing panels as may be implied in the COV comment. ERSD feels that use of “one-time” panels better addresses concerns regarding “in-breeding” within the program. In addition, it is important to understand that BER evaluates proposals independently against a standard of scientific merit.

With specific regard to linkage to mission needs of DOE, the NABIR program needs to be more pro-active in its attempts to transfer knowledge to the staff and engineers at the individual sites. Suggestions as to how to enhance dialogue between scientists and site managers include workshops, short courses, and technical presentations

ERSD recognizes this need and appreciates the COV's suggestions. The EMSP has a good track record (recognized explicitly by the COV in subsequent comments) of interactions among PI's and site staff. The envisioned integration of NABIR and EMSP should strengthen these interactions for NABIR PI's. ERSD also provides support to research coordinators at DOE sites with significant ERSD funding (e.g., PNNL) or science needs (e.g., SRS) to help coordinate collaboration among researchers and with site managers. ERSD, as a research program within the Office of Science, supports basic and fundamental scientific research. While it is sometimes possible to directly transfer basic scientific findings to the user community, there is often the need for additional efforts to turn these findings into deployable technologies. This second step is the responsibility of the DOE Office of Environmental Management (EM). ERSD works closely with EM to develop solicitations and select projects that address the long-term needs of that organization. In addition, there are examples of ERSD researchers transferring their findings directly to end users. ERSD currently is working to understand the conditions under which basic science can be transferred to end users and to try to encourage more of its PI's to interact with end users. In addition, site managers and EM staff are routinely invited to PI meetings. ERSD also has begun to cross-invite NABIR and EMSP scientists to corresponding meetings and workshops.

As an additional step in this direction, ERSD has committed funds to support workshops and technical presentations in FY06. This funding will be used to support "internal" meetings including ERSD investigators and site problem holders as well as to support special sessions or symposia in conjunction with national and international scientific meetings.

It would be valuable if the program were to organize international conferences involving both investigators supported by NABIR and those supported by other programs as a means of helping to evaluate the national/international impact of NABIR-supported science and as a means of integrating NABIR research into broader (geo)microbiological and environmental scientific communities.

As mentioned above, ERSD has committed FY06 funds to support both internal and external meetings. With regard to an international conference, ERSD will initiate discussions with other DOE offices that support environmental research (e.g., EM, RW) to evaluate their interest in supporting such a conference. The ongoing collaborations with NSF through the EMSI program also provide mechanisms to more broadly disseminate research findings and raise the visibility of ERSD research programs in the broader scientific community.

There is a need for development of new sensors and associated technologies (networking, computer data integration, sensor calibration and verification) for long-term management of sites. Although NABIR may need to argue for other related programs to fund the bulk of such research, it should be integrated with the NABIR program.

ERSD agrees with the COV's statement that DOE will need scientific advances in areas such as sensor technology. ERSD plans to release a call for field-based research that targets issues of monitoring and characterization in FY05 for FY06 funding. ERSD expects that the planned, integrated research program would have a specific emphasis on monitoring and characterization science. Such efforts exist currently in both the NABIR (e.g., the Assessment Element) and EMSP programs. While there are examples of integration between sensor development and the overall program (i.e., application of the Tulane University uranium immuno-sensor at the FRC), additional research in this area and associated integration into the overall program is needed and has been included in the most recent ERSD research solicitation. This area will continue to be included in subsequent solicitations.

Better integration of science and engineering and greater representation of combined science/engineering teams and approaches is needed.

ERSD agrees with this statement and feels that such integrated research is a major focus of the two major field efforts currently underway (FRC & UMTRA) and is an important component of several other projects (e.g., Tulane immuno-sensor and EMSI's at Penn State and Stanford). ERSD will encourage such collaborations in the upcoming field research solicitations.

Several projects were funded on arsenic, which is not one of the identified target elements. It should be noted, however, that in the wrap-up session with NABIR program managers, it was indicated that these projects were funded because of Congressional interest in the topic.

The COV is correct in both the observation and the justification for these projects. ERSD does not intend to continue funding arsenic research beyond the current commitments.

There is inadequate justification for funding researchers in other countries, such as Canada, the United Kingdom, and Denmark when there are researchers in the United States who are fully capable of doing the same types of analyses and who have appropriate background and expertise. As noted above, this reflects the concern that there may be insufficient efforts to attract domestic scientists to this program.

In FY04, foreign awards across ERSD research programs numbered six funding actions to four investigators, totaling $667k. This represents 0.6% of the ERSD budget and approximately 1% of the total number of ERSD funding actions for that year. ERSD funds research based on scientific merit without considering demographic, or in this instance geographic, factors (see 10CFR-605.10). In a situation where all factors were equal, ERSD would favor a domestic proposal over an identical foreign submission. However, in the absence of such a tie, funds are awarded to the project with the highest scientific merit as evaluated by panels of independent peer reviewers. ERSD does

recognize the COV guidance to enhance efforts to attract domestic scientists and will do so as outlined elsewhere in this response.

Several grant files contained documentation on fewer than the three requisite reviews, so the review process is not adequately documented for these applications.

Most files examined do not contain annual or final progress reports. Such reports are critical to evaluation of the success of individual projects and of the NABIR program as a whole, specifically with regard to whether or not key objectives within the NABIR elements have been met.
(both comments addressed below)

COV reviewers were provided with review summary sheets that were to be completed and left in each file that was reviewed. As a follow up to that review in the context of this comment, the NABIR files provided to the COV were examined by ERSD staff. ERSD provided twenty randomly selected NABIR files to the committee. The committee reviewed fifteen of those files. The review summary sheets indicate that the committee found seven of the fifteen files to be lacking either reviews or progress reports. Examination of the files showed that four of the seven were actually complete. This discrepancy is explained by several factors, including poor organization of materials within the file, awards that do not require progress reports (i.e., Oak Ridge Institute for Science and Education (ORISE) for support of proposal review process), or new projects that are not yet due for a progress report. Based on ERSD examination, three of the fifteen files were deficient in some aspect. Each of the three projects was last funded in FY03.

ERSD recognizes that maintaining complete, accurate and well-organized files is necessary for evaluation by outside reviewers such as the COV. Program managers have been reminded of the importance of maintaining funding files.

A number of grant applications were highly criticized in the written review comments but still received numerical rankings of 7, 8, or 9 (out of a possible 10). For some applications with lower rankings, the low rankings were not sufficiently justified by the written comments. Thus, in the files reviewed, the numerical rankings often did not seem to agree with the written comments.

While ERSD did not attempt to quantify the COV's contention of "A number of grant applications…" it is aware of, and does acknowledge this concern. The PeerNet system that is used by BER to manage proposal review allows reviewers to input comments and scores prior to as well as during the actual panel meeting. The program manager is able to monitor this process in real time. However, during the actual panel meeting, it is difficult to monitor changes in either comments or scores that may result from panel discussions. Program managers routinely remind reviewers to be sure that their comments reflect their scores and visa versa.

NABIR employs a numeric scoring system from 1-10, where an average minimum score of seven is required for a project to be funded. This system is explained to the review panel. It has been observed that this system's lack of clear reference points (beyond the

cutoff value of 7) results in discrepancies between "easy graders" and "hard graders". The EMSP program uses a different system where reviewers are asked to assign each proposal to a category of "Must fund", "Should fund" and "Don't fund". Generally, the "Must fund" proposals are selected for funding, while selection of proposals from the "Should fund" category is based on available funding and programmatic considerations, including: balance of technical areas (contaminants, bacterial species, etc) and providing opportunities for high-risk/high-payoff research. Projects categorized as "Don't fund" are not funded. These descriptive categories appear to be more obvious to reviewers and to result in a more consistent approach to scoring. NABIR will implement this system with its next review panel.

> *It is not clear that application declinations contain sufficient information for a PI either to be able to change or modify an application so as to make it ultimately acceptable to the NABIR program or to understand fully why it was not better received.*

BER uses external peer review for a number of reasons, including the need to make fair and unbiased decisions and to obtain the specialized expertise necessary to evaluate the technical content of each proposal. Program managers oversee the review process and manage the resulting projects, but it is the judgment of the review panel that provides the basis for either funding or declining a project. As a result, it is the comments of the review panel that explain the ultimate decision. The program manager is responsible for explaining this system to the review panel and for encouraging them to be informative in their comments in order to provide guidance for potential future improvements to a proposal. In addition, the program manager is responsible for evaluating the performance of individual reviewers. Reviewer's performance is evaluated by their ability to explain their decisions, for consistent evaluations and for reflecting scores with corresponding comments. Reviewers who perform well are likely to be used again, while reviewers who perform poorly are not.

Based on the preliminary report of the Climate Change Research Division (CCRD) COV, BER implemented a standardized system of notification for declined proposals. That system includes returning to the submitter verbatim comments (edited only to maintain anonymity, avoid *ad hominem* attacks and to avoid reference to other proposals) from the review panel. In addition, the submitter is informed of the reason for declination – i.e., lack of funds (meaning the proposal was fundable, but all funds were expended on higher ranked proposals) or insufficient scientific merit (meaning the proposal would not have been funded even if funds were available).

EMSP

Specific comments:

Documentation Available

> *The subcommittee found the documentation for award decisions to be incomplete. Most of the files for awards made to academic investigators contained concise, written justification for the award decisions. However, this was not always the case for awards made to investigators at National Laboratories. Additionally, the six applications that obtained a "middle" ranking by the review panels lacked written justification for final disposition. Thus, it was not possible for the subcommittee of the COV to determine why three of these latter applications were funded while funding was declined on the remaining three. The subcommittee of the COV recommends that a written justification for the program managers' decisions be placed in every file.*

The COV has identified the legacy of two systems that were involved in the EM Science Program. The mechanisms used by BER to fund university grants and national laboratory awards are significantly different; universities being funded through formal federal financial assistance mechanisms and national laboratories being funded through internal DOE transfer of funds. As a result, the type and level of documentation differed significantly between these to types of funding actions. In addition, prior to FY03 (and even in the early part of that fiscal year), funding actions for EMSP were handled by the DOE Office of Environmental Management, which uses yet another approach to funding national laboratories. As a result, the level of documentation for funding decisions to national laboratories in the EMSP program is highly variable. Since FY03, a consistent SC-based approach has been applied to all EMSP funding actions. In addition, based on the preliminary report of the Climate Change Research Division (CCRD) COV, BER implemented a standardized system to provide "concise, written justification" for all funding decisions – both university and national laboratory.

Regarding the selection of projects from the "middle" ranking (i.e., "Should fund"), ERSD agrees that these decisions should be documented in the funded folders. It is in this "middle" ranking category that program managers are required to exercise discretion to make selections among a group of potentially fundable projects. These decisions are made based on considerations of programmatic balance, but have not been documented in the past. For all future reviews, program managers will add explicit explanations for their selection of projects funded from this category to those files.

When the EMSP was managed by EM, applications were first reviewed for scientific merit by external, peer reviewers and were subsequently reviewed for "relevancy" by EM technical managers and engineers. Some project files contained evidence of the relevancy portion of the review process, but this information was missing for many of the 13 successful applications that were examined. No information on relevancy was present in the folders of the three unsuccessful applications that were reviewed. The subcommittee recommends that materials associated with a formal relevancy review should be placed in the file if such a review has been conducted.

The DOE "relevancy" review was phased out of the EMSP as the program transitioned from EM to BER. The level of documentation in projects funded during EM's ownership of the EMSP is variable and will be difficult to remediate. Beginning with FY04, "relevancy" review was discontinued and the BER review process, as described previously, has been applied.

It should be noted that EM continues to have a role in the selection of projects in the EMSP. Technical representatives from EM are invited to review those projects that are deemed to be fundable based on the results of the peer review. Input from EM technical representatives is considered by program managers in selecting projects for funding. This written input is included in the solicitation file. As discussed elsewhere, the specific rationale for selection or declination of a project will be included in individual project files. Input from the applied side of DOE is seen as an important consideration when selecting these projects. EM input has been constructive and has helped to focus ERSD's basic science program on the priority needs of EM.

<u>The Call and Submittal Process</u>

Requests for applications are well organized with a great deal of site specific technical information available in electronic form to facilitate the preparation of applications by members of the scientific community. Adequate time is allotted between issuing the request for applications and the deadline for submittal.

ERSD appreciates the COV's positive comments and will work to ensure that these aspects are maintained and extended to other elements of the research program.

The electronic submittal process is still inadequate and very difficult to use. DOE should seriously consider adopting a modified form of the electronic grant submittal program developed by the NSF. This latter package is now very robust and simple to use and may better serve the scientific community.

ERSD appreciates the COV suggestion. Currently, the SC system for accepting and managing proposals is under revision. However, this issue goes far beyond BER and this Division and will need to be considered at a higher organizational level.

The COV was surprised to find that in some instances existing investigators are notified that they may submit applications for renewal even though an open request for applications is not made to the scientific community. This practice is undesirable because it does not convey an atmosphere of "openness." Furthermore, by limiting a funding cycle only to renewals, the EMSP may be missing the opportunity to fund a more valuable application from a new investigator. The COV strongly encourages the EMSP to open up every funding cycle to competition for new projects.

ERSD has historically used the "renewal only" approach when the amount of funding available for future project support was less than that currently allocated to an element of the program (i.e., when it would not be possible to even support all of the current projects if all reviewed successfully). ERSD acknowledges that this does not demonstrate "openness" in the program and will follow the COV suggestion. That approach has already been implemented in the NABIR Biomolecular element call. There are twelve current projects that may choose to submit renewal applications, while funding is available to fund approximately six projects. The solicitation explains this situation, but is open to everyone. This approach will be used routinely by ERSD in the future.

The Review Process

Applications submitted to the EMSP are assigned to three panel members (one primary and two secondary reviewers) who each prepare a written review prior to the convening of the panel meeting. Written reviews are also obtained on an "as needed basis" if the program manager feels that a wider range of expertise is needed than is represented by the panel members. Review panels have been comprised of highly qualified individuals representing an appropriate range of: 1) technical specialties, 2) years of experience, 3) government versus academic affiliations, 4) geographic distribution, and 5) diversity.

ERSD appreciates the COV's positive comments and will work to ensure that these aspects are maintained throughout the research program. The approach described here for the EMSP program also is followed by NABIR.

The subcommittee was pleased that scientific merit played a dominant role in the determination of the fate of an application. Concomitantly, the subcommittee members recognize the need for consideration of relevance in the final determination of an application's disposition.

No response needed.

The time to decision appears to be appropriate, but the calendar time of the decision is often not optimal for the start of research projects at universities. Often the timing of an award requires that investigators wait one full year before they are able to recruit graduate students to work on research projects funded by EMSP.

It is assumed that the COV comment refers to the lack of synchrony between the federal fiscal year and the academic year. Funding schedules in ERSD are driven by the availability of funds and the need to expend those funds prior to the end of a fiscal year. ERSD is constantly pressured to minimize uncosted balances (i.e., funds allocated in one fiscal year, but carried across to another). Large uncosted balances are strongly discouraged by Congress and every attempt is made to reduce them. This generally

results in efforts to fund universities as early as possible in a given fiscal year (this typically means early November, after the beginning of the academic year). While this issue has not been raised routinely by university PI's, ERSD is sympathetic and could potentially initiate projects late in a fiscal year, using year-end funds if necessary. Alternatively, universities are able to charge a grant with expenses incurred up to 90 days prior to formal receipt of an award, which might help to alleviate this problem. ERSD program managers frequently work with PI's to resolve problems associated with the timing of an award.

The size of the awards has remained unchanged since the initiation of the EMSP. The actual size of the awards is small and may not be adequate to fund research at National Laboratories. The ERSD should consider increasing the maximum allowable size of individual awards and reduce the number of projects funded in a given cycle.

ERSD agrees with this recommendation. Beginning in November 2004, ERSD solicitations have increased maximum award limits.

It would be valuable if the PI of each application were to receive verbatim copies of technical reviews after sufficient information has been removed to maintain confidentiality. PIs should also receive copies of the relevancy reviews if applicable. Additionally, the COV feels that each PI should receive written notification from the program manager indicating the rationale for the decision to award or decline funding of his/her application.

The PI of each application, whether funded or declined, receives verbatim copies of peer review comments (edited only to maintain anonymity, to avoid *ad hominem* attacks and to avoid reference to other proposals). As explained previously, ERSD no longer conducts formal "relevancy" reviews. BER uses external peer review for a number of reasons, including the need to make fair and unbiased decisions and to obtain the specialized expertise necessary to evaluate the technical content of each proposal. Program managers oversee the review process and manage the resulting projects, but it is the judgment of the review panel that provides the basis for either funding or declining a project. As a result, it is the comments of the review panel that explain the ultimate decision. The program manager is responsible for explaining this system to the review panel and for encouraging them to be informative in their comments in order to provide guidance for potential future improvements to a proposal. In addition, the program manager is responsible for evaluating the performance of individual reviewers. Reviewer's performance is evaluated by their ability to explain their decisions, for consistent evaluations and for reflecting scores with corresponding comments. Reviewers who perform well are likely to be used again, while reviewers who perform poorly are not.

Based on the preliminary report of the Climate Change Research Division (CCRD) COV, BER implemented a standardized system of notification for declined proposals. That system includes returning to the submitter verbatim comments (edited only to maintain anonymity and to avoid reference to other proposals) from the review panel. In addition, the submitter is informed of the reason for declination – i.e., lack of funds (meaning the proposal was fundable, but all funds were expended on higher ranked proposals) or

insufficient scientific merit (meaning the proposal would not have been funded even if funds were available).

Information Management

> *The web-based information management system of the EMSP is excellent, but the information contained therein is not current. The COV subcommittee found that it lacked final reports on some previously funded projects. Nevertheless, the system contains a large amount of useful information on the reports and findings of the EMSP research portfolio. This information is extremely valuable to future PIs, DOE managers, and other stake-holders. The subcommittee recommends that the web-based information management system be brought up to date and maintained for the duration of the program.*

ERSD agrees with the COV's evaluation of the EMSP on-line database. That system's lack of currency is the result of a reorganization of the DOE grants process that "short circuited" the information transfer pathway. The Program Assistant for EMSP has now taken on the responsibility for collecting and transferring the necessary information to OSTI who manages that database. The EMSP database will be up to date in the next few months. ERSD has asked the DOE Office of Scientific and Technical Information (OSTI) to include all research projects funded by the Division in the database. That effort currently is underway and should be complete early in CY05.

Communication and Future Planning

> *The COV applauds the EMSP for its use of symposia at the American Chemical Society meetings and the series of sub-program workshops that it sponsors to maintain communication between EMSP investigators and with DOE site managers. The EMSP should consider inviting members of the scientific community that do not currently receive funding from the program to these workshops and symposia in an effort to expand its portfolio of investigators. This could be extremely effective in bringing young investigators into the program. Additionally, it would be helpful to sponsor symposia at other professional society meetings such as the American Geophysical Union, again with the intent of increasing the breadth of investigators participating in EMSP projects.*

ERSD appreciates the COV's positive comments and will work to ensure that these aspects are maintained throughout the research program. ERSD accepts the COV recommendations concerning expanded participation at programmatic workshops and will work to implement this recommendation within the current limitations on travel funds for technical staff. ERSD has committed funds to support workshops and technical presentations in FY06. This funding will be used to support "internal" meetings including ERSD investigators and site problem holders as well as to support special sessions or symposia in conjunction with national and international scientific meetings.

The establishment of EMSP lead scientists at Hanford and SRS is useful in facilitating information transfer between the scientific community and site managers. The EMSP should consider broadening this effort to other sites such as the Idaho National Engineering and Environmental Laboratory and the Oak Ridge National Laboratory.

ERSD agrees with this recommendation. Between NABIR and EMSP, the Division has a funded contact or "lead scientist" at most of the national laboratories that receive significant ERSD funding. INEEL is the exception to this rule and ERSD will work to establish some similar relationship with this laboratory in the near future.

The COV recognizes that the EMSP has just recently been transferred to SC/BER/ERSD from EM. It is critical that ERSD develops a strategic plan for the EMSP and the integration of the efforts done in this program with other ERSD program elements (NABIR, EMSL, and SREL). While integration of EMSP with NABIR may seem most obvious, EMSL and SREL could play important roles in the future of this program through the facilitation of laboratory and field measurements, respectively. In addition, there are programs in both DOE and other federal agencies that are directly relevant to the EMSP and ERSD. Communication and coordination with these programs should be maintained and, where appropriate, joint planning and program implementation should be carried out to optimize the use of EMSP and ERSD resources and to leverage investments of other agencies. The Office of Science and Technology Policy (OSTP) and the National Science and Technology Council (NSTC) can – and should – facilitate this process. Staff should participate in OSTP/NSTC activities where and when appropriate. Advice should continue to be obtained through workshops, BERAC, and other organizations including the National Academy of Sciences.

The ERSD agrees with the COV's recommendation and currently is engaged in internal discussions on ways to integrate the two research programs (i.e., EMSP & NABIR). It is also agreed that all elements of the program should be more fully integrated. Mechanisms for improving the integration of all ERSD programs into the overall ERSD mission are detailed elsewhere in these responses. ERSD agrees that communication and coordination within DOE and with other federal agencies is necessary and beneficial. ERSD plans to continue existing collaborations and to actively pursue additional possibilities as funding and staff workload permit. ERSD currently collaborates in the following areas:

- ERSD has significant interactions with the Office of Environmental Management (EM), particularly in the context of EMSP. Representatives of EM have participated in proposal reviews and currently are reviewing a draft solicitation for EMSP. ERSD also is involved in initial discussions that would result in an integrated research program, funded by both ERSD and EM to advance the science and technology needs for long-term stewardship.

- ERSD co-funds three Environmental Molecular Sciences Institutes (EMSI's) with the National Science Foundation. These multi-year, multi-million dollar collaborations examine some of the most important molecular-level questions associated with environmental management issues.

- ESRD funds the Environmental and Molecular Sciences Laboratory, a national user facility that has pioneered the development of collaborative work environments for multidisciplinary study of biological, chemical and physical

processes. The facility has hosted over 6000 scientists from academia, research laboratories and industry who use the advanced equipment, facilities, and capabilities in environmental spectroscopy, high field magnetic resonance, high performance mass spectrometry and molecular computing.

- ERSD represents DOE on the Interagency Working Group on Environmental Biotechnology. This working group currently funds a number of research projects on phytoremediation. ERSD continues to be a major partner and financial supporter of this effort.

- ERSD represents DOE on the Interagency Steering Committee on Multimedia Environmental Models (ISCMEM). This committee originates from a Memorandum of Understanding among ten Federal Agencies to facilitate cooperation and coordination in the research and development of multimedia environmental models. In FY05, ERSD will take its turn as chair of ISCMEM.

- ERSD is an active participant in the OSTP, National Science and Technology Council, Committee on Environment and Natural Resources (CENR) Subcommittee on Toxics and Risk Assessment.

- ERSD co-funds workshops and meetings with a number of other agencies and organizations. Examples of such collaboration include the NSF-DOE workshop, "Water: Challenges at the Intersection of Human and Natural Systems;" DOE-NRC Worshop entitled “Frontiers in Soil Science Research,” and the BER/BES/RW workshop “Development of Radionuclide Getters”

Environmental Molecular Sciences Laboratory

Vision

The current vision of EMSL as the "premier science facility of BER" needs to be carried to the next level of detail to guide resource investments and future emphasis. This need for more detailed planning is best accomplished in a partnership of BER and ERSD with EMSL and with the leadership of the Pacific Northwest National Laboratory (PNNL), at which EMSL is located. This was also identified as an issue by participants in the 2001 External Review of EMSL that was conducted under the auspices of BER. The "experiments" of the Grand Challenges research programs and the Collaborative Access Teams are exciting and may provide considerable insight as to the most impactful areas for EMSL. In particular, the question as to whether the appropriate balance should be skewed more towards large multi-user groups or more towards smaller groups and the identification of specific interdisciplinary areas on which to focus will be addressed, but the outcomes of these "experiments" are likely at least five years into the future. Additional strategic guidance is needed in the interim. EMSL and PNNL leadership must be made fully aware of the major expectations that ERSD has for the Laboratory, and any constraints associated with achieving these goals must be clearly articulated to, and by, both the Laboratory and BER.

ERSD agrees with the COV's concern that a more detailed and long-range vision is needed for EMSL. In a number of meetings and briefings between PNNL, EMSL and BER over the past six months, some issues for EMSL have been identified and discussed. As a result, SC has charged BERAC to conduct a broad review of the mission, programs, funding and operations of EMSL. Dr. Michelle Broido, a member of BERAC, has been selected to chair that review committee and currently is identifying committee members. That review is anticipated to take place in the first half of 2005. BER expects this broad review of EMSL to result in advice and insight provided to BER that will assist it in developing the recommended guidance and vision. Results of the review findings are expected to be implemented in FY06.

Replacement and augmentation of capital equipment

The original investment for instrumentation in EMSL was well over $100M. To continue to remain a state-of-the-art facility and to attract the kind of talent needed to advance interdisciplinary science, it is critical that this equipment be updated/replaced and supplemented on an ongoing basis. This need has been recognized by all involved, including BER and the 2001 review team. BER does not appear to have a clear plan for accomplishing this in light of what appear to be continued flat budgets. The guiding vision and bounding constraints of such a plan need to be articulated and shared with all involved. Since the budgeting process requires considerable time, this "equipment renewal plan" should include an interim plan for living within flat budgets and a longer term plan tied to the Strategic Vision discussed above that would open up new funding opportunities for significant recapitalization.

ERSD agrees with this finding. EMSL's value and unique capabilities result from the synergy of collaborative technical staff and state-of-the-art equipment. However those capabilities can not be maintained without a substantial and ongoing investment to "recapitalize" the laboratory. The reality of this situation is that in times of declining budget, ERSD has no mechanism to support such an investment without "new" funding allocations or major reductions to ongoing research programs. A request to SC for "new"

funding will need to be justified by a thorough and respected evaluation of the laboratory, its performance to date and potential for future accomplishments. That is the objective of the BERAC review discussed elsewhere in this section. The findings and recommendations of this review will greatly influence BER's decision as to whether or not to pursue additional funding for both capital investment and increased operations funding. ERSD also recognizes the potential timeframe associated with such a plan and will work within its budget, with BER and with PNNL to identify interim funding mechanisms to address critical near-term capital and operations needs.

Upcoming peer review

> *Either ERSD or BERAC will soon be conducting another external peer review of EMSL, and this will be a valuable opportunity for assessing the impact of the science conducted at EMSL and its success as a user facility. It is critical to EMSL's success as a user facility that it (a) attract some of the leading researchers in the respective areas addressed by EMSL and (b) that the problems chosen will have significant impact on the overall understanding of important science areas including those critical to DOE and other agencies funding the research. To provide both the quality of guidance and stature of the review that is desired, it is critical that reviewers be nationally recognized leaders in fields associated with the respective areas of EMSL. Given the demands on time and scheduling constraints of such leading researchers, planning for the review should begin about six months before the expected review date. Also, because a significant percentage of the research performed at EMSL addresses needs of BER's sister office, the Office of Basic Energy Sciences (BES), BES program managers should be invited to this review. Peer reviews of EMSL should continue on a regular basis, with three years as a suggested interval.*

SC has charged BERAC to conduct a broad review of the mission, programs, funding and operations of EMSL. Dr. Michelle Broido, a member of BERAC, has been selected to chair that review committee and currently is identifying committee members. That review is anticipated to take place in the first half of 2005. BER expects this broad review of EMSL to result in advice and insight provided to BER that will assist it in developing the recommended guidance and vision. Both ERSD and Dr. Broido are in agreement with the approach outlined in this comment and will work together to conduct this review.

Best practices for EMSL as a user facility

> *PNNL has made significant progress in identifying user models for EMSL. Given the complex nature of EMSL as a user facility and the large operational budgets required for EMSL, it is critical to extend this activity to a full benchmarking of EMSL operations, to include best practices and lessons learned from BES user facilities; formal benchmarking of EMSL policies, practices, and costs against selected other user facilities; and a review of the solicitation and review processes for allocating instrument and computer time.*

ERSD agrees with the need for a concerted effort to benchmark EMSL against other user facilities. The uniqueness of EMSL has been highlighted by past difficulties in identifying good models for such efforts. EMSL efforts to date to conduct such an exercise have met with limited success. ERSD will work with the BERAC review committee to assign responsibility and a timeline to this effort.

In addition to the above recommendations, the COV was concerned with the potential negative impact of the turnover in top level management at EMSL and PNNL on EMSL's performance. This is an area that BERAC or some other appropriate body might want to address.

ERSD shares the COV's concern regarding turnover in EMSL management. EMSL currently is without a permanent Director and PNNL has been conducting a nationwide search for that position. It is important to EMSL that that leadership position is filled with the appropriate blend of skills, experience and reputation and that the Director receives the necessary support from ERSD, BER and PNNL. The planned BERAC review of EMSL could include issues associated with this position and its frequent turnover.

Savannah River Ecology Laboratory

Specific comments

As a result of the transfer of responsibility for SREL from DOE-EM to DOE-SC, ERSD has instituted a process of review to align the SREL mission and projects with those of the Division. Both the external and internal reviews conducted by ERSD staff and external peer reviewers have been appropriate and comprehensive. These reviews provide valuable information for use in the development of a new cooperative agreement between UGA and DOE that ensures scientific alignment of SREL with ERSD; they should also allow metrics for research accountability to be included in the new Cooperative Agreement. The COV believes that both ERSD and SREL are making the requisite steps toward this goal of alignment and accountability. An accurate assessment of effectiveness and efficiency can not be determined until the new Cooperative Agreement is drafted.

ERSD appreciates the COV's positive comments concerning the SREL program. ERSD also agrees that developing the new Cooperative Agreement (CA, the funding instrument through which the SREL program is supported) will be an important step in codifying many of the agreements and decisions that have been reached over the past year. ERSD also agrees that the establishment of metrics for research accountability will be an important aspect of the new CA. The agreements reached with SREL to restructure its research program and to better align that program with the mission of ERSD are seen as positive steps and progress has already been made in this effort. The progress with SREL has been the direct result of regular and ongoing interaction among the ERSD, SREL and the Savannah River Operations Office (SRO). ERSD and SREL expect to routinely review the programs and progress of this activity. A new CA will be developed over the next year for implementation in the summer of 2006.

ERSD used an adequate number of external reviewers during the Programmatic Review conducted in November 2003. The Internal Review conducted in August 2004 similarly used an adequate number of SC staff members and led to explicit recommendations. The credentials of the reviewers, both external and internal, were of sufficient breadth to obtain an unbiased analysis of the SREL mission and projects. ERSD staff should be commended for the efforts taken to assess whether or not each individual project currently being conducted at SREL is in some way aligned with any aspect of the overall BER program.

Again, ERSD appreciates the COV's positive comments concerning its relationship with the SREL program. The progress in aligning this program with the ERSD mission has resulted from healthy, open and direct communications among the three concerned organizations (i.e., ERSD, SREL & SRO). ERSD has found this approach to be productive with SREL and sees it as a successful model for the management of other such projects.

ERSD has implemented an effective process for issues related to alignment and accountability, but difficult decisions remain to be made. Major transformation in the mission of SREL needs to be made to bring it into alignment with the DOE and the ERSD missions. In reviewing the documents provided at the COV meeting, the COV members noticed that there has been significant mission "creep" on the part of SREL; i.e., expansion of research projects without concurrent expansion of funding base and without clear applicability to DOE mission needs. Many of the ongoing projects do not relate to the ERSD mission. In addition to SREL moving its scientific activities closer to those of interest to ERSD, there should also be some expansion of ERSD interests to ensure that they encompass the capabilities and opportunities presented by SREL. These changes should be reflected in the next Cooperative Agreement.

ERSD agrees with this comment. ERSD will work with SREL through the development of the next cooperative agreement to better align the capabilities of SREL with the interests of ERSD. Identification of issues of misalignment was the first step in a process that is expected to lead to a mutually beneficial relationship between ERSD and SREL. SREL represents a research resource and source of expertise for environmental remediation issues that are not addressed elsewhere in the Division. With few exceptions, ERSD environmental research programs focus on subsurface contamination. SREL and its research program are ERSD's only investment in surficial science associated with environmental remediation. In addition, the radio-ecological components of the SREL program represent capabilities and expertise that are available in few other places. ERSD recognizes the mission "creep" and has encouraged SREL to merge its diverse research projects into a handful of integrated research programs that draw on the strengths and unique capabilities of the laboratory and its location. The results of that effort are currently under development by SREL.

These research topics have broad application to ERSD (as well as to aspects of CCRD). The resulting research proposals will be reviewed externally by panels developed cooperatively by ERSD and SREL. A subset of each review panel will be asked to continue in an advisory/review capacity to monitor the progress of the projects.

The SREL mission and research objectives should be redefined to meet its SC home, and specific performance metrics should be set for these objectives. There should be, at a minimum, annual mission and project reviews similar in scope and content to the external and internal program reviews conducted in November 2003 and August 2004, respectively. Based on review of documents provided, the COV is concerned that publications from SREL-based research are not, as a rule, in top tier journals nor of as high profile as would be expected of such a research laboratory. Higher expectations need to be set for publications that arise from ERSD-funded activities

ERSD agrees with the COV comments and will establish such metrics. ERSD also agrees that annual evaluation of progress is necessary to establish and maintain this new SC mission orientation. ERSD acknowledges the COV's concern for the overall quality and impact of SREL publications – the most tangible products of this research program. This measure of performance will continue to be monitored by ERSD.

The COV believes that the number of graduate students, and particularly so for postdoctoral fellows, at SREL is relatively low. Once the SREL mission is better defined and aligned with ERSD, SREL should consider more effective development and use of graduate students and fellows.

This concern was raised by the Programmatic Alignment Review panel in late 2003. SREL is a research organization within an academic institution and recognizes and values the role of graduate students and post-doctoral fellows in research programs. The geographic separation between SREL and the University of Georgia (UGA) make it difficult for full-time students to work at the lab. In addition, SREL argues that the role of professional technicians in long-term field studies is vital to the accurate and consistent collection of data. Nevertheless, SREL has acknowledged this concern and has agreed to seek ways to increase the use of graduate students and post-doctoral fellows.

SREL is currently overseen by three programmatic and administrative entities –UGA, SRS, and ERSD. Each of these entities has a different mission and set of responsibilities that conflict, creating problems for SREL. Lines of authority and responsibility need to be resolved in the next Cooperative Agreement. A key issue/question the COV developed and that must be resolved can be stated as follows: Is the ERSD program one of the scientific programs addressed by SREL scientists within their UGA charter OR is the SREL itself the program that is part of ERSD? In the former question, the mission of SREL is defined by UGA, and ERSD is just one of the funding agencies that supports research that SREL would undertake. Under this scenario, UGA would have the administrative burden (and all operation and maintenance responsibilities) for operation of the laboratory. SREL staff could also freely pursue other forms of external funding support ("work for others"). Under the latter scenario, ERSD has all administrative (and operations and maintenance) responsibilities and the official role of UGA is uncertain. This would also restrict the activities of SREL staff in their pursuit of external or "work for other" efforts as would be consistent with the restrictions at other National Laboratories

The COV eloquently described an aspect of the complicated relationship with SREL. ERSD agrees with the representation of this key issue/question regarding the relationship between ERSD and SREL. There are overlapping questions of authority and responsibility, both financial and administrative, to be resolved.

With regard to the issue of "work for others" or external funding from agencies other than DOE, the COV had a significant concern that because of the tremendous amount of salary support provided to SREL under the Cooperative Agreement, SREL scientists are unfairly advantaged over other academicians when applying for external funding. Put succinctly, DOE funding pays for SREL scientists to prepare applications to other funding sources, including supporting the acquisition of preliminary data that might be needed to be competitive. Such resources are not typically available to other academicians.

ERSD will work to resolve these concerns as part of the development of the new cooperative agreement.

ERSD should continue efforts to obtain budget detail for all activities undertaken at SREL. The COV agrees that budget information provided to date is insufficient to account for proper and effective expenditure of ERSD funds. Budgetary detail should be a major component of the next Cooperative Agreement.

ERSD agrees with this comment and expects the steps outlined in the response above to be an important step in that direction. Also, financial accountability will be a topic of discussion for the next CA.

The COV believes that ERSD should consider naming SREL as an additional Field Research Site in accordance with the findings and recommendations of the April 2004 assessment report prepared by a Subcommittee of the BERAC. Creation of a field site at SREL may lead to more effective and efficient development of SREL's mission and projects.

ERSD will consider this recommendation as it works to develop the next round of field research solicitations. SREL will be encouraged to apply to the upcoming solicitation for large-scale field-based research programs expected to be released in FY 05 and funded in FY 06.