

**REPORT TO THE  
BIOLOGICAL and ENVIRONMENTAL ADVISORY COMMITTEE**

**BY THE COMMITTEE OF VISITORS FOR  
THE REVIEW OF THE  
ENVIRONMENTAL REMEDIATION SCIENCES DIVISION**

**May 2008**

**List of acronyms used in this report:**

BER	Office of Biological and Environmental Research
BERAC	Biological and Environmental Research Advisory Committee
BES	Office of Basic Energy Sciences
COV	Committee of Visitors
DOE	Department of Energy
EM	Office of Environmental Management
EMSL	Environmental Molecular Sciences Laboratory
EMSP	Environmental Management Science Program
ERSP	Environmental Remediation Science Program
ERSD	Environmental Remediation Sciences Division
ESD	Environmental Sciences Division
FTE	Full-Time Equivalent
FY	Fiscal Year
GPRA	Government Performance Results Act of 1993
IFC	Integrated Field-Scale Subsurface Research Challenges
NABIR	Natural and Accelerated Bioremediation Research program
OPA	Office of Project Assessment
OSTP	Office of Science and Technology Policy
PART	Program Assessment and Rating Tool
PI	Principal Investigator
PNNL	Pacific Northwest National Laboratory
PNSO	Pacific Northwest Site Office
SC	Office of Science
SciDAC	Scientific Discovery through Advanced Computing
SFA	Scientific Focus Area
SREL	Savannah River Ecology Laboratory
SRS	Savannah River Site
UGA	University of Georgia

## Executive Summary

Dr. Raymond Orbach, Under Secretary for Science and Director, Office of Science (SC), on May 10, 2007, charged the Biological and Environmental Research Advisory Committee (BERAC) with assembling a Committee of Visitors (COV) to assess the processes used to manage the research portfolio in the Environmental Remediation Sciences Division (ERSD) of the Office of Biological and Environmental Research (BER) for fiscal years 2005 through 2007 (Appendix 2). As a result of this charge, 11 carefully selected scientists representing all major technical aspects of the ERSD portfolio, and from both universities and federal agencies, assembled at Department of Energy (DOE) Headquarters in Germantown, Maryland, from January 13<sup>th</sup> to 15<sup>th</sup>, 2008, to conduct a review of ERSD. The COV was split into two groups, one to assess the grant programs of the Environmental Remediation Science Program (ERSP) and their efficacy, and the other to assess ERSD's oversight of the Environmental Molecular Sciences Laboratory (EMSL). This COV also commented on the ERSD plan to implement the Science Focus Area (SFA) concept at national labs.

Concerning ERSD leadership over the last 3 years, Dr. Michael Kuperberg was the Acting Division Director over the majority of this time, and the COV feels that he did an outstanding job. Presently, ERSD has a rotating leadership, with each of the full-time ERSD program managers taking the lead over four month spans. This is also working remarkably well, a true testament to the excellent technical staff of ERSD. Nevertheless, this COV recommends that a permanent Division Director be put in place as soon as possible, and that the technical staff of ERSD be increased by one in response to having to implement SFAs, and at the same time dealing with an ever-increasing university generated proposal load.

It is readily apparent that travel funds are not sufficient for ERSD program managers. The COV feels that travel is particularly important to the applied science projects needed to fulfill the ERSD mission, such as visiting Integrated Field-Scale Subsurface Research Challenge sites, as well as attending science conferences like American Geophysical Union meetings.

The ERSP within ERSD currently provides about \$47M annually for funding research that concerns the monitoring, mobility, and remediation strategies of DOE-relevant contaminants. This COV found that all ERSP solicitations over the last three years are generally clear and appropriate. The proposal review process, proposal selection process for funding, and grant tracking are, for the most part, acceptable, and in many aspects, exemplary. Shortcomings are minor to occasionally moderate in importance, and include failure to obtain extra reviews when there are outliers in a set of scores for a particular proposal, and less than ideal documentation on accomplishments related to some contracts, particularly from national labs. The COV is very supportive of ERSD's efforts to include exploratory research in its portfolio and encourages the Division to continue the efforts in this regard.

ERSD also provides EMSL, a national user facility at the Pacific Northwest National Laboratory (PNNL), with a budget of about \$43M annually, and provides oversight management for this important and unique laboratory. EMSL is now 10 years old, and it has been a part of ERSD for approximately half of that time (since ERSD's formation in 2003). Despite management, oversight, and logistical problems with EMSL early on, this COV is pleased with both the present leadership and management of the lab. This COV provides a number of recommendations to continue to improve the efficacy of EMSL well into the future. These recommendations include reducing the amount of week-to-week oversight of EMSL by ERSD technical staff now that the lab is running well, and to put more time into helping to formulate EMSL's longer term strategy, as well as plans for recapitalization of major portions of EMSL equipment.

A significant programmatic change with ERSD is underway in the form of the SFA concept. SFAs mark a major departure from how national labs have obtained research funding from ERSD in the past. Responsibility for laboratory research programs will be generally shifted from an individual Principal Investigator (PI) to programmatic laboratory managers. This method of funding national labs has its benefits and pitfalls, but this COV is for the most part confident that ERSD managers will transition to the SFA model well. This COV strongly encourages vigilance in pushing laboratories to achieve the highest quality in research, to expand or contract lab contract size where appropriate, and to continue to encourage the addition of young and innovative researchers.

## Introduction

In 1993, the U.S. Congress enacted the Government Performance Results Act of 1993 (GPRA), an Act intended, among other things, to "... improve Federal program effectiveness ... [and] improve internal management of the Federal Government" (<http://www.whitehouse.gov/omb/mgmt-gpra/gplaw2m.html>). In 2004, the Office of Management and Budget developed the Program Assessment and Rating Tool (PART), a process used to provide formal ratings effectiveness of over 25 percent of Federal Government programs. In response to both GPRA and PART, the DOE SC implemented a number of strategic planning and evaluation processes, including the use of a Committee of Visitors (COV) program, to ensure that there are continuing improvements in the management of its research budget. The COV charged with the evaluation of the Environmental Remediation Sciences Division (ERSD) programs is the fifth COV established to review programs within the Office of Biological and Environmental Research (BER).

ERSD is one of three divisions within BER, the other two being Life and Medical Sciences and Climate Change Research. ERSD was formed in fiscal year (FY) 2003 by splitting two programs out of the (then) Environmental Sciences Division (ESD) within BER (the Natural and Accelerated Bioremediation Research [NABIR] program and the Environmental Molecular Sciences Laboratory [EMSL] user facility support program), and combining them with two programs from the DOE Office of Environmental Management (EM) (the EM Science Program [EMSP] and the Savannah River Ecology Laboratory [SREL]). The President's FY 2006 budget request consolidated two of these research programs (NABIR and EMSP) into a single research program for ERSD – now referred to as the Environmental Remediation Sciences Program (ERSP) [funding for the third research component, SREL, was terminated in the same budget request]. Since the FY 2006 consolidation, ERSP has released four research solicitations (06-12, 06-16, 07-18 and 08-09).

ERSD also has the responsibility for the oversight and management of EMSL located at the Pacific Northwest National Laboratory (PNNL). EMSL was originally conceived by PNNL in the late 1980's and early 1990's with support from the Office of Basic Energy Sciences (BES), although its stewardship eventually passed to BER. BER management oversaw the \$229M construction project during 1995 to 1997. EMSL began operation as a DOE National Scientific User Facility on October 1, 1997. EMSL has been operated by PNNL for the past 10 years.

On May 10, 2007, Dr. Raymond Orbach, Under Secretary for Science and Director, Office of Science (SC) of the Department of Energy (DOE), charged the Biological and Environmental Research Advisory Committee (BERAC) with assembling a COV to assess the processes used to manage the research portfolio in the ERSD of BER for fiscal years 2005 through 2007 (Appendix 2). In response to this charge, COV Chair Michael Hochella gave a great deal of thought to selecting the members of the committee. Criteria used to select the scientists that would make up this committee included international reputation, field of expertise, employer, location, gender, and

whether presently BER-funded, with the intent of finding a reasonable balance of members in each of these categories. Each prospective member was contacted by the Chair via telephone to discuss his/her willingness to serve, to inform him or her of the duties of the committee, and to review the process of the review. In the end, a COV was established consisting of 12 scientists from around the country, with representation from national laboratories (5), universities (5), and federal agencies (2). All had outstanding international reputations, and half, including the Chair, were not funded by BER at the time of the review. Two subcommittees of the COV were formed, with eight assigned the primary task of reviewing the ERSP portion of ERSD, three assigned the primary task of reviewing the EMSL management portion of ERSD, and the COV Chair overseeing both areas. One member of the EMSL subcommittee had to cancel at the last minute due to illness, resulting in an 11-person COV, and a switch of one member from the ERSP committee to the EMSL committee. The committee members, and their assignments, are shown in the COV membership list (Appendix 3). The COV met from Sunday, January 13<sup>th</sup> to Tuesday, January 15<sup>th</sup>, 2008, at the Germantown, Maryland, DOE headquarters building using the agenda also shown in Appendix 4.

For ERSP, the COV reviewed established programs of grants and other awards, addressing the (1) appropriateness of the solicitations issued; (2) quality and effectiveness of the program's merit/peer review procedures used to evaluate applications received in response to solicitations; (3) selection of reviewers; (4) process by which peer review and other factors are used to select those applications for which awards will be made; (5) appropriateness of the resulting portfolio of awards, with regard to scientific issues and geographic and demographic balance; and (6) management of the awards, once made. The COV was also charged with reviewing ERSD's oversight of EMSL. Finally, although not specifically mentioned in the charge by Dr. Orbach, this COV felt compelled to comment on the Scientific Focus Area (SFA) concept, a new paradigm that will be used by BER to fund programs at National Laboratories.

It is important to state that, although this COV worked in two subgroups to review both ERSP and EMSL, all text and comments below were discussed and agreed upon by the committee as a whole.

The COV would like to thank the technical and administrative staff of ERSD for their complete cooperation and warm hospitality throughout this review process. Each member of the ERSD staff was fully compliant in all phases of the preparation and execution of the review. They made the work of the COV both efficient and pleasant.

### **Leadership of ERSD**

For most of the period of this COV's review (FY2005-2007), Dr. Michael Kuperberg was serving as the Acting Director of ERSD (in the absence of Teresa Fryberger who was Director, but accepted a detail to the White House Office of Science and Technology Policy [OSTP] in FY2004). Dr. Kuperberg was appointed Acting Division Director from July 2004 through November 2006. This COV feels that

Dr. Kuperberg did an outstanding job as Acting Director during this time. He kept ERSD on a productive course through some challenging times during the Division's restructuring, critical funding redistributions, and the uncertainty of Dr. Fryberger's return.

Since November 2006, the Acting Division Director position has rotated among Mr. Paul Bayer, Dr. Michael Kuperberg (again), and Dr. Todd Anderson in 120-day increments. Dr. David Lesmes has been asked to be the Acting Division Director beginning December 24, 2007.

This COV found that this "rotating leadership," with each of the full-time ERSD Program Managers serving as Acting Director for 4 month stints, has worked remarkably well and is a testament to the very high level of skill, collegiality, and professionalism of the ERSD staff. The next Division Director (whether an internal or external hire) will be fortunate to have such a cohesive and high-performing group. This COV anticipates that this productive and participative work environment will be maintained.

This COV feels strongly that ERSD, EMSL, and the broader researcher community will be best served by a permanent Division Director and urges BER to move with all possible speed to fill this vacancy. This is particularly important at a time when the ERSD may be rethinking EMSL management and oversight, transitioning to SFAs for national labs, and further developing its strategic plan.

### **Staffing of ERSD**

The 2004 COV in 2004 recommended additional technical and support staffing. Those positions are now filled and are clearly making major contributions to the work of the Division. Ms. Kim Laing, an administrative assistant handling ERSP grant and lab project files, among other key organizational duties such as the logistics surrounding PI meetings, is crucial. The COV was pleased to see the improvement in program documentation enabled by this proficient staffer. Ms. Terry Jones, secretary, has also been outstanding in her duties including SERDP activities and meeting coordination.

Going forward, this COV recommends at least one additional technical staffer in addition to the present Division Director and six Program Manager full-time equivalents FTE's. A net increase in Program Managers would also allow the addition of complementary expertise (geochemistry stands out as a critical area). Some key justifications are:

- Change in funding strategy for the National Labs – to be most effective, the SFA and the Integrated Field-Scale Subsurface Research Challenges (IFCs) at National Laboratories will need active and involved management from ERSD technical staff. BES and other SC offices may have useful models for oversight of similar programs already in place. Developing and implementing the oversight plan that

strikes this balance will require significant investments of both time and intellectual energy. This is a critical task and cannot be deferred.

- The proposal response to the annual calls – these have not decreased, even though the national lab PIs are no longer submitting proposals. This indicates a significant expansion in the academic community’s interest in ERSD projects.
- The need for ongoing management and oversight of EMSL – this is particularly the case due to the increased reporting requirements for the advanced computing facility.
- ERSD staff involvement in several intra- and interagency working groups – this involvement is both critical and time-intensive.

### **Travel for ERSD Technical Staff**

It quickly became apparent to this COV that ERSD technical staff did not have the travel funding necessary to allow them to visit national labs, universities, technical conferences, IFCs, and at times even EMSL with the frequency that this COV would consider healthy, both for the staff and the people that they are visiting. This COV feels that travel is particularly important to the applied science projects needed to fulfill the ERSD mission. This COV recommends that BER management look into ways, and get around obstacles, needed to get more travel funding to ERSD’s technical staff.

### **General Comments on Proposal Handling, Review, Selection, and Administration**

This COV spent most of its time on the 2006 ERSP calls 06-04 (Scientific Discovery through Advanced Computing; SciDAC) and 06-12 (Environmental Remediation Science Program; ERSP), and less on 2005 calls 05-05 (NABIR) and the EMSP competition. The latter programs (NABIR and EMSP) are no longer in place; the 2006 calls and administration are more representative of how ERSP is run today. In this section, general comments are given about these solicitations. The sections that follow give more detailed comments specifically on calls 06-04 and 06-12.

In general, all solicitations reviewed seemed clear and appropriate – they spelled out tasks of interest to ERSD, as well as tasks that were clearly not of interest. The SciDAC solicitation was complicated and in places a bit confusing. Future SciDAC calls (if any) will have to carefully communicate the desired balance between “code development” and “science.”

The solicitations resulted in well over 200 pre-applications (pre-apps), submitted via email. Each of these pre-apps was read by at least two ERSD staff members, and sometimes as many as four. The staff responses (encourages or discourages for full application) and comments were communicated to the PI. In general, the response and



comments appeared fair and consistent with the call. In cases where marginal pre-apps were received, the comments were clearly constructive and helpful.

The process of handling these pre-apps appears a bit impromptu – emails are forwarded among the Program Staff, adding comments at various steps – but the product feedback to the PI is consistent with solicitation, fair, timely and of high quality. The Program Support staff is clearly doing a great job in facilitating and documenting this process.

In general, the COV found that the review process for pre-apps and full proposals was thorough and fair. Some general comments and suggestions follow:

- ERSP proposals are mostly reviewed by a selected panel. The selection of panelists and the assignment of these proposals to the panelists with appropriate expertise is fine.
- There is some use of “remote panels” (panels that do not physically meet) and additional mail reviews. Both of these appear well-implemented to respond to smaller groups of proposals in a technical area, or proposals that were not easily accommodated within a panel.
- Most proposals had 3-4 reviews. Some had more reviews, in particular mail reviews to augment the panelists’ expertise. There were a few proposals that had only two reviews. While having only two reviews might not *necessarily* compromise the thoroughness or fairness of the review process, the Program Managers need to be especially careful in these cases, and the COV believes that they are.
- The written reviews, in general, are thoughtful and specific, providing high quality advice to the Program Managers and the PIs. There is a heavy reliance on track record of the PI, although this is often expressed in boilerplate comments in the review.
- It is sometimes hard for COV members to understand the range of review scores. This may be related to an individual’s scoring preferences, and is not directly under the control of ERSD staff, but we encourage the Program Managers to continue to work towards consistency by seeking extra reviews when there are outlier scores.
- The relationship between the “average” score and the qualitative reason for declination (lack of technical merit vs. lack of funds) was not always obvious to the COV members.
- From 2005 (NABIR, EMSP) to 2006 (ERSP), there is a clear increase in the quantity and quality of the internal documentation for proposals. The COV applauds this and encourages the staff to continue improving this critical need.

- There is evidence for an appropriate level of Program Manager discretion in selecting proposals for funding. For programmatic reasons, some highly scored proposals were not funded, and some lower scored proposals were funded. The documentation for these cases is sometimes terse, but generally sufficient especially in the 2006 calls.
- In the 2006 SciDAC call (06-04), the addition of a few sentences of Project Manager comments (often reflecting significant discussions among the ERSD staff) to internal documents for declinations was great. Extending this from the relatively small number of applications in SciDAC to larger calls has significant workload implications, but the COV members feel that ERSD should consider this practice for each call, especially if the ERSD technical staff is increased as suggested.
- All PIs received review comments and a letter with a reason for declination (lack of funds, insufficient technical merit). Providing additional written feedback to the PIs does not seem to be common BER practice. The Program Managers emphasize that many PIs contact them by telephone and get additional useful information and context. These telephone calls are clearly very useful for the PIs, but new or inexperienced PIs may not know that useful advice is readily available. Minor wording changes on the declination letter might encourage the PIs to take advantage of the opportunity to speak with a Program Manager.
- The guidance given to reviewers with regard to numerical scores varies somewhat for different solicitations, but is generally consistent in that a score greater than 7.0 is considered a fundable proposal from the point of view of scientific/technical merit (“Very Good” or “Should Fund”). For the 05-05 (NABIR) solicitation, the declination letters are consistent with these scoring categories. Any declined proposal with aggregate score > 7.0 was noted as declined “due to insufficient funding” while those with 7.0 or lower were declined “due to insufficient technical merit.” However, in the declination letters for other solicitations there are a fair number of proposals which received average review scores greater than 7.0 but for which the reason for declination was given as “insufficient scientific and/or technical merit.” It seems that the letters to the PIs should in fact indicate that these were declined due to insufficient funding given that they scored in the fundable range (“Should fund”). The letters could also indicate that some scientific/technical concerns placed them lower than other proposals that were funded. Examples of proposals for which scores were greater than 7.0, but the declination letters cited lack of technical merit as the reason, include: 1) four 06-04 SciDAC proposals which had average scores greater than 7 (7.13 to 7.17); and 2) one 06-12 ERSP exploratory proposal that received an overall rating of 7.3, equal to the score of another proposal that was funded.
- The 2004 COV voiced a concern that the ERSD community could become insular. They suggested that ERSD consider how to ensure that the community

remained open to new approaches and new people. ERSD responded by instituting a new category of Exploratory Awards to the 06 ERSP calls, and this continues in the 07 and 08 calls. The COV is very supportive of ERSD's efforts to include exploratory research in their portfolio and encourages the Division to continue its efforts in this regard.

- Concerning the oversight of awards, the contracts to universities use a standardized format with essential information (narrative, publications, future plans). Program Manager review of university reports, and the financial oversight of these contracts, seems appropriate and sufficient. For National Laboratory contracts, reporting is sometimes spotty and inadequate. The National Lab narratives did not appear to have minimal report requirements – in some cases, the progress report was a narrative that summarized the original proposal and in some files there was no paperwork on progress that supported the continuation of funding. ERSD might consider developing a list of expectations for the national lab progress reports that includes some of the content required for universities/industry to better manage and justify funding continuation. The COV recognizes that the shift toward program area funding to the laboratories is underway, but historical observations suggest challenges that ERSD staff members might consider as they develop strategies related to future management and review of programs that are larger and more complex than the individual research projects.
- The COV recognizes that the annual PI meeting is a significant component of monitoring and reviewing progress. Unfortunately, there is no documentation in the file related to this type of management and progress review. If an annual meeting is to be a major element in oversight and management, then ERSD should consider developing a process to document this in each awardee file. This could be as simple as a checklist that identifies the project and PI, provides a checkbox related to progress, and has an area for a short summary sentence or two – this could be placed in the file upon return to ERSD offices.

#### **Specific Comments on ERSP 06-04**

- In this call (SciDAC-II, Groundwater reactive transport modeling and simulation), approximately 12 of 16 (75%) had lead PIs from National Labs. The remainder had a University lead with a National Lab participant.
- After review and evaluation, two proposals were funded (12%) – both with lead PIs from National Labs.
- In general, the review process and decision-making for the SCIDAC efforts was well run, fair and defensible. In this program, clear summaries of the successes and declinations were generated and maintained as a cover sheet in the files.

These summaries were provided in a standard fashion, in a useful format, and (for declinations) under the correct declination category. While this SCIDAC call comprised only 16 proposals, the COV supports this type of documentation and encourage generating such summary statements for all of their research calls including larger calls containing more proposals such as ERSP. Further, the COV recommends that ERSD consider, where possible, including these summary statements in the declination letter to the PI.

- These particular awards were relatively large (> \$6 million). For programs of this size, ERSD needs to be particularly cognizant of potential issues associated with proposal ranking using only four reviewers. This is particularly significant here because it appears that some of the reviewers were subject matter experts (*e.g.*, “visualization”) who were asked to look at their subject area and appeared to score proposals low if they did not contain a significant content in that subject area. In a few cases, this led to some challenging issues – for example, proposal 101305 received scores of 10, 9, 9, and 3. Even with the low score this proposal was third overall and ERSD appropriately included it as competitive and fundable and ultimately identified the reason for declination as lack of adequate funding. A second proposal (101339) also appeared to be impacted by a divergent score (8, 7.5, 9, and 4). In this case, the divergent score lowered the proposal from fourth to seventh position. The file documented appropriate reasons for not funding this particular proposal, but this type of influence of a single reviewer needs to be carefully monitored and approaches to address potential concerns developed to assure fairness. This might include obtaining another opinion or two when the standard deviation of the average review score exceeds a certain value. This is particularly important for programs such as this SciDAC call where the PI and co-PI’s have been required to invest significant resources in the preparation of a large multi-organizational proposal.

### **Specific Comments on ERSP 06-12**

- The review process and proposal selection for this call, involving innovative field scale remediation research, appear to be generally defensible and fair.
- Five of the relatively highly rated proposals that were not funded were in part due to potential overlap with Notice 06-16 (large field research centers). We feel that this was an appropriate decision for the ERSD staff to make and many of those PIs were ultimately funded through the 06-16 call. Were these investigators informed at the pre-application stage? Note that proposal 103098 was funded and re-scoped to support the new field research center that was established at the Hanford 300 Area. It is unclear why this project was not included in the 06-16 grouping and/or funded by Hanford or the recent Columbia River supplemental applied technology funding allocated by Congress.

- Two stable isotope proposals were funded (including work with H, O, S, Cr, and U stable isotopes) resulting in a relatively high weighting in this area. This is defensible given that additional interdisciplinary field site research was/is being encouraged in the 2007 and 2008 programs.
- An example of a concern is that a few proposals had ratings from reviewers that were dramatically different. Examination of one of these (103166), as an example, suggested that ERSD might want to look at such proposals carefully to see if they include ideas that might have the potential to expand the conceptual diversity of the ERSP program. In this case, the proposal examined processes occurring at the vadose-groundwater interface. Because this is a truly complex setting, research at such interfaces is a valid target for SC, but it may have been scored lower by some reviewers because it is not the standard setting for ERSD research. Several reviewers scored this proposal highly and it was obviously of a good technical quality. This case highlights the potential value of an ERSD staff strategic examination of proposals with a large scoring spread, and again, like in the SciDAC call, obtaining more reviews.
- The contractual documents related to funding, monitoring and oversight of the research was better documented for the university proposals than for the DOE laboratories (there has been insufficient time for these projects to determine how the monitoring will perform over the typical 3 year cycle). For universities, standard language was included that required progress reports that included (among other things) a reporting of “progress compared to the planned tasks for the reporting period . . .”. While this is presumed for all cases, some of the DOE laboratory arrangements do not explicitly address what will be monitored (*e.g.*, papers and a final report with technical and progress reports as required by DOE). As future funding shifts toward the labs receiving “Scientific Focus Area” funding rather than individual proposals, the monitoring management and review process will need to be structured to assure that ERSD goals are met and to assure quality and efficacy.
- The letters to the PIs for each of the declined proposals appropriately include the peer review comments. It is not clear from the file documentation that the PIs for the funded proposals received the peer review comments. The COV encourages communication of the peer review comments related to the funded proposals and, as appropriate, requiring the PI to respond to the comments and adjust the planned research tasks.

### **ERSD’s Oversight of EMSL**

*Background* – The 2004 COV review of ERSD included an assessment of ERSD’s management of EMSL. This COV met in October 2004, and identified four issues that ERSD management needed to address as part of their oversight of the EMSL facility. These issues included vision, recapitalization plans, the pending 2005 peer

review of EMSL, and best practices for a user facility. In November 2004, Dr. Raymond Orbach asked BERAC to provide advice on the mission, operation, and future plans of EMSL. Because the charge letter from Dr. Orbach included questions with regards to both the financial and scientific operation of EMSL, the decision was made that two reviews, one from BERAC and one from the Office of Project Assessment (OPA), be conducted simultaneously. This “two-headed” review was conducted in May 2005 and identified substantial deficiencies in the operations and management of EMSL. Issues identified by the “two-headed” review reiterated the 2004 COV issues and included a number of recommendations for improving the management and operation of EMSL as a user facility. As a result of the rather unfavorable review conducted in 2005, ERSD initiated major changes in its management of the EMSL facility. Finally, in 2006, a subcommittee of the BERAC was charged by Dr. David Thomassen, Acting Associate Director of Science for BER, with conducting the Follow-on Management and Operations Review of EMSL. The purpose of the 2006 review was to assess the appropriateness of the EMSL response to the management and operational findings and recommendations from the May 2005 DOE OPA review and the corresponding May 2005 BERAC review findings. The 2006 Review Committee was highly impressed by the responses of EMSL staff, PNNL, and the Pacific Northwest Site Office (PNSO) to the serious concerns raised by the May 2005 review committees.

On January 14 of this year, the EMSL subcommittee of this COV met with ERSD management and the director of EMSL, Dr. Allison Campbell, and had an opportunity to review all historical program management documents including the 2004 COV review, the 2005 BERAC/OPA “two-headed” review, and the 2006 BERAC follow-on review. The COV was satisfied with the initial response of ERSD management to the 2004 COV comments. Nevertheless, it is clear that the necessary changes in operations and management of EMSL occurred only after the completion of the 2005 “two-headed” review. The COV comments of 2004 as well as the substantial changes in response of the formal EMSL reviews of 2005 served as a strong catalyst for significant operational and management changes, and these subsequent improvements required a substantial effort by the ERSD management team. The broad changes brought up by the 2004 COV were implemented subsequent to the 2005 review. A common vision was established among ERSD, EMSL, PNSO, and PNNL organizations, recapitalization discussions were begun, and EMSL management undertook benchmarking exercises relative to several other DOE user facilities.

The present COV recognizes the significant changes that ERSD and EMSL management instituted during the last four years in response to the various reviews. Major changes in operational procedures, management tasks, and the institution of metrics have helped in progress toward achieving the vision of EMSL as an integrated user facility. The COV first provides the following general comments and then lists several recommendations.

#### *Comments*

- The COV is impressed with the success of Dr. Campbell as the new EMSL director and the transition into a stable management and operations structure at

EMSL. The COV expects the management structure to remain in place and to maintain the newly adopted vision for overall laboratory excellence.

- The COV would like to congratulate the ERSD managers on the successful implementation of new measures following the scientific and operations EMSL review of 2005. Newly implemented management policies and the oversight of the EMSL operations have contributed to the revitalization and refocusing of the EMSL mission by its management team.
- Since the 2005 “two-headed” review, the EMSL director has been having weekly conference calls with two ERSD program managers. These conference calls include Dr. Campbell’s science team every other week. The ERSD managers stated that they visit EMSL at least twice per year. This includes what was called “deep dives” in which ERSD managers engage specific science program leads and tour their labs, meet with users, etc. As part of the overall management strategy, Dr. Campbell is also in contact with DOE-PNSO on a regular basis.
- Consensus with respect to the EMSL mission statement exists among key management agencies; however, the COV recognizes an incongruity between the lab mission statement and the practical realization of *integrated* experimental and computational user efforts.
- In discussion with ERSD managers, the COV requested information on plans for capital equipment refreshment at EMSL. ERSD managers described the rather unstable nature of funding allocation, primarily resulting from complexities and long-term funding schedule requests necessary for OMB. ERSD is in the process of developing a “goldbook” that outlines, in broad terms, the EMSL’s capital equipment needs based on scientific themes. ERSD also provided lists of five-year capital equipment purchase projections for OMB in the years 2005 and 2007. However, the process used to develop these lists was not documented, nor did it become clear to the COV how ERSD managers actually accomplished this task.

#### *Recommendations*

- While the present rigorous oversight structure was agreed upon early after the critical review received in 2005, and has been implemented and executed very well, the COV believes that the recent operational and programmatic successes at EMSL allow for a revision of the scale and scope of oversight. ERSD managers should consider reducing operational oversight that will allow them to focus more on moving EMSL along its path towards fulfilling its scientific mission, as well as strategizing long-term oversight and concentrating on EMSL program development.
- Based on the COV’s discussion with ERSD managers, it is apparent that Mr. Paul Bayer and Dr. Michael Kuperberg have led ERSD’s management effort at EMSL. However, it was not always clear whether this management chain existed for historical or other reasons; except for Mr. Bayer’s lead oversight of the EMSL

supercomputer, management roles and responsibilities were not clearly identified as far as the COV can ascertain. Some of this uncertainty may result from the fact that the four ERSD program managers must rotate into the acting division director position on a 120 day cycle. Nevertheless, we recommend a more clearly defined management chain, and believe that this is particularly important for a program in which many organizations are involved (ERSD, PNNL, DOE-PNSO, EMSL).

- While ERSD and EMSL management have made great strides in the management, operations, and scientific excellence of EMSL, it was evident to the COV that few, if any, *integrated* computational/experimental user projects were being supported at EMSL. Development of a user community with interests in both of these world class facilities at EMSL needs to be cultivated if EMSL's full mission is to be realized.
- Essential to assessing EMSL's progress towards becoming an "integrated" computational and experimental user facility is the establishment of metrics. EMSL users are tracked for their use of multiple experimental instruments, and the use of multiple facilities is encouraged. However, it was not apparent to the COV whether EMSL is tracking or giving preference to users requesting *both* computational time and experimental facilities. This metric should be particularly important given its inclusion in the mission statement of EMSL.
- The COV strongly encourages ERSD managers to develop a clear and documented process, updated on an annual basis, for EMSL capital equipment purchases, with justifications based on the scientific themes and mission of EMSL (and based on the vision developed in the "goldbook"). With an annually updated and justified capital equipment purchase document, ERSD and EMSL managers will be better prepared to address uncertain and temporally variable capital equipment purchase opportunities. This will also ensure that capital equipment requests are well justified and aligned with the mission and trajectory of EMSL agreed to by both EMSL and the ERSD management.
- The COV asked ERSD managers about opportunities to improve EMSL management based on experience available in BES and other BER divisions. ERSD suggested that the unique nature of EMSL as a user facility made it difficult to compare to others in BES. While EMSL may be unique as a user facility, some cross-fertilization between ERSD and other facilities is encouraged. In this spirit, the COV encourages ERSD to better document their interaction with other BER divisions and BES in discussions relevant to management, funding, recapitalization, user access, and other user facility operations.



## Scientific Focus Area (SFA) Concept

A substantive programmatic change is underway that impacts the interpretation of COV comments and future responses. Specifically, future research calls will be to university and industry only and several identified DOE labs will be funded (based on historical precedents) within broad scientific focus areas. This new paradigm recognizes the fact that the research enterprise of national laboratories is fundamentally different than those in place at universities and within industry. The initial target SFA DOE lab funding levels will be based on historical precedents and individual labs will be encouraged to develop integrative programs that strongly advance ERSD goals and to maintain levels of collaboration with universities/industry. There are many potential benefits and advantages to the transition to integrated focus areas and there are also potential pitfalls – particularly related to assuring project management monitoring toward the ERSD objective.

*The COV believes that the current ERSD technical staff is cognizant of the issues related to transitioning to a SFA approach, the staff members recognize the challenges, and they have every intent to keep the program fresh and refreshed, and to maintain the highest science quality possible.*

The COV identified some of the transition issues, both positive and negative, based on reviewing the ERSD files from the past three years. The COV encourages ERSD staff members to consider these comments as they develop their management and review infrastructure for the future.

- A primary goal of the new SFA paradigm should be to allow the national laboratories to fully express the capabilities that national laboratories have that universities and industry do not. Similarly, this new paradigm for ERSD should encourage work that is best and most efficiently performed at universities/industry to be done by universities/industry.
- The paradigm change encourages integration and the development of comprehensive solutions – particularly in combination with the field scale research sites. The SFA approach should encourage integrative and collaborative observation and modeling – *e.g.*, testing hypotheses that jointly include fundamental observational and modeling principles. Conversely, the national laboratories will not be required to document with specificity a scientific concept or idea (as is required for a traditional funded research proposal). In the new paradigm, responsibility for the program is shifted from an individual PI to programmatic laboratory managers – these managers need to be accountable for both funding and performance.
- The documented “encouragement” by ERSD to maintain levels of collaboration with universities/industry is appropriate and negotiation of low overheads associated with this type of “pass-through” money is viewed as a positive step by the COV.

- This COV supports expanding the SFA program through initiatives and to allow new labs into the program if they are (or become) competitive.
- To achieve SFA goals, ERSD needs to carefully develop and implement program management and review, with documentation and metrics that consider the following (this type of documentation will be important to future COV panels):
  - *Policies and procedures* for monitoring and reviewing performance and funding.
  - *Clear management approaches* that can be used to modify funding profiles based on performance and to contract (or expand) programs as needed.
  - *Levels of external collaboration*, including specific metrics for industry, universities, and other organizations (*e.g.*, national laboratories that are not SFA laboratories).
  - *Programmatic diversity and openness*. These are expected to assure that diverse scientific approaches are included. Within the SFA laboratories, metrics are needed to encourage participation of (and funding for) new and young investigators as well as expansion of this externally to student programs.
  - *Cross fertilization and avoiding insularity*. Metrics need to be developed to assure the application of scientific work from other SFA laboratories and universities.
  - *Programmatic integration of the SFA efforts with the integrated field challenge sites (and other controlled field sites)*.

## **APPENDIX 1**

### **History and Overview**

#### **Environmental Remediation Science Division**

## History and Overview

### Environmental Remediation Sciences Division (ERSD)

The Environmental Remediation Sciences Division (ERSD) resides within the Department of Energy (DOE) Office of Science, Office of Biological and Environmental Research (BER). ERSD is one of three divisions within BER (Figure 1 below). BER's three divisions are: [Life and Medical Sciences](#), [Climate Change Research](#) and [Environmental Remediation Sciences](#).

The mission of the Environmental Remediation Sciences Division is to “advance our understanding of the fundamental physical, chemical, and biological processes that control contaminant behavior in the environment in ways that help solve DOE’s intractable problems in environmental remediation and stewardship.” The Office of Management and Budget (OMB) evaluates ERSD’s progress in this mission through a long-term PART measure. The Federal Program Assessment Rating Tool (PART) was established to provide consistent performance ratings and guide budget decisions across the Federal government. ERSD’s long-term measure is to: *provide (by 2015) sufficient scientific understanding such that DOE sites would be able to incorporate coupled physical, chemical and biological processes into decision making for environmental remediation and long-term stewardship*. All projects funded within ERSD are viewed in the context of this long-term measure as are all other programmatic decisions.

ERSD was formed in fiscal year (FY) 2003 by splitting two programs out of the (then) ESD within BER (the Natural and Accelerated Bioremediation Research [NABIR] program and the Environmental Molecular Sciences Laboratory [EMSL] user facility support program), and combining them with two programs from the DOE Office of Environmental Management (EM) [the EM Science Program ([EMSP) and the Savannah River Ecology Laboratory (SREL)].

**NABIR** – The Natural and Accelerated Bioremediation Research (NABIR) program was “home grown” in BER. In 1994, because of the advancements in genomics stimulated by the Human Genome Program (HGP), the discovery of microbial activity at depth through BER’s Deep Subsurface Microbiology subprogram and EM’s successes in bioremediation efforts from their Integrated Program and Integrated Demonstration projects, the DOE national labs established a Biotechnology Interlaboratory Council (BIC). The BIC and EM’s Strategic Laboratory Council (SLC), along with recommendations from DOE-sponsored American Academy for Microbiology Colloquia and NRC workshops, prompted DOE to form a team of scientists to write an overarching plan for bioremediation in BER. This plan was extensively reviewed and finally used as implementation guidelines for the NABIR program which first officially solicited proposals in 1997. NABIR’s goal was to provide the scientific understanding needed to use natural *in situ* processes and to develop new methods to accelerate those processes for bioremediation at DOE sites. NABIR was initially organized around seven Science Elements: Acceleration; Assessment; Biogeochemical Dynamics; Biomolecular Sciences and Engineering;

Biotransformation and Biodegradation; Community Dynamics and Microbial Ecology; and Systems Integration. An important component of the program was the intent to establish three field research centers for providing DOE-relevant samples and for conducting *in situ* research. In addition, informed by the Ethical, Legal, and Social Issues (ELSI) program component of the Human Genome Project (HGP), NABIR also formed a comparable component called “BASIC” (Bioremediation and its Societal Implications and Concerns) to address expected issues resulting from research on biological approaches to environmental remediation that might include research on genetically modified organisms. NABIR was envisioned as a \$90M annual program with application to all critical DOE contaminants, both inorganic and organic, and media (subsurface, surface and aquatic sediments). Over the subsequent 8 years, the program’s funding varied over time, but was never more than \$25M per year. The funding constraints required a reduction in scope to focus on those contaminants unique to DOE (i.e., radionuclides and selected non-radioactive heavy metals), and the subsequent establishment of only one Field Research Center on the Oak Ridge Reservation in Tennessee. The NABIR program provided new insights into the understanding impact of biological processes on subsurface contaminant mobility. NABIR also championed the application of cutting-edge molecular biology techniques to the understanding of environmental microbiology.

**EMSP** – The Environmental Management (EM) Science Program (EMSP) began in FY 1996 as a \$50M per year, Congressionally-mandated, merit-review based program funded within the DOE Office of Environmental Management. By direction of Congress, it was jointly managed with the DOE Office of Science (SC, then the Office of Energy Research, ER) and EM. EM has the Departmental responsibility for environmental cleanup of legacy waste within the nuclear weapons complex, while ER was the fundamental science arm of DOE.

Estimates of the total extent and liability associated with DOE’s environmental remediation responsibility have varied widely. However, even conservative estimates in 1996 cited hundreds of billions of dollars and many decades before the task would be completed. Thus EMSP was created to support research that would lead to significantly lower cleanup costs and risk; and to bridge the gap between basic research (i.e., ER/SC) and need-driven applied technology development (i.e., EM). EMSP research proposals were solicited broadly from the scientific community and were peer reviewed by panels of scientists from outside DOE using SC’s scientific merit procedures. Those proposals that were judged as scientifically meritorious were then evaluated for relevance by EM staff. Proposals that received favorable merit and relevance evaluations were then discussed by a joint SC-EM committee of program managers, which made recommendations to the heads of SC and EM for funding. Annual research progress was evaluated jointly by EM and SC program managers.

The EMSP structure evolved over time, and funding declined from the FY 1996 high of \$50M per year to about \$30 by FY 2003, when it was transferred to SC-BER. At that time, EMSP was organized around five “Focus Areas”: High Level

Waste (HLW); Mixed Waste, Transuranics and Spent Nuclear Fuel; Decontamination and Decommissioning; Subsurface Science, and Health and Risk.

EMSP researchers rightfully claim credit for a number of successes in the cleanup program. EMSP supported research into monitoring and characterization techniques, resulting in, for example, a personnel monitor for thoron and radon that was implemented at the Fernald Site. EMSP research in barriers and contaminant immobilization has recently resulted in important field deployments at the Hanford site. Research in geochemistry and mineralogy demonstrated that radioactive cesium leaking from HLW tanks at Hanford would not migrate away from the area under the tanks, but rather would be bound to subsurface minerals in the immediate vicinity of the leaking tanks, saving a substantial investment in barriers to prevent movement of cesium into the water table or on to the Columbia river. Similarly, EMSP research made two major contributions to resolving obstacles encountered during treatment of HLW at the Savannah River Site. One project in fundamental interfacial chemistry discovered the sources of massive foaming problems in the processing stream and then developed reagents that prevented foam formation. The second focused on the coordination chemistry of cesium to discover new molecules that bound this metal and allowed it to be extracted from the waste stream. This replaced a process for precipitation of cesium salts that in practice resulted in the formation of large volumes of untreatable sludge instead of a targeted cesium precipitate.

**SREL** – The Savannah River Ecology Laboratory (SREL) is a University of Georgia (UGA) research institution, located within DOE-owned facilities and on DOE land on the Savannah River Site. SREL was founded in 1951 by Dr. Eugene Odum, a long-time UGA faculty member and “father” of modern ecosystem ecology. Dr. Odum saw opportunities to conduct ecological research on the newly created Savannah River Site (SRS). BER’s predecessor organization initially funded Dr. Odum to conduct these studies and establish the SREL. The goal of SREL was, and is to, “provide an independent evaluation of the ecological effects of SRS operations through a program of ecological research, education, and outreach.” Over the years, SREL has received the majority of its funding from DOE. From Fiscal Year (FY) 2001 to FY 2005, DOE provided \$7-\$8 million per year to SREL. Until FY 2003, the Department’s Office of Environmental Management (EM) provided this funding under a Cooperative Agreement between the Savannah River Operations Office (SRO) and UGA. The funding level was largely a continuation of the legacy of the original 1950s decision to fund the laboratory, but also due to Congressional interest. During the same period, SREL received additional funding from the University of Georgia and some external grants, the latter together totaling roughly \$1.5 to 3.5 million per year.

With the FY 2003 budget appropriation, funding for SREL was transferred from EM to the Office of Science and placed into the newly created ERSD. At the time, DOE funding of SREL was not based on peer-reviewed competition; it was

a legacy of the 1950s, and the laboratory's research focus was largely unrelated to the ERSD program focus on subsurface contaminant mobility and remediation. From FY 2003 through FY 2005, the ERSD worked with SREL management in an effort to consolidate the laboratory's research programs and to bring those programs into alignment with ERSD's mission-based research.

The President's FY 2006 Budget Request included a reduction of approximately \$10 million for ERSD. The reduction forced a difficult evaluation of the ERSD research funding portfolio on the basis of DOE mission and scientific priorities. On the basis of this evaluation, the President's FY 2006 Budget Request phased out research including radioecology and surficial fate and transport – maintaining the portfolio of scientifically peer-reviewed research focused on subsurface contaminants and plumes. The effect of these budget decisions was to terminate legacy funding for SREL.

In the subsequent two years, there has been major attrition of staff from SREL (either to other organizations within UGA or by leaving the university entirely). In FY 2006, SC (\$1M) cooperated with EM (\$3M) and NNSA (\$0.3M) to provide \$4.3M funding in support of SREL's transition through the SRO Cooperative Agreement. SREL has been encouraged to compete for future funds within BER solicitations. A small number of proposals for FY 2007 funding were either led by, or included SREL scientists. None of these proposals was successful. There have been no proposals received from SREL since that time. At this point, SREL is dramatically reduced in size and function. UGA and EM/SRO appear committed to maintaining some level of effort in this program, but at a level that is dramatically reduced from FY 2005. BER has no current funding at SREL and it is unlikely that other SC programs would fund SREL activities. The fate of SREL has been a recent topic of Congressional hearings and the subject of numerous press releases.

**ERSP** – The President's FY 2006 budget request consolidated the two research programs (NABIR and EMSP) into a single research program for ERSD – now referred to as the Environmental Remediation Sciences Program (ERSP) [funding for the third research component, SREL, was terminated in the same budget request]. ERSP combined the subsurface biological focus of the NABIR program with the physical/chemical and technological focus of the Subsurface Science component of the EMSP program. The other remaining component of EMSP, the High-level waste element, was terminated in FY 2007, much to the consternation of the Office of Environmental Management. The termination was the result of additional reductions to the ERSD budget. Since the FY 2006 consolidation, ERSP has released four research solicitations (06-12, 06-16, 07-18 and 08-09).

**EMSL** – The William R. Wiley Environmental Molecular Sciences Laboratory (EMSL) was originally conceived by PNNL in the late 1980's and early 1990's with support from the Office of Basic Energy Sciences (BES). As the concept for EMSL was still taking shape, BES transferred the developing project to the Office of Environmental Management (EM) because EM was interested in having a

facility to conduct research that would address EM's cleanup needs. EM stewarded the project for two years, eventually transferring it back to the Office of Science in 1994, and into BER. BER management oversaw the \$229M construction project during 1995 to 1997, and the project was completed on time and within budget and scope. EMSL began operation as a DOE National Scientific User Facility on October 1, 1997, under the sponsorship of BER (at that time in the Division of Environmental Sciences). To stimulate utilization of this new facility, BER encouraged PNNL to make use of EMSL. EMSL has been operated by PNNL for the past ten years.

BER organized an independent review of EMSL in 1998; the findings were positive. In 2001, BER organized another independent review of EMSL with 14 external reviewers. The reviewers found EMSL to be scientifically productive, but to have some operational and management issues. PNNL provided a response to the reviewer comments, but subsequent changes in leadership at PNNL and at EMSL combined with a lack of oversight by BER, led to further deterioration in EMSL's operations and management. In part, because BER recognized the need for a more thorough review of EMSL, and in part, because it had been three years since the 2001 peer review, BER initiated planning in 2004 for another review of EMSL. In May 2005, BER conducted two parallel reviews of EMSL. EMSL's scientific productivity was reviewed by a BERAC review committee led by the BERAC Chair, Dr. Michelle Broido. EMSL's operations and management was reviewed by SC's Office of Project Assessment (OPA), by a review team chaired by Mr. Daniel Lehman.

The 2005 BERAC review found that while "the science conducted in the EMSL is of very high quality, and a significant amount is, indeed, cutting edge," the "...scientific effort and staff are strongly affected by administrative issues within the EMSL." The BERAC reviewers recommended that both EMSL's User Advisory Committee and EMSL's Scientific Advisory Committee be reinvigorated. The 2005 OPA found a need for: a) enhanced managerial resources and definition of roles and responsibilities, b) improved communications among BER, DOE's Pacific Northwest Site Office (PNSO), PNNL management and EMSL management, c) an improved financial reporting system, d) increased understanding of the impact of non-BER funding within EMSL, and 3) extensive benchmarking. In addition, both the BERAC and OPA reviewers found: a) the lack of a shared vision for EMSL on the part of BER, PNNL management and EMSL management, b) a need for a prioritization/decision making plan, and c) a need for a standardized user access protocol.

ERSD responded by: a) establishing weekly conference calls among PNSO and EMSL management, b) establishing an EMSL Management Team within BER, c) developing an EMSL mission statement in collaboration with PNNL and EMSL management, and d) asking EMSL to develop a set of strategic science directions aligned with DOE's mission and programs. EMSL responded by developing the EMSL Action Plan, which provided detailed responses and plans



to address both the BERAC and OPA review findings and recommendations. The EMSL Action Plan was completed by December 31, 2005.

In June 2006, ERSD requested that a BERAC subcommittee conduct a follow-on review of the EMSL to ensure that EMSL had implemented changes outlined in the EMSL Action Plan. The BERAC subcommittee review occurred in June 2006 and was chaired by Dr. James Tiedje. The 2006 review found that the EMSL Action Plan was “timely, comprehensive and on target,” and that the implementation was “effective, widely accepted, and appeared to be on its way to completion by September 30, 2006.” The reviewers believed that the actions “should have the desired outcome with regard to addressing the previous review findings.” The committee had a few additional recommendations, which EMSL has been addressing by incorporating changes into the FY07 EMSL Performance Plan and dashboard, and the FY08 EMSL Performance Plan and dashboard.

In August 2007, ERSD and SC’s Office of Advanced Scientific Computing Research (ASCR) established a joint committee to review the steady-state operations of the Molecular Science Computing Facility (MSCF) within the EMSL, as required by the Office of Management and Budget (OMB). The emphasis of the review was on the establishment of a performance baseline for customer results, business and strategic results, financial performance and innovation. The review was chaired by Roy Whitney, the Chief Information Officer for the Thomas Jefferson National Accelerator Facility (TJNAF). In the draft review report, the reviewers found that the MSCF was enabling significant scientific results in high impact journals and breakthrough science, had good communications with users at multiple levels, fostered an environment of innovation, and in the area of cyber security, had a valid authority to operate. Areas for improvement included development of a long-term and scalable approach for data storage, development of a metric to build on the integration of computational and experimental approaches in EMSL, and obtaining additional computational leadership within the EMSL.

**ERSD Establishment** - With the FY 2003 budget, NABIR and EMSL were moved from BER’s (then) Environmental Science Division (which then became the Climate Change Research Division) into the new Environmental Remediation Sciences Division. These two SC programs were combined with two programs transferred from EM (EMSP and SREL) to form ERSD with a total budget of approximately \$110M (combined funding for research and for operation of EMSL). Dr. Teresa Fryberger (formerly with EM) accepted the position of Division Director for ERSD.

**Research Budget History** - The FY 2003 research budget for ERSD was approximately \$57M. Since FY 2004, the ERSD research budget has declined steadily (see Figure 2 below). Those declines led the ERSD program managers to critically evaluate the ERSD research programs and components in 2005 and 2006 in the context of ERSD’s long-term Performance Assessment Rating Tool (PART) measure (Figure 3 below). It was decided that the intractable, long-term problems for DOE in environmental remediation related to understanding and influencing the factors that control contaminant fate and transport in

the subsurface. That decision, combined with budget reductions, led to the termination of funding for the SREL and the mixed waste component of the EMSP with the FY 2006 President's Budget Request, and the High Level Waste component of the EMSP with the FY 2007 President's Budget Request.

**Staffing** - When ERSD was established in 2003, it had a permanent staff of four – Teresa Fryberger (Division Director), Paul Bayer and Anna Palmisano (Program Managers) and Judy Nusbaum (Secretary). ERSD also relied on the services of shared program managers from the Life Sciences Division: Roland Hirsch, Dan Drell and Arthur Katz. ERSD supplemented its permanent staff with National Lab detailees (Henry Shaw from LLNL in 2003, Drew Tait from LANL in 2004 and Ray Wildung from PNNL in 2005) and an IPA (Mike Kuperberg-2003-2006). In FY 2004, Todd Anderson was hired as a Program Manager. Also in FY 2004, Teresa Fryberger accepted a detail to the White House Office of Science and Technology Policy (OSTP). David Lesmes was hired as a Program Manager in 2006. Also in 2006, Teresa Fryberger became Director of NASA's Applied Sciences Program in the Earth Sciences Division (resigning from SC). Mike Kuperberg acted as Division Director from July of 2004 through November of 2006. Since that time, the Acting Division Director position has rotated among Paul Bayer, Mike Kuperberg (again), and Todd Anderson in 120 day increments. David Lesmes has been asked to be the Acting Division Director beginning in December 24, 2007. Based on recommendations from the 2004 COV, ERSD was able to establish and fill three new permanent positions: Mike Kuperberg and David Lesmes (program managers) and Kim Laing (Program Support Specialist). Terry Jones (Secretary) joined ERSD in 2007 to replace the former secretary who had retired. The current organizational responsibilities are fluid as the acting Division Director position rotates among the four program managers.

Figure 1

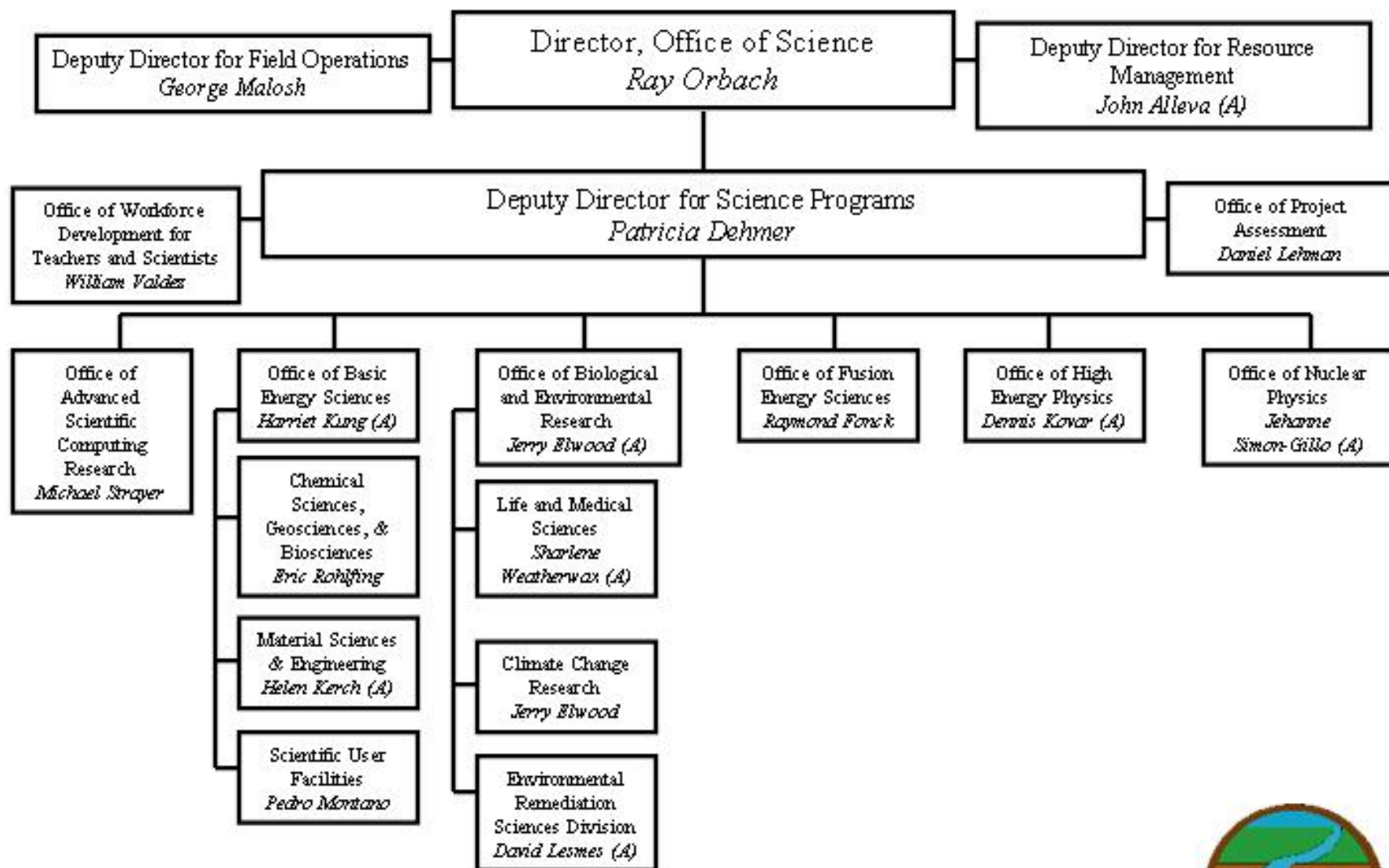


Figure 2

**ERSD research funding history -  
Environmental Remediation Science Program**

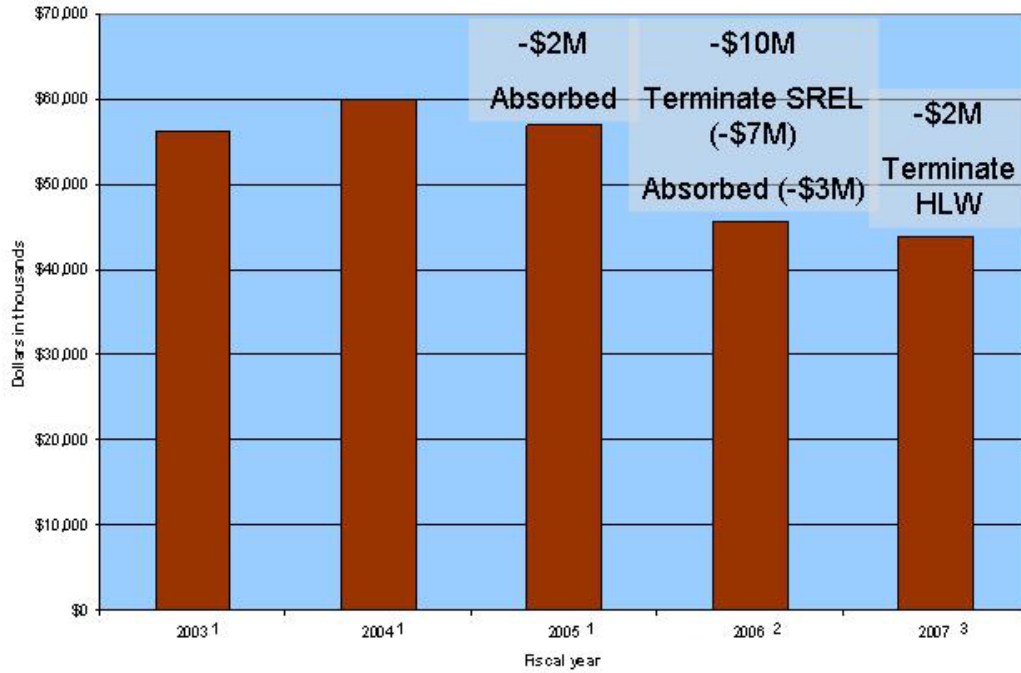


Figure 3

**Environmental Remediation Sciences Division**

Long-term Measure	Goals	Science Themes	Technical Areas	Mechanisms
<b>ERSD Long Term Measure</b>  By 2015, provide sufficient scientific understanding to allow a significant fraction of DOE sites to incorporate coupled biological, chemical and physical processes into decision making for environmental remediation	<b>Goal 1:</b> Develop an improved understanding of the processes governing the fate and transport of contaminants in the subsurface in order to predict and control environmental remediation and long term stewardship of DOE sites.	Fundamental Molecular Scale Research	Surface Chemistry	EMSL, EMSIs Synchrotrons
			Aqueous Complexes	
			Nanoscale Research	
		Subsurface Biogeochemistry	Microbe-Mineral Reactions	Notice 06-12 Projects
			Contaminant-Mineral Rxns	
		Subsurface Microbiology	Microbial Ecology/Metabolism	Notice 06-12 Projects
			Microbially Catalyzed Rxns	
	Groundwater Flow and Transport	Aquifer Characterization	Notice 06-12 Projects	
		Groundwater Hydrology		
	Vadose Zone Processes	Geochemical Gradient Rxns	Notice 06-12 Projects	
		Unsaturated Zone Chemistry		
	Conceptual/Computer Model Development	Scaling of Processes 3D HPC Framework	SciDAC 06-04	
	<b>Goal 2:</b> Explore new options and concepts for the remediation of subsurface environments.	Physical/Chemical Remediation Processes	Immobilization	Notice 06-12 Projects
			Removal Techniques	
		Biological Processes	Barrier research	TBA
Bioremediation				
Long Stewardship Research		MNA processes/ Modeling	Notice 06-16	
Field Scale Research	Fate & Transport Remediation Research at Large DOE Test Sites	Notice 06-16		
<b>Goal 3:</b> Develop new measurement and monitoring tools to better understand and manage contaminant transport.	Site Characterization Technologies	Geophysics Techniques Seismic, GPR, EMT etc.	Notice 06-12 & SBIR/STTR Projects	
		Biological, Chemical and Physical Sensor Technology		Geonics-based techniques
	Chemical speciation detection			
	Flow detection			
Autonomous Sampling and Data Collection/Reporting Systems				

## Appendix 2

Charge from Ray Orbach to BERAC to assemble a COV to conduct a review of ERSD



### Under Secretary for Science

Washington, DC 20585

May 10, 2007

Dr. Michelle S. Broido  
Associate Vice Chancellor for Basic Biomedical Research  
and Director, Office of Research, Health Sciences  
University of Pittsburgh  
Scaife Hall, Suite 401  
3550 Terrace Street  
Pittsburgh, PA 15261

Dear Dr. Broido:

By this letter, I am charging the Biological and Environmental Research Advisory Committee (BERAC) to assemble a Committee of Visitors (COV) to assess the process used by the Environmental Remediation Sciences Division (ERSD) in BER to manage the ERSD-supported research program, as well as the operation of the Environmental Molecular Sciences Laboratory, a national scientific user facility. The COV panel will be provided with background material on the targeted processes prior to its meeting, including the report from the previous COV review of ERSD and the ERSD response to the COV recommendations and comments. The panel should evaluate the actions taken to respond to the recommendations of the previous COV and the effectiveness of those actions in resolving the identified issues.

The panel should provide an assessment of the processes used to solicit, review, and recommend proposal funding actions for FY 2005-2007. It should assess the processes used to manage ongoing research programs in the ERSD, especially the decision-making processes. It also should assess the division's management and oversight of the EMSL. I would like the panel to consider and provide evaluation of the following:

1. For both the DOE laboratory projects and university grants, assess the efficacy, fairness, and quality of the processes used to: (a) solicit, review, recommend, and document proposal funding actions, and (b) monitor active projects and programs for progress and outcomes. For example, is the proposal review process rigorous and fair, are funding decisions adequately documented and justified, does the solicitation process for proposals provide sufficient and useful guidance to prospective applicants, and are the progress and outcomes of multi-year projects adequately monitored and evaluated to justify decisions about continued funding? Is there evidence of programmatic considerations in making funding decisions? Is such evidence adequately documented?
2. Assess the efficacy and quality of processes used to manage ongoing programs. For example, does the process (a) consider the depth and balance in a research portfolio, (b) solicit and encourage some exploratory, high-risk research, (c) link



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the research to both mission needs of DOE and programmatic goals and objectives, (d) enable the support of coherent suites of projects that are integrated and collectively of added scientific value to programs, (e) ensure a reasonable and appropriate turnover of funded investigators to enable and foster the support of new projects and scientists by programs, and (f) result in a portfolio of elements and programs that have national and international scientific standing?

The panel should assess the processes and operations used for proposal funding actions and program implementation decisions in the ERSD during FY 2005-2007, and the panel should provide comments on how they have changed based on the recommendations of the previous COV and how they can be improved. It may examine any files of both DOE laboratory projects and university projects funded in the period FY 2005-2007. It also may examine any documents related to ERSD program implementation. The panel is asked to review the aforementioned processes used by all ERSD programs and elements.

A primary requirement is that the COV should have significant expertise across all covered areas and that this expertise should not rely upon one person alone. A second requirement is that a significant fraction of the committee receives no direct research support from the DOE. A guideline is that approximately 25 percent of the members, including the Committee Chair, receive no support from DOE. It is also important to have representation on the COV from individuals with experience in managing research programs and research facilities, either at DOE or NSF. There should be an attempt to balance membership between university principal investigators and national laboratory investigators. A final overlay should also consider a number of other balance factors, including institution, geographic region, etc. In the end, the COV should constitute an exceptional group of internationally recognized researchers, with broad research expertise in the program areas in BER's ERSD, as well as a deep familiarity with DOE programs.

The COV should take place late in 2007 at the BER/DOE Germantown location at 19901 Germantown Road, Germantown, Maryland. A discussion of the COV report by BERAC should be held no later than the Spring 2008 BERAC meeting. Following acceptance of the full BERAC committee, the COV report with findings and recommendations is to be presented to me, as the Director of the Office of Science.

If you have any questions regarding this charge, please contact J. Michael Kuperberg, 301-903-4902, or by email at [Michael.Kuperberg@science.doe.gov](mailto:Michael.Kuperberg@science.doe.gov).

Sincerely,



Raymond L. Orbach

cc: Michael Kuperberg  
David Thomassen

## APPENDIX 3

**Membership of the Committee of Visitors (COV)  
for the  
Environmental Remediation Sciences Division  
of the  
Department of Energy, Office of Science**

**January 13 – 15, 2008**

### **Chair**

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### **EMSL Program Review**

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**Note:** Dr. Linda Horton, Center for Nanophase Materials Sciences at Oak Ridge National Laboratory, was scheduled to be on this COV, but had to withdraw at the last minute due to illness. She informed COV Chair Michael Hochella of this directly the day before the meeting.

**DOE BER ERSD COV  
AGENDA**

*Sunday evening orientation meeting will take place at the Marriott Hotel in Gaithersburg. All other meetings will take place in the DOE Germantown Facility.*

*PLEASE NOTE: THE DOE GERMANTOWN FACILITY IS A SECURE FACILITY. VAN TRANSPORTATION FROM THE HOTEL TO DOE WILL BE PROVIDED. IF YOU PLAN TO DRIVE THERE AS AN INDIVIDUAL, PLEASE ALLOW TIME TO HAVE YOUR CAR THOROUGHLY SEARCHED EACH TIME YOU DRIVE ONTO THE GROUNDS.*

**Sunday, January 13**

6:00 pm	Appetizers & introductions @ Marriott Hotel Gaithersburg	Meeting Room TBA
6:30 pm	Welcome & Opening Remarks	Mike Hochella
	Overview and Background presentation (COV dines while ERSD talks)  ERSD's role within DOE Office of Science ERSD history ERSD organization, mission and emphasis	ERSD staff
8:00 pm	Q&A / Discussion	All
8:30 pm	Adjourn	

DOE BER ERSD COV AGENDA

**Monday, January 14 (DOE Headquarters, Germantown, Room G-207)**

7:30	Meet in lobby of Marriott Hotel (Gaithersburg) Depart in vans for DOE Germantown Undergo security (badging) and screening procedures	
8:30	Welcome and introductions Signing of COI forms	Mike Hochella, COV Chair David Lesmes, Acting Division Director
8:45	Overview and Charge to Committee	Jerry Elwood
9:00	ERSD mission and strategy Overview of funding/review process in OBER/ERSD Future plans	ERSD staff
10:00	Discussion of approach to COV Charge	Mike Hochella
10:30	Breakout sessions (2) - ERSP - Todd Anderson, David Lesmes, Arthur Katz, Roland Hirsch  - EMSL - Paul Bayer, Mike Kuperberg	Review Groups and Relevant Staff
12:00	Lunch (provided)	G-207
1:00	Breakout sessions – continued One-on-one discussions with ERSD staff as needed	
4:00	Executive session – findings, additional needs, writing assignments	COV – G-207
5:00	Meeting with ERSD staff (questions, requests for further information)	COV – G-207
5:30	Return to hotel	
	Dinner – on your own	

DOE BER ERSD COV AGENDA

**Tuesday, January 15 (DOE Headquarters, Germantown, Room G-207)**

7:30	Meet in lobby of Marriott Hotel (Gaithersburg) Depart in vans for DOE Germantown Undergo security (badging) and screening procedures	
8:30	Meeting with BER staff – responses to previous requests, additional discussion, Q&A	COV and relevant staff
9:00	Breakout sessions – draft findings  Further Q&A with ERSD staff as needed	
12:00	Lunch (provided)	G-207
1:00	(A) EMSL team in executive session to draft report	
	(B) ERSP team in executive session to draft report	
1:30	Executive session	G-207
2:30	Report to BER leadership	G-207
3:00	Return to hotel	

