REPORT TO THE

BIOLOGICAL AND ENVIRONMENTAL ADVISORY COMMITTEE

(BERAC)

BY THE COMMITTEE OF VISITORS FOR

THE REVIEW OF THE LIFE AND MEDICAL SCIENCES DIVISION

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EXECUTIVE SUMMARY

On 23 January 2008, Dr. Raymond Orbach, Under Secretary for Science, charged the Biological and Environmental Research Advisory Committee (BERAC) with assembling a Committee of Visitors (COV) to assess the processes used to create and manage the research portfolio in the Life and Medical Sciences Division (LMSD) of the Office of Biological and Environmental Research (BER). The LMSD current portfolio of scientific awards includes the following Programs, Projects, Centers and Institutes: (1) Genomics:GTL Program (GTL), (2) Carbon Sequestration Project (CS), (3) Structural Biology Facility Program (SB), (4) Low-Dose Radiation Research Program (LDR), (5) Radiochemistry and Instrumentation Program (RI), (6) Ethical, Legal, and Social Issues Program (ELSI), (7) Bioenergy Research Centers (BRC), (8) Joint Genome Institute (JGI), (9) Artificial Retina Project (AR), (10) Computational Biology, and (11) Workshops.

In response to this charge, a COV was established consisting of 22 scientists from around the country, with representation from academia (16), the private sector (1), the National Laboratories (2), and the Federal Government (3). Two of the COV members currently receive DOE funding. Two of the COV members served on the prior Life Sciences Research Division COV that met in May of 2005. The COV met on 8 – 11 June 2008, at the DOE headquarters in Germantown, Maryland. Assistance and support were provided, as needed, by the LMSD staff. To maximize the effectiveness of the analysis, 11 subcommittees of the COV were formed – each assigned to review carefully and deeply a different Program or Project of the overall LMSD research portfolio. The entire COV evaluated and analyzed the portfolio, as a whole, provided answers to the specific questions offered by DOE, and provided recommendations.

Overview and General Recommendations

- The LMSD research portfolio continues to support cutting edge, high priority research in areas of critical national concern. The increased focus on bioenergy, through the newly created Bioenergy Research Program, is an excellent case in point. LMSD-sponsored scientists are engaged in projects that seek to explore new avenues of bioenergy research.

- The LMSD Program Managers (PMs) are, simply put, inspirational. They are deeply committed to the research efforts supported by LMSD and work tirelessly to ensure the LMSD portfolio maintains a diverse mix of timely, sound, and exceptional research in areas specifically relevant to DOE missions.

- The LMSD Program Managers (PMs) remained committed to providing first rate, equitable reviews of the applications submitted to them. The prior COV report noted that the current staffing levels are inadequate for the tasks at hand, which resulted in too little documentation of the review process.

Unfortunately, the staffing levels have not appreciably increased, even while the breadth and depth of the programmatic research has substantially expanded, and yet, somehow, the PMs were able to institute a significant change in their documentation process. The result was that, in most cases, levels of documentation were appropriate and enabled a thorough assessment of the LMSD review process.

- The LMSD review process overall is extremely well managed. The calls for applications (RFAs) are timely, relevant to DOE missions, and the science underlying these RFAs are vetted by the community through a host of workshops and PM discussions. The peer review process is sound and equitable. Review panels are comprised of the appropriate range of research expertise and represent a reasonable cross- section of the relevant research community. The PMs have paid close attention to achieving balance in terms of age of reviewers, geographic representation, university versus National Laboratory affiliations, and promoting diversity, while avoiding conflicts of interest. The prior COV noted that there was a tendency to select too many reviewers who work in close proximity to Washington, DC. This situation has been remedied in most cases. ***The COV commends the LMSD PMs for the close attention they have paid to this critical component of the review process, even while challenged with inadequate staffing levels.***

- The Genomics: GTL program is a 'crown jewel' in the repertoire of LMSD-funded research. Indeed, it is a star in the entire Office of Science portfolio. The quality of the planning, management, and oversight by PMs, and the quality and utility of the resulting scientific and technological products, is outstanding. The program is vibrant, vital, and should continue to be carefully nurtured. The resourcefulness, responsiveness, and rapidity of the PMs in laying the groundwork for, assisting in the FOA development and review of, and instantiation of the new Bioenergy Research Centers, represent an extremely strong case in point.

- The GTL Program has been very pro-active in identifying and funding emerging technologies. As an example, LMSD emphasized systems biology approaches as far back as 2000, well before most other agencies had identified this opportunity. Newer examples of this ability to respond to the rapidly changing opportunities in the research arena include the LMSD focus on microbial community analysis using genomics and proteomics, the microbial fuel cell work, and the new emphasis on biomass conversion. The overall program planning of LMSD is forward looking and effective. ***The COV recommends that the DOE administration recognize this remarkable talent in their PMs and provide more substantial support, in terms of staff, time and travel resources, to ensure that the PMs are able to maintain this "finger on the pulse" ability that they have demonstrated in the past.***

- The three newly created Bioenergy Research Centers are a stunning example of the dexterity and flexibility of the LMSD Program Managers. In response to strong interest from the President, the LMSD, in collaboration with other DOE offices, prepared an FOA in fall of 2006, which called for the creation of two LMSD-based research centers. The vision articulated in the FOA was that these centers "develop novel biological solutions for the production of such fuels as cellulosic ethanol or hydrogen or for other groundbreaking bioenergy research with the potential to revolutionize biology-based energy production." The quality of the resulting research portfolio is outstanding. Although it is true that the scientific community in the targeted areas (bioenergy science and technology) is limited, the COV felt that the three BRCs who received funding have sufficient expertise and strengths in the relevant areas of research that it is clear that first class research will result. ***The COV recommends that the PMs involved in the management of the BRCs be released from some significant amount of their remaining duties, to provide more time for them to nurture and engage these valuable investments and help ensure their success.*** Further, they should receive additional support staff to help manage such a complex combination of awardees. An investment of 75 million per year for five years demands this level of attention to detail. Current staffing levels simply will not permit the level of support these centers require and deserve.

- ***The COV recommends that there be extensive oversight of the Bioenergy Research Centers, that strong scientific advisory committees be assembled, and that a rigorous set of evaluation procedures be established that will provide frequent feedback and ensure that the activities of the BRC remain on track.*** It is expected that the LMSD will conduct annual site visits and reviews at each of the three BRCs. It is imperative that LMSD provides sufficient support to enable these site visits.

- The Computational Biology program has the potential to serve as the hub of many of the biological research activities sponsored by the DOE. It can potentially play a major role in the automated annotation of the large amounts of sequence and metagenomic data being generated, can coordinate the development of genomic and metagenomic tools, and can oversee uniform data formats that permit integration of disparate data sets. To do so, however, requires a clarification of the role and responsibilities of this program *vis a vis* other DOE-sponsored components and a thoughtful definition of the objectives of the program -- objectives that will complement, rather than duplicate or compete with large ongoing initiatives at the NIH and elsewhere, and that visibly enhance the DOE mission. Further, it will require a specific funding line like other parts of LMSD.

- ***The COV recommends that the CB program be emancipated from the program objectives and solicitations of the supercomputing programs at the National Labs.*** While the availability of supercomputing facilities is an

undeniable asset to the biocomputing efforts at DOE, scale and platform appropriate software development and modeling should be encouraged. Most biological problems do not require the level of hardware provided by the supercomputers. Further, most biologists do not have ready access to supercomputers, so it is unlikely that analytical approaches developed which require that platform will be generally useful to the community. This is particularly significant if the focus of CB remains on providing support, rather than engaging in basic research. The COV recommends that this suggestion be the subject of a BERAC discussion.

- ***The COV recommends that the LMSD consider a specific line of funding for the CB Program.*** This area of support is critical to the success of many of the existing LMSD research programs and projects and deserves significantly more funding and attention if there is to be any hope of capturing the depth of information resulting from the already immense and rapidly growing focus on functional genomics, proteomics and systems biology of most LMSD research.

- The Structural Biology Program is charged with the difficult task of ensuring that biological interests are served at these large DOE-supported facilities. On the one hand, the lion's share of the cost of constructing and operating these facilities is borne by an entirely different part of DOE, which raises several intra-agency problems. In particular, how can LMSD, which contributes a comparatively small fraction of the DOE-based investment in the SB Program, ensure that the biological research community has the access to SB facilities that they deserve, particularly when construction and operating decisions for the National Laboratories investment in SB are made outside LMSD? On the other hand, LMSD does not have a budget large enough to build, maintain, and operate all of the beamlines at these facilities that the biological research community is actually using. For this reason, the SB Program must coordinate its funding activities with those of other sponsors, most notably NIH. The inter-agency negotiations required to make this happen can be challenging. On the whole, the *ad hoc* system that has evolved over time for handling these intra- and inter-agency challenges has worked extremely well. The PMs have been making good decisions about how SB should proceed in this area, and they should take pride in the results achieved. ***The COV recommends that BERAC consider establishing an advisory committee for SB, whose primary purpose would be to provide expert advice on a regular basis with regard to strategic planning, particularly with respect to technique and facility development at the national laboratories.***

- ***The COV recommends that the BER should have a much stronger presence at the SNS/ORNL, in the areas of neutron scattering, neutron reflectivity, and neutron crystallography, as applied to critical problems in structural biology.***

- The COV confirms that the research supported by the Radiochemistry and Instrumentation Program is of fundamental importance in the development of nuclear medicine and molecular imaging, and has provided many of the basic technologies necessary for the advancement of these fields. The decision to keep one strong project alive was a good one, in that it maintained an internationally recognized multidisciplinary team that covers all the major disciplines in this field.

- The Artificial Retina Project is an example of how the assets of the National Laboratories and the oversight of the LMSD PMs can be leveraged to tackle some of the more technically demanding challenges to human health, *i.e.,* restoring sight to the blind. This project involves contributions from four National Laboratories, three universities and one private company. Each entity has its own culture for conducting research and, although the group has a focused goal that guides the research efforts, the paths traversed to accomplish this goal are diverse, with often conflicting constraints, which has presented numerous challenges to the project management. Not only has the PM risen to these challenges and produced a cohesive effort, he has produced a team whose results have surpassed all expectations for the program. Further, and perhaps even more remarkable, he has successfully managed the negotiations required involving complex intellectual property rights.

- The COV is surprised and somewhat disturbed that such a stunning success story, which highlights the abilities of our National Laboratories, the personnel in LMSD, our Nation's universities and the private sector to join forces to address a significant human health challenge, and which has had such significant success in every aspect of the endeavor will soon be terminated. The rationale behind this decision was not clear to the COV.

- The COV applauds BER for its significant investments in the Carbon Sequestration Project. ***However, the COV recommends that the level of investment should be increased to more adequately fund research in this area of critical national need.*** With the current national focus on biofuels as a potential supplementary energy source, it is imperative that funds be made available to support further study of the impact that biofuel production will have on atmospheric CO_2 levels and carbon sinks. This information is required immediately, and only a large investment by DOE is going to provide the level of detailed required. ***The COV enthusiastically supports continued joint funding opportunities between DOE and USDA, and encourages the two agencies to consider including a special programmatic focus on understanding how crop plants will respond to future predicted climate fluctuations and breeding varieties adapted to projected climate extremes.***

- The Joint Genome Institute continues to provide superb access to complete genome sequences to the community. ***The COV recommends that the JGI maintain this high level of community involvement.***

- The JGI should be at the forefront of innovative informatics efforts to support its growing sequencing capacity. Current investments in informatics development fall short of what is needed. As more complex genomes enter the JGI sequencing pipeline and next generation sequencing becomes the norm, JGI must position itself to provide high-quality sequence data that is immediately usable for its stakeholders. ***The COV recommends that JGI's investment into informatics be increased significantly, not just to keep pace with current sequencing demands, but also to anticipate future needs associated with data generated via next generation sequencing.***

- ***The COV concurs with the previous COV recommendation that JGI consider how its resources could be used to support some "big science" sequencing efforts. We urge JGI to consider soliciting community ideas for large-scale transformative sequencing projects.***

- The Low Dose Program supports animal, tissue, and cell culture (both monolayer and 3D) studies of molecular responses to ionizing radiation. The COV noted that at the start of this program, the prevailing thought was that radiation effects would not be detectable below 0.2 Gy. The Low Dose Program has not only shown that the effects can be seen, but that they are complex. Seminal findings supported by this program include (1) radiation-induced changes in monolayer cultures in Petri dishes do not represent what happens in cells in vivo, (2) cells in 3D cultures do more accurately reflect in vivo events, and (3) radiation-induced cellular changes and, indeed, the behavior of cells overall, are influenced by their environments including matrices, nutrients and signaling molecules, and neighboring cells. As a result cancer cells may exhibit very different behavior in monolayer culture, in 3D culture and in tissues, appearing phenotypcially normal in some 3D cultures and tissue environments.

- The original focus of the Ethical, Legal and Social Issues Program concerned genetic privacy, complex traits, human subjects, intellectual property and education. The solicitation of FY2004 concerned Genetics in the Workplace, Complex & Multiple Traits, and Innovative or Exploratory Activities, and was reviewed by the previous COV. The most recent solicitation in FY2007, concerned the ethical, legal and societal implications of research on alternative bioenergy technologies, synthetic genomics and nanotechnologies. ***The COV recommends that BERAC consider establishing a scientific advisory committee for ELSI, which would aid the PM in the development of solicitations. The membership of the advisory panel should include expertise in social sciences.***

- ***The COV recommends the gradual expansion of the ELSI program, provided that the solicitations can be refined to generate a larger number of applications worthy of funding.***

INTRODUCTION

Overview

On 23 January 2008, Dr. Raymond Orbach, Under Secretary for Science, charged the Biological and Environmental Research Advisory Committee (BERAC) with assembling a Committee of Visitors (COV) to assess the processes used to create and manage the research portfolio in the Life and Medical Sciences Division (LMSD) of the Office of Biological and Environmental Research (BER). The charge letter issued by Dr. Orbach is found in Appendix A. In response to this charge, a COV was established consisting of 22 scientists from around the country, with representation from academia (16), the private sector (1), the National Laboratories (2), and the Federal Government (3). The Federal Government representatives included one scientist from the National Institute of Standards and Technology, and two scientists from the National Institutes of Health. Two of the COV members currently receive DOE funding. Two of the COV members served on the prior Life Sciences Research Division COV held in May of 2005. The complete roster of the COV is found in Appendix B. The COV met on 8 – 11 June 2008, at the DOE headquarters in Germantown, Maryland and the agenda for the meeting is found in Appendix C. Assistance and support were provided, as needed, by the LMSD staff. A list of the LMSD Staff Members and their responsibilities is provided in Appendix D. To maximize the effectiveness of the analysis, 11 subcommittees of the COV were formed – each assigned to review carefully and deeply a different Program or Project of the overall LMSD research portfolio. The COV assignments are provided in Appendix E. The entire COV evaluated and analyzed the portfolio as a whole, provided answers to the specific questions offered by DOE, and provided recommendations. What follows is the report from that meeting.

The COV was charged with assessing the processes and operations used for proposal funding actions and program implementation decisions by the Life and Medical Sciences Division (LMSD) during the FY 2005 – 2007. The operation of the DOE Joint Genome Institute (JGI), a national scientific user facility, is not included in this review, having undergone a BERAC review in November 2005 and undergoing a review in the fall of 2008. The COV was specifically asked to assess the following three major elements:

1. 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 both the DOE laboratory projects and university grants.

2. The efficacy and quality of processes used to manage ongoing programs in terms of (a) research portfolio balance, (b) balance between high and low risk projects, (c) relevance to DOE mission needs, (d) ability to support coherent suites of projects that are integrated and collectively of added scientific value to programs, (e) ability to ensure a reasonable turnover to support new projects and scientists, and (f) ability to ensure that the process results in a portfolio of elements and programs that have a national and international scientific standing.
3. The changes to processes and operations based on the recommendations of the previous Life Sciences Research Division COV.

DOE Programs in the Life and Medical Sciences

The DOE's support for Life and Medical Sciences emphasizes those areas that can uniquely benefit from DOE strengths, such as large-scale science, instrument intensive research and multi-disciplinary methods emphasizing chemistry, computation and physics. The LMSD current portfolio of scientific awards includes the following Programs, Projects, Centers and Institutes: (a) Genomics: GTL Program (GTL), (b) Carbon Sequestration Project (CS), (c) Structural Biology Facility Program (SB), (d) Low-Dose Radiation Research Program (LDR), (e) Radiochemistry and Instrumentation Program (RI), (f) Ethical, Legal, and Social Issues Program (ELSI), (g) Bioenergy Research Centers (BRC), (h) Joint Genome Institute (JGI), (i) Artificial Retina Project (AR), (j) Computational Biology Program (CB) and (k) Workshops.

The Genomics: GTL program retains a unique and highly successful commitment to funding research to accelerate biological solutions to DOE missions in bioenergy, waste clean up, and carbon cycling. One exciting offshoot from GTL has been the very recent creation of three integrated, multidisciplinary Bioenergy Research Centers, focused on achieving transformational breakthroughs in basic science needed for the development of next-generation biofuels. The mandate for these Centers came directly from the President's Office, and the DOE showed remarkable dexterity and speed in its efforts to produce a timely response to this presidential mandate. The Carbon Sequestration Project (which is co-managed with the Climate Change Research Division) manages a broad portfolio of research to obtain the fundamental scientific understanding of terrestrial species (particularly trees and perennial grasses) required to enhance long-term carbon sequestration in terrestrial ecosystems. The Ethical, Legal and Social Issues program is currently focused on such topics as bioenergy technologies, synthetic biology, and nanotechnology. Finally, the Structural Biology Facility Program continues to develop new instrumentation for structural biology applications that take advantage of unique capabilities of DOE National User Facilities and participates in making these facilities widely available to the structural biology community.

Although historically LMSD (and its predecessors) has been engaged in research programs whose efforts have led to significant positive impacts on human health, such as the Low Dose Radiation Program, the Radiochemistry and Instrumentation Program, and the Artificial Retina Project, the medical component of each is clearly secondary to the technical, analytical, or multidisciplinary challenges that inspired the LMSD Program to tackle such issues in the first place. The COV has paid close attention to this critical dimension of the LMSD portfolio and is confident that in every case of potential duplication of efforts with the NIH, NSF or DOD, LMSD has remained mission driven and only tackled projects that directly impact human health when it is appropriate for them to do so and is in the Nation's best interests.

A couple of examples will serve to highlight the distinction being made here. The Artificial Retina Project appears to be a human-health motivated project, and thus outside the immediate purview of DOE mission-driven research, but the component that the LMSD has tackled (developing an artificial retina), involves harnessing the talents and tools available at several of the National Laboratories to address problems related to micromachining electrode arrays, creating electronic devices that can service hundreds of electrodes and yet be small enough for implantation in and around the eye, and packaging these electronics to withstand long-term immersion in a saltwater environment. These areas of research and development are ideally suited to the strengths of the National Laboratories and represent research that NIH simply does not embrace in its portfolio. A second example involves the Radiochemistry and Instrumentation Program, which has helped transition basic research advances in radiotracer and imaging instrumentation into valuable medical applications, and fundamental technologic advances into the public and private sectors.

The COV commends LMSD for its continued commitment to developing unique capabilities that contribute to fundamental, basic science as well as the invention, development, and application of instrumentation. The LMSD is credited with the highly productive transition from the human focus of the Joint Genome Institute to the incorporation of community-based sequencing initiatives. The impact of these sequencing efforts on the communities of microbial ecology, bioremediation, and bioenergy is immeasurable.

LMSD Program Administration

LMSD leadership has been rotating through different staff with a cycle of 120 days. The Acting Director position has been held by Sharlene Weatherwax, David Thomassen, and is currently held by Roland Hirsch. Prior to November 2007, Mike Viola was the permanent, full time Division Director. These Acting Directors have led the LMSD through a period filled with extraordinary success, such as the creation of the Bioenergy Research Centers, as well as some difficult decisions, such as the termination of the Artificial Retina Program. The COV

feels that these individuals have done superb jobs overseeing this large and diverse portfolio of scientific research.

LMSD Program Managers and Staff are, simply put, exceptional. Program Managers (PMs) are clearly devoted to the Division and exert Herculean efforts to ensure the continued success of the large and diverse portfolio of research programs they manage. The LMSD administration has successfully addressed most of the recommendations from the prior COV report. In particular, the informational packet that was sent to the COV several weeks prior to the meeting was quite useful. This packet provided the background required to ensure that the diverse COV participants had a solid understanding of the Life and Medical Sciences Division. Further, the increased level of documentation and attention to written records was truly remarkable, particularly in light of the fact that the program remains significantly understaffed. The COV members were uniformly impressed with the progress in the quality and depth of relevant documentation provided by the program managers, particularly with regard to the GTL, AR, SB and BRC programs.

There is, however, one significant area discussed in the prior COV report that has not been adequately addressed or resolved. The prior COV was “convinced that PMs do not have adequate time to interact constructively with potential applicants, administer reviews with the care they deserve, monitor funded activities with interactions (including site visits) with investigators, and keep current with the state of research in areas of current and potential interest.” The recommendation was that the number of Ph.D. level staff members be increased significantly. The previous COV also proposed that some relief could be achieved through the hiring of masters-level individuals who could handle some of the more routine duties that existing administrative staff do not have the training to handle. The LMSD has been successful in recruiting two additional program managers since the last COV, but it anticipates remaining at the current staffing levels for the near future. This COV wants to be quite clear in declaring that the current levels of support, including the number of PMs, PM assistants and administrative staff, are simply not adequate to maintain the exceptional levels of productivity and quality of efforts that have been the hallmark of the LMSD administration to date.

This matter, brought up over three years ago, has now entered an even more critical phase. First, there continues to be no succession plan in place. Several programs are in serious jeopardy of complete failure if the one knowledgeable PM in charge were to retire or leave. The knowledge held by these individuals cannot easily be replaced. Second, the PMs simply do not have enough time to continue to push for the highest quality of science, given their vast competing administrative duties. The PMs are tasked with such an extreme load of basic administration, it is a wonder that they find time to stay abreast of their areas of expertise and, even worse, to stay broadly enough informed to manage to stay in tune with the rapidly expanding, constantly changing fields that they are meant to

oversee in LMSD. Third, although the prior COV made it clear that the level of funds for travel and the level of support required that would permit travel when funds are available is completely inadequate, this issue has not been addressed. The fact that these PMs oversee a research portfolio with a value in excess of 400 million dollars per year, and have, in the past, been provided with on the order of $4,000 per year per person for travel funds is ridiculous. The COV notes that this was increased to ~$6,000 per year in 2008, but it is not known if this will be sustained; even this increased amount remains of concern. The COV has learned that the new Associate Director of BER has undertaken her own evaluation of the travel situation and applauds her attention to this important situation. However, it is difficult to understand why it has taken so long for this matter to rise to this level of administrative oversight.

The COV was continuously amazed at the breadth of the PMs' efforts. In addition to the creation of research solicitations, the creation and management of review panels, and the subsequent communications (and documentation of such) with funded PIs and National Laboratories, they also engage in basic budgeting issues for each award and track budgets for the duration of the awards. The PMs must also plan and host investigators workshops, which are incredibly valuable to the investigators and DOE program managers as well. Finally, the PMs are tasked with all of the many requirements involved in running the COV. The COV is simply amazed at how the PMs are able to juggle this large and complex load with the limited support provided.

LMSD PROGRAM OVERVIEWS AND RECOMMENDATIONS

Genomics: GTL Program

Overview

The Genomics: GTL program employs a systems biology approach to develop the science technology and knowledge base to use plant and microbial processes to explore new energy resources and solutions. GTL research priorities include a focus on bioenergy and biofuels development, understanding the relationship between global climate change and ecosystem function, and the search for biological solutions to environmental problems including hazardous waste cleanup and carbon biosequestration. The GTL Research enterprise includes investigators at universities and National Laboratories, National User Facility, and the newly established Bioenergy Research Centers.

The approach of using systems biology methods to characterize, quantify, model and manipulate complex biological phenomena, in light of current bioenergy challenges, is timely and innovative. Genomics: GTL is making excellent use of, and contributing to, new technology developments in areas including

microbiology, genomics, proteomics, metabalomics, biochemistry, physiology, and other areas relevant to energy products, processes, and resources.

The GTL Roadmap document has been a useful tool for planning, strategizing, and conducting workshops to solicit community input on the important scientific questions, approaches, and major tools and strategies to address mission oriented, central problems in bioenergy research. In addition, the program has been responsive to emerging areas that require flexibility in the direction of research plans. For example, in response to the National Research Council report on the Genomes to Life program, the large facilities model was abandoned to initiate the new Bioenergy Research Centers. The responsiveness and turnaround to this sea change were remarkable and has resulted in the successful establishment of a new and very promising program. The ability of GTL staff to accelerate this response provides direct evidence of the vitality, acuity, and efficiency of this program and its managers.

The COV focused on GTL Funding Opportunity Announcements (FOAs) from 2004-2007, including 04-32 (Genomics:GTL), 07-12 (Lignocellulolysic material degradation and multiplexed screening for plant phenotypes), 07-13 (Quantitative microbial biochemistry and metabolic engineering for biological hydrogen production), and 07-14 (New genomic strategies and technologies for studying complex microbial communities and validating genomic annotations). The materials provided by LMSD PMs were excellent, providing a clear and thorough documentation of the review and awarding processes. There was a substantial increase in the documentation and reporting records available for the solicitation, review and awarding process, relative to what was available at the 2005 COV. Clearly, the LMSD PMs and staff resolved to solve the issues raised by the prior COV, and they should be commended for their responsiveness and dedication to these efforts. The PMs were ready and available to answer all COV questions and provide any supplementary materials requested during the current COV review.

Generally speaking, the mix of proposals in the FOAs reviewed by the COV covered a reasonably broad portfolio of mission-relevant research. There was a trend of soliciting and funding very large proposals in the early 04-32 call, with the 2007 FOAs targeting a more diverse and balanced set of target research areas and PIs.

Specific Comments and Recommendations

- The review process in GTL has evolved to become a thorough, complete, and fair process, with respect to both panel composition and written review quality, the overall assessment provided to the PI, and the documentation of the decision making process by the PMs. The membership of panels and *ad hoc* reviewers included a broad technical and scientific cross-section of leaders in the appropriate fields. There was some concern that in at least one

FOA case local reviewers (in particular for 07-12) were over-used. ***The COV commends the PMs for their focused attention on resolving this prior deficiency in process and procedure and recommends that they continue their diligent efforts in this critical area of administration.***

- The process for selection of proposals from originally submitted pre-proposals appeared fair. As explained to the COV, the decision making process to review the pre-proposals was based on a consensus-based review of pre-proposals by all relevant PMs, whose decisions were based upon on a combination of solid scientific basis, programmatic needs, and consistency. In general the pre-proposal process seemed an efficient way to provide quick feedback, avoid unnecessary work for applicants who missed the mark, and reduce the burden for panelists, reviewers, and PMs. ***The COV recommends that the PMs include in the "Summary of the review and selection process for proposals submitted…" a copy of the spreadsheet used by the PMs to cull pre-proposals, which would make the process even more transparent***.

- The reviews were generally consistent with priorities and criteria laid out in the program's solicitations, announcements, and guidelines. They were thorough, complete, and reflected responsible, expert and conscientious scientific review. The PMs' documentation for recommendations was complete, and the information and justification provided was thorough. The PMs also provided excellent documentation on the reviews and awards made. This effort represents a significant improvement over the level of documentation in the past. ***The COV commends this rapid and thorough turn-around in this area of administration and recommends that the PMs continue in their excellent efforts to create a transparent process.***

- The pace at which decisions were made and funding was awarded was better than is typical for most other agencies. The pre-proposal process seemed to increase the efficiency and facilitate this turn around. ***The COV was surprised by the ability of the PMs to maintain such a rapid proposal turn-around time, given the significant lack of adequate staffing. This outcome clearly reflects the dedication of the PMs to their research portfolios and scientists***.

- There was a minimum of three written reviews provided for every proposal investigated, and as many as seven reviews were obtained for some proposals. This is an outstanding level of high quality reviews compared to other agencies. The PMs were very effective in their use of outside expertise and *ad hoc* reviewers. Many of the panel members were well-recognized experts in their field, and their expertise covered the scientific and technological areas necessary for each solicitation. Their reviews, in the main, were critical, balanced and professional, and obviously provided the

PMs with important “domain expert” opinions on the recommendations for awards and declines.

- GTL has supported some revolutionary programs with high visibility, good publication records and reported products. However, most of the proposals and solicitations reviewed by the COV were awarded in the fall of 2007, so the quality of the work resulting from these awards is still, by and large, pending. Some of the earlier awards (2005) have already resulted in breakthrough research. In particular, Dr. Jill Banfield’s work is revolutionary and explores new areas of microbial community population genomics, ‘metaproteomics’, and evolution and variability in natural microbial populations. Dr. Derek Lovely’s research is likewise groundbreaking, and is focused in the areas of microbial fuel cells, systems biology of Geobacter and metal reduction in the laboratory and in natural environments. The molecular details (including physiology, transcriptional regulation, flux analysis and environmental variability) of metal respiration in Geobacter have provided important insights into areas relevant for the creation of microbial fuel cells and uranium immobilization and/or remediation. The research of Dr. Harley McAdams, Dr. Lucy Shapiro and collaborators has resulted in high quality, high profile results that has led to a number of new insights into cell signaling pathways and the regulation of cell development, transcriptional regulation, and control and modulation of complex intracellular biochemical networks. ***The COV commends the PMs for directing the funding opportunities and supported research efforts in areas that have yielded such significant and substantial mission-relevant results.***

- The size, scope, and duration for the projects in GTL in 2007 trended towards a more balanced mix of multi-investigator large and medium sized single PI proposals. The greater number of FOAs and proposal awards in 2007 resulted in a better balance of new high-risk technologies and older technologies in novel but less risky configurations. The use of more medium-sized awards allowed the funding of more PIs, more diverse technologies and approaches, and resulted in a broader portfolio of science and technology applications. ***The COV urges the PMs to continue to seek such a broad mix of high to low risk and small to large research projects in its portfolio.***

- With respect to program management, there have been dramatic improvements over the past three years in terms of the documentation of the solicitation and review processes. However, the (somewhat arcane) FWP format required by the National Laboratories does not seem sufficient in some cases to evaluate the progress made from funds awarded to the National Laboratories. ***The COV recommends that the LMSD require a more appropriate manner of review, even if it is in addition to the format formally required by the National Laboratories. It is simply not possible to compare the relative progress made by these different avenues of***

funding, which is a critical component to the management of such a diverse portfolio.

- The GTL has been very pro-active in identifying and funding emerging technologies. As an example, LMSD emphasized systems biology approaches as far back as 2000, well before most other agencies had identified this opportunity. Newer examples of this ability to respond to the rapidly changing opportunities in the research arena include the LMSD focus on microbial community analysis using genomics and proteomics, the microbial fuel cell work, and the new emphasis on biomass conversion. The overall program planning of LMSD is forward looking and effective. ***The COV recommends that the DOE administration recognize this remarkable talent in their PMs and provide more substantial support, in terms of staff, time and travel resources, to ensure that the PMs are able to maintain this "finger on the pulse" ability that they have demonstrated in the past.***

In closing, the GTL is a 'crown jewel' in the repertoire of LMSD-funded research. Indeed, it is a star in the entire Office of Science portfolio. The quality of the planning, management, and oversight by PMs, and the quality and utility of the resulting scientific and technological products, is outstanding. The program is vibrant, vital, and should continue to be carefully nurtured. The resourcefulness, responsiveness, and rapidity of the PMs in laying the groundwork for, assisting in the FOA development and review, and instantiation of the new Bioenergy Research Centers, represent an extremely strong case in point.

Bioenergy Research Centers

Overview

The three newly created Bioenergy Research Centers are a stunning example of the dexterity and flexibility of the LMSD Program Managers. In response to strong interest from the President, the LMSD, in collaboration with other DOE offices prepared an FOA in fall of 2006, which called for the creation of two LMSD-based research centers. The vision articulated in the FOA was that these centers "develop novel biological solutions for the production of such fuels as cellulosic ethanol or hydrogen or for other groundbreaking bioenergy research with the potential to revolutionize biology-based energy production." The expectation was that these centers would have annual budgets of $25M per year for five years and that two such awards would be made. The President recommended that three such centers be developed and the necessary money was provided.

Proposals were solicited through the single FOA, and GTL requested, but did not require, a letter of intent or a pre-proposal. The FOA gave clear instructions as to

the fundable scope, acceptable missions, and required content. Further, the LMSD staff expedited the review process by answering reviewers' questions and concerns early in the process. Proposal review occurred in two stages. Twelve proposals were received, and a panel was assembled that represented expertise in the areas covered in the proposals. The proposals were ranked and approximately 10 PMs from LMSD selected four proposals for a second round of review, based upon a combination of scores and written reviews.

In the second round, three projects were strongly supported using the same procedure as the first round. The relevance of reviewer expertise, conflict of interests and timing conflicts resulted in a slightly smaller panel for the second round of evaluation. It should be noted that the projects ultimately selected were ranked in the same order in both review cycles. The use of reverse site reviews was an essential component in the success of this process. Each PI was allowed to make a brief presentation, which was followed by a question and answer period. The review panel and LMSD staff were constrained by the requirement that they ask only questions of "clarification", and reviewers were coached by the staff on how to ask questions consistent with this constraint. This process allowed panel concerns to be addressed by the applicants and permitted the panel to see how effectively each group worked together.

Specific Comments and Recommendations

- The COV was impressed with the efficiency of the review process. Proposals were received February 1, 2007 and the two-staged review, which included a reverse site visit, was completed by May 31, 2007. After each panel met, LMSD PMs quickly evaluated the recommendations and made their funding decisions. The Under Secretary was able to publicly announce the awardees before July 1, 2007. ***The COV commends the LMSD PMs and staff for the remarkable speed and thoroughness achieved in this review, especially given the size of the budgets and the multi-disciplinary and multi-institutional nature of the proposals.***

- Overall, the COV felt the quality of the reviewers was high and the reviewers gave detailed, informed reviews. It was unfortunate that many of the leading scientists in the area of biology and molecular biology of cell walls had submitted proposals, thus depleting the pool of potential expert reviewers. To counter this weakness, reviewers included foreign experts.

- The COV was somewhat concerned about the low percentage of engineers on the panel. However, the COV appreciates the challenge of finding reviewers and felt the balance was certainly reasonable. Each proposal was reviewed by at least three reviewers, often by more, and all were required to vote. Most reviewers were available for both review cycles.

- The quality of the resulting research portfolio is outstanding. Although it is true that the scientific community in the targeted areas (bioenergy science and technology) is limited, the COV felt that the three BRCs that received funding have sufficient expertise and strengths in the relevant areas of research that it is clear that first class research will result.

- The awards are commensurate with concerted initiatives of this scope that involve not only theoretical and computational work but a large component of experimental and field studies. It was recognized by some reviewers that the large-scale production of bio-fuels would likely not be feasible in the 5-year span of the projects. However, the centers will likely be funded beyond the 5-year commitment, contingent upon satisfactory progress and based upon a review in their third year and the availability of funds. Given the large initial investment, plans for support beyond five years seems a reasonable continued commitment, provided that scientific progress is significant and timely, and the proposed research incorporates new ideas, methodologies as they emerge in this rapidly growing field***.***

- The PMs did an outstanding job in putting this program together in such a short period of time. Further, the LMSD has taken an aggressive stance in the development of the management plans for these centers, which were developed with input from several sources within the DOE Office of Science. Nonetheless, the COV is concerned about several components of the management plans. First, the PMs in LMSD do not have experience with managing Centers of this size and complexity. Second, the management of one such Center would be taxing to this already over-taxed staff. The management of three such demanding centers seems almost impossible in the current staffing situation. Currently, the LMSD PMs conduct one-hour telephone teleconferences with each center every other week in which time is allocated to scientific (75%) and administrative (25%) issues. They also spend a significant amount of time photocopying, creating spreadsheets, and performing routine lower level staffing duties. Clearly their time is better spent communicating with the scientific community about advances in the relevant areas of research and monitoring the funded projects and their scientific outputs. ***The COV recommends that the PMs involved in the management of the BRCs be released from some significant amount of their remaining duties, so as to provide more time for them to nurture and engage these valuable investments and help ensure their success. Further, they should receive additional support staff to help manage such a complex combination of awardees. An investment of $75 million per year for five years demands this level of attention to detail. Current staffing levels simply will not permit the level of support these centers require and deserve*****.**

- A second concern is that the LMSD PMs should have mechanisms in place to formally evaluate the organizational aspects of the centers and their

effectiveness and be prepared and able to modify Center procedures should they prove ineffective or problematic. ***The COV recommends that there be extensive oversight of these centers, that there be strong scientific advisory committees, and that a rigorous set of evaluation procedures be established that will provide frequent feedback and ensure that the activities of the BRC remain on track. It is expected that LMSD will conduct annual site visits and reviews of the three BRCs. It is imperative that LMSD provides sufficient support to enable these site visits.***

- Genomics is foundational in these projects, and it is clear that the BRCs will need to work with the Joint Genomic Institute (JGI). To facilitate this collaboration, some discretionary funding was allocated to JGI. ***The COV recommends that this collaboration receive the same oversight as the BRCs, to ensure that the Centers are provided with the required sequencing support.***

Computational Biology

Overview

It is abundantly clear that the generation of vast amounts of raw biological data (microarrays, sequences, etc.) will continue to accelerate. However, the value of these data depends entirely on our ability to extract meaning at a rate that keeps pace with data generation. Furthermore, the integration of data at various temporal and spatial scales--from the molecular to the ecosystem level-- still awaits the development of tools, models and visualization techniques that will define 21st century systems biology. The computational biology program has the potential to serve as the hub of many of the biological research activities sponsored by the DOE. It can potentially play a major role in the automated annotation of the large amounts of sequence and metagenomic data being generated, can coordinate the development of genomic and metagenomic tools, can oversee uniform data formats that permit integration of disparate data sets. To do so, however, requires a clarification of the role and responsibilities of this program vis a vis other components of the DOE Bioscience and a thoughtful definition of the objectives of the program -- objectives that will complement, rather than duplicate or compete with large ongoing initiatives at the NIH and elsewhere, and that visibly enhance the DOE mission. The COV feels that the program must be emancipated from the program objectives and solicitations of the supercomputing programs at the National Labs. While the availability of supercomputing facilities is an undeniable asset to the biocomputing efforts at DOE, scale and platform appropriate software development and modeling should be encouraged.

Specific Comments and Recommendations

- ***The COV recommends that the LMSD consider a significant increase in the levels of funding for the CB Program.*** This area of support is critical to the success of many of the existing LMSD research programs and projects and deserves significantly more funding and attention if there is to be any hope of capturing the depth of information resulting from the already immense and rapidly growing focus on functional genomics, proteomics and systems biology of most LMSD research.

- ***The COV recommends this program be decoupled from DOE's supercomputing program.*** Most biological problems do not require the level of hardware provided by the supercomputers. Further, most biologists do not have ready access to supercomputers, so it is unlikely that analytical approaches developed which require that platform will be generally useful to the community. This is particularly significant if the focus of CB remains on providing support, rather than engaging in basic research.

- ***The COV recommends that the PM be provided with an assistant in order to provide the appropriate level of oversight.*** Not only would this permit the PM to create time to interact with and learn from the computational and biological communities, but will also help ensure a reasonable succession strategy so the program is not orphaned due to some un-anticipated departure of its only PM.

Structural Biology Facility Program

Overview

The Structural Biology Program of LMSD supports research resources for scientists at synchrotron and neutron sources, which in turn leads to determination of three-dimensional structure information. Currently funded research resources include those at the National Laboratories at Argonne, Brookhaven, Los Alamos, Lawrence Berkeley, Oak Ridge, and the Stanford Linear Accelerator Center. Structural biologists started using DOE neutron sources and synchrotron light sources around 1970. By the early 1990s there was a significant expansion in SB-related activities and a new focus on the relationship of molecular structure and biological function. The level of community interest and use in the SB Program has continuously increased since its inception and there are no signs of this interest abating any time soon. In every case, the facilities being used by this community were built to serve other scientific and technical needs, but the importance of the biological studies they have enabled has become increasingly obvious, even to these other constituencies.

The SB Program is charged with the difficult task of ensuring that biological interests are served at these large DOE-supported facilities. On the one hand, the lion's share of the cost of constructing and operating these facilities is borne by an entirely different part of DOE, which raises several intra-agency problems. In particular, how can LMSD, which contributes a comparatively small fraction of the DOE-based investment in the SB Program, ensure that the biological research community has the access to SB facilities that it deserves, particularly when construction and operating decisions for the National Laboratories investment in SB are made outside LMSD? On the other hand, LMSD does not have a budget large enough to build, maintain, and operate all of the beamlines at these facilities that the biological research community is actually using. For this reason, the SB Program must coordinate its funding activities with those of other sponsors, most notably NIH. The inter-agency negotiations required to make this happen can be challenging.

On the whole, the *ad hoc* system that has evolved over time for handling these intra- and inter-agency challenges has worked extremely well. The PMs have been making good decisions about how SB should proceed in this area, and they should take pride in the results achieved. DOE-sponsored light sources are serving the nation's structural biology community very well.

Specific Comments and Recommendations

- ***The COV recommends that BERAC consider establishing an advisory committee for SB, whose primary purpose would be to provide expert advice on a regular basis with regard to strategic planning, particularly with respect to technique and facility development at the national laboratories.*** The PMs would consult with this SB Advisory Committee regarding all specific program solicitations.

- ***LMSD should play a principal role in the development of facilities for x-ray spectroscopy, x-ray scattering, and x-ray crystallography optimized for applications in structural biology at the National Synchrotron Light Source II (NSLS II) currently under development at Brookhaven National Laboratory (BNL).*** While the involvement of NIH may be necessary and/or desirable, BER should take the lead on this important project.

- The development of pixel-array detectors is essential for most efficient data collection at the count-rates provided by high-brightness synchrotron x-ray and spallation neutron sources. While DOE has invested substantially in this development, it is somewhat discouraging that the first devices for the user community have recently been produced and commercialized abroad. ***The COV recommends that DOE explore how this occurred, in light of the federal technology transfer mandate, given this substantial investment, and steps should be taken to ensure that this loss not be repeated.***

- ***The COV recommends that the BER should have a much stronger presence at the SNS/ORNL, in the areas of neutron scattering, neutron reflectivity and neutron crystallography, as applied to critical problems in structural biology.*** The latter, for example, would build upon the demonstrated success of the Protein Crystallography Station at LANSCE/LANL that provided the critical demonstration of this capability for a pulsed neutron source.

- ***The COV recommends that the SB program remain focused on the more general area of structural biology, rather than more narrowly on the needs of any specific program(s), such as GTL.*** The past and future contributions of BER to the development of user facilities at the national laboratories has been, and should continue to be, more broadly focused to include all aspects of structural biology.

Radiochemistry and Instrumentation Program

Overview

From its inception in 1946 through 2005, the RI program under the Atomic Energy Commission and its successor, the Department of Energy, has carried out a Congressional mandate to develop beneficial applications of nuclear and other energy-related technologies for medical diagnosis and treatment. The RI Program has supported fundamental basic science that forms the foundation upon which advances in radiotracer and imaging instrumentation have been transformed into medical applications. Transformation of the fundamental knowledge generated through the RI programs by NIH, Medical Foundations, and Industry has fostered advanced life-saving medical procedures that are now performed in millions of patients annually. It can be argued that the RI Program has had a greater impact on human health than any other single pursuit at DOE. Cases in point include the development of ^{99m}Tc, PET, SPECT, and targeted radionuclide therapies. The diagnostic and therapeutic benefits to the citizens of the United States, as well as patients worldwide, represent one of the great success stories of the DOE.

The COV affirms that the research supported by this program is of fundamental importance in the development of nuclear medicine and molecular imaging, and it has provided many of the basic technologies necessary for the advancement of these fields. In the past few years, DOE has demonstrated a trend to eliminate funding for efforts perceived as medical science research, with the first steps involving the elimination of most of the radiochemistry/instrumentation budget and the merging of the Life and Medical Sciences Divisions. The COV was informed that the next step in this process is to eliminate medical sciences from the LMSD portfolio, and focus radiochemical expertise on plant and microbial

imaging. This course of action has led to no solicitations or major awards over the FY05-07 review period.

The Office of Science and the National Institutes of Health requested that the National Academy of Sciences perform a comprehensive review of the status of Nuclear Medicine in the United States. This comprehensive study resulted in the publication of a book entitled “Advancing Nuclear Medicine Through Innovation”. A key recommendation derived from the NAS review was reinstating DOE-OBER support for technology development that serves as the platform upon which Nuclear Medicine and Molecular Imaging is advanced. The NAS report also recommends that the DOE and NIH coordinate their respective activities with DOE focused on general development of technology and NIH focused on disease-specific applications. The COV feels that it is ironic that at a time in which the US economy faces severe threats from raising health care costs that the DOE is divesting itself from key fundamental technology development that holds great promise as a platform that can be translated into clinical procedures for guiding individualized patient therapy and thereby eliminating expensive, ineffective procedures.

Throughout the life of this program critical funding has been provided to five national laboratories and some 25 universities to support basic radiopharmaceutical research and high-resolution PET, SPECT, and hybrid imaging instrumentation. Historically, the RI program has been well managed with the scientific agenda driven through workshops and interactions with key scientific leaders in the Nuclear Medicine field. The RI program managers are commended for the manner in which this program has been managed over its life with specific recognition of the great effort made to preserve this important program during the dramatic funding reductions that have occurred during the current reporting period.

The COV recommends that the DOE-OBER continue to support basic research that builds on unique DOE capabilities in physics, chemistry, engineering, and computational science. The DOE should support fundamental imaging research, maintain core infrastructure for imaging research and development, including innovative imaging technology with respect to new radiochemistry and radiotracer methodologies for dynamic metabolic and molecular imaging of biological systems for nuclear medical applications. BER should also explore the application of these imaging technologies for the study of plant and microbial metabolic networks and the regulatory systems underlying cellular differentiation, specialization, and interactions with the environment.

Specific Comments and Recommendations

- The program has routinely conducted workshops involving experts from the scientific community to prioritize areas of critical research needed for solicitations, and hold panel reviews for both solicitation and major-program

reviews. **We find that the quality and effectiveness of the review processes in radiochemistry and instrumentation have been well optimized based on decades of funding outstanding programs.**

- However, the dramatic, reduction in funding over this latest review period has stressed the process to the breaking point and will have the longer term impact of seriously hindering the development of molecular imaging over the next decade. Even the recent solicitation for FY08 is a solicitation for one-year pilot projects, which shows a lack of commitment to this historically rich area of instrument development at DOE.

- The 2004 BNL review and the 03-14 solicitation were the main activities examined by this COV. In both cases, the resulting review panels consisted of more than 10 reviewers, from a variety of multidisciplinary backgrounds and were balanced across disciplines and institutions. Reviewers were experts in the disciplines represented in the solicitation description. There was little overlap in the participants of the two review panels examined.

- When the RI program was fully funded (FY05), there was an appropriate mix of multidisciplinary projects, spanning chemistry to instrumentation to direct medical applications, and there was an appropriate balance of innovative proposals. This changed somewhat in the funding crisis of FY06 and continuing through FY07, as no new proposals were funded. The decision to keep one strong project alive at the Brookhaven National Laboratory (BNL) was a good one, in that it maintained an internationally recognized multidisciplinary team that covers all the major disciplines in this field.

- For the one program consistently supported in this period (BNL), the research quality is exceptional, and the project portfolio is multidisciplinary and comprises an appropriate mix of innovation, with high, medium and low-risk efforts. Another program that appeared in the portfolio for one year (MIND Institute) was historically an earmark and was included in this portfolio, in our view, by irregularities in the portfolio envelope, which was driven down to essentially one project the year before.

- Historically, the RI program has been well managed, with some documentation of annual reports and reviews by the program manager. The PM has a technical background in this area and is kept up-to-date in the field through DOE-sponsored workshops and interaction with the nuclear medicine community.

- Over the years, the program management in this office has been very closely linked with the Principal Investigators and institutions where the program has major investments. The positive side of this focus is that investigators and institutions can count on DOE for flexible, loyal support. The down side of this

system is that it is difficult for new institutions or programs with fundamentally new ideas to break into the program.

- With the exception of the FY06-07 period (where funding was not available), the RIP responsiveness to emerging research has been good. In fact, DOE funding has supported much of the work done at the absolute cutting edge of this field, as evidenced through funding of such areas as exotic methods of radioisotope reactions (microfluidics), exotic metals for diagnostics and therapy, and small, mobile animal imaging.

- This program is truly workshop-driven, with the scientific community providing excellent scientific input to drive research priorities. This was demonstrated for both the FY03 and FY08 solicitations. However, the shortage of funds produced by the FY06 budget resulted in support only to the Brookhaven National Laboratory. **The COV believes that the decision to support one institution in a significant manner, versus the alternative model in which several programs would be funded at sub-critical levels, was sound.** Previous peer reviews had clearly demonstrated the superior strengths of the BNL-based RI program and made it the logical choice to receive the limited funds available. However, the selection of a single flagship institution was apparently not done through a peer-review process, rather, the decision was made from within the BER. In fairness to the RI program managers, the decision to cut the funding to this program was a difficult one and outside review committees are not always the best venues to resolve such difficult decisions.

- It can be argued that the RI Program has had a greater impact on human health than any other single pursuit at DOE. Cases in point include the use of Technetium-99m, PET, SPECT, and targeted radionuclide therapies, which all had their origins in this program. Millions of patients benefit from these procedures every year. The program also directly serves future national priorities. The availability of affordable healthcare is a top priority of the United States and effective, early diagnosis promises to be one of the most effective ways to reduce health care costs. Molecular imaging is one of the main scientific avenues being pursued to accomplish this. Basic radiochemistry and instrumentation research provides the platform upon which molecular imaging is developed and translated to patient care.

- **The question can be raised as to whether the RI program addresses current DOE mission needs. The answer to this COV is a resounding yes.** The niche of the DOE has always been the peaceful (often medical) use of the atom, including the fundamental infrastructure on which nuclear medicine and molecular imaging is based. There is no substitute sponsor for this work. The RI program certainly relates to many well-funded efforts across the NIH. However the structure of the NIH is not suitable to support basic

radiochemical and instrumentation research itself. The DOE is the only agency able to meet this critical national concern.

- When the decision to significantly cut the funding to this program was made, several areas of RIP research were imperiled, including:
    - Microfluidics for radiochemical production
    - Basic copper isotope chemistry for diagnostics and therapeutics
    - Detector technology development (high spatial resolution, high detector sensitivities) that enables the transition from *in vitro* experiments to *in vivo* small animal trials, which provide an indispensable step in the translational pipeline from basic research to patient care.

- In the past, and to some extent in the 03-14 solicitation, the RI Program has ventured into the medical imaging agent/drug development territory. **The COV believes that this departs from the fundamental radiochemical instrumentation mission of the program and raises the most significant questions concerning potential overlap with NIH missions.** One path forward would be to refocus on developing a strong program in basic radiochemistry and radio-instrumentation over a broad range of potential applications, including medical ones. The downside of this path is that it has a less direct link with disease diagnosis and patient response. The upside is that it is more consistent with overall Office of Science themes.

Artificial Retina Project

Overview

The Artificial Retina Project is an example of how the assets of the National Laboratories and the oversight of the LMSD Program Managers can be leveraged to tackle some of the more technically demanding challenges to human health, i.e., restoring sight to the blind. This project involves contributions from four National Laboratories, three universities and one private company. Each entity has its own culture for conducting research and, although the group has a focused goal that guides the research efforts, the paths traversed to accomplish this goal are diverse, with often conflicting constraints, which has presented numerous challenges to the project management. Not only has the PM risen to these challenges and produced a cohesive effort, he has produced a team whose results have surpassed all expectations for the program. Further, and perhaps even more remarkable, he has successfully managed the negotiations required involving complex intellectual property rights.

The COV spent a considerable amount of time trying to understand what attributes of the program contributed the most to its success. First, the PM has a good understanding of the talents the National Laboratories could bring to bear

on the problem. Second, he had a vision for how the resources of the National Laboratories could be employed to address one key challenge with respect to human health, the ability to create an artificial light and motion detecting prosthetic, the artificial retina. Third, the PM had support from the upper levels of DOE administration. Fourth, he has the personal skills and knowledge to be able to successfully negotiate the required IP agreements, without which the project would have failed in the initial stages. Finally, the project has a well-qualified clinical champion and public communicator and a well-connected commercial champion.

The process involved in the development of the artificial retina involved harnessing the talent and tools available at several of the National Laboratories to address problems related to micromachining electrode arrays, creating electronic devices that can service hundreds of electrodes and yet be small enough for implantation in and around the eye, and packaging these electronics to long-term immersion in a saltwater environment. The universities contribute to the device construction and clinical implementation. The private company drives the reliability and manufacturability of the device and also handles the regulatory component of the program.

Specific Comments and Recommendations

- The major challenges to the Artificial Retina Project are two-fold. First, the DOE has made a decision to terminate this project in the near future (~ 2010 time frame). This decision is the result of a perception by the DOE administration that there is a duplication of efforts in this area by the NIH. However, it is important to understand that the AR Program is focused on technological issues related to device manufacture, while the NIH is focused on the neurological aspects of artificial vision that include the types of neural structures excited, characterizing the visual perceptions, the psychophysics of coding visual information, and tissue reactions to implanted devices.

- Second, a critical link in the timely success of this project involves the ability to deal with complex issues involved in intellectual property. The program manager must be on top of this matter and, in particular, remain focused on finding where to turn for solutions to the constantly changing IP issues that need to be addressed. He must know with whom to consult, and when, to ensure the smooth management of the project. Indeed, the PM is the critical link in identifying problems and finding a suitable resource to solve them. It is impossible for him to maintain such focus given his current lack of travel support, and equally important, his lack of administrative support. He needs the flexibility to attend AR project meetings, have the time to maintain close communication with all of the key players, and stay abreast of developments in the field.

- The COV is surprised and somewhat disturbed that such a stunning success story, which highlights the abilities of our National Laboratories, the personnel in LMSD, our nations universities and the private sector to join forces to address a significant human health challenge, and which has had such significant success in every aspect of the endeavor will soon be terminated. The rationale behind this decision was not clear to the COV.

Carbon Sequestration Project

Overview

The Carbon Sequestration Project was initiated in 2002 and emphasizes basic research into carbon sequestration mechanisms. The oldest competition reviewed was 05-10, which concerned Poplar Genome-Based Research on Carbon Sequestration and focused on approaches to improve productivity and slow degradation of biomass. Pre-applications were not required but 25 were received. Feedback was given to PIs by the PM, especially when the topic or methods were not responsive to the RFA and DOE mission. Sixteen full proposals were reviewed by a panel of 10 scientists, representing all of the research areas highlighted in the RFA. The panel members were from four national labs and six universities.

The documentation regarding the application and review process was thorough. At least three detailed panel reviews were obtained for each proposal, and these were provided to PIs. Records of post-panel correspondence with successful PIs was maintained, documenting replies to reviewer comments, improvements in the work plans and changes to the budgets that reflected changes in the work plans. In at least one such case the budget was increased to accommodate changes in technology suggested by the panelists. The resulting portfolio broadly represented the areas of science targeted in the solicitation. Three applications were received from national labs (one of which was funded and which received 25% of the total funds) and 13 from other institutions (seven of which were funded, including a collaboration between a company and university).

Plant Feedstock Genomics held two competitions that were reviewed by the COV (06-03 and 07-03), which were done jointly with USDA CSREES (BER-DOE was the lead agency in both years). The goal of this solicitation was to fund projects ranging from genomics-enabled systems biology to plant breeding and biotechnology. Community input was solicited through workshops, discussions at professional society meetings, and at inter-agency working group meetings. Pre-applications were required.

In the first year of the RFP, 105 pre-applications were received and 26 full submissions reviewed. In year two, 101 pre-applications were received and 29 full proposals reviewed. DOE and USDA personnel solicited NSF program staff

input into pre-proposal vetting, and NSF staff were observers at both panels. In both years the panels were composed of 9-10 highly qualified reviewers representing the range of expertise described in the program solicitations, and at least three reviews per proposal were obtained from these individuals. The PM wrote panel summaries for each reviewed proposals, and these were provided to the PIs along with panelist reviews. A total of 20 awards were made, one to a lead PI at a DOE National Laboratory. In cases where the PM did not follow the advice of the panelists, there was a written record that clearly articulated the reasons, which were generally concerned with creating a balanced scientific portfolio and leveraging DOE investments into switch grass sequencing. However, the reasons given to the PIs for declinations were not always clearly spelled out. The summaries of the panel make up and funding decisions/portfolio balance provided by each program officer were extremely helpful to the COV members.

Specific Comments and Recommendations

- ***The COV appreciates the thorough documentation provided for the proposals processed through the 05-10 solicitation and recommends that this level of documentation become the standard for both the Carbon Sequestration and Plant Feedstock Genomics programs.***

- ***The COV applauds BER for investing in these two programs. However, the COV recommends that the level of investment should be increased to more adequately fund research in this area of critical national need.*** With the current national focus on biofuels as a potential supplementary energy source, it is imperative that funds be made available to support further study of the impact that biofuel production will have on atmospheric CO_2 levels and carbon sinks. This information is required immediately and only a large investment by DOE is going to provide the level of detailed required.

- ***The COV enthusiastically supports continued joint funding opportunities between DOE and USDA, and encourages the two agencies to consider including a special programmatic focus on understanding how crop plants will respond to future predicted climate fluctuations and breeding varieties adapted to projected climate extremes.***

Joint Genome Institute

Overview

JGI was created in 1997 to merge the sequencing capabilities of three of the National Laboratories that had previously been involved in the Human Genome Sequence Project. Currently, JGI is a partnership of five-laboratories (LANL,

LBNL, LLNL, ORNL and PNNL) and one university (Stanford). The JGI mission is to "advance genomics in support of the DOE missions related to clean energy generation and environmental characterization and cleanup" by providing "integrated high-throughput sequencing and computational analysis that enable systems-based scientific approaches to these challenges."

Since 2000, sequencing services of the JGI have been offered to the scientific community through the Community Sequencing Program (CSP). According to the JGI website, in FY 2007, approximately 55% of JGI sequencing funds were devoted to CSP, 25% to BER Microbial Genome sequencing, 15% to the Laboratory Sequencing Program and 5% to the JGI Director. The COV was asked to review aspects of the CSP, as well as the Field Work Proposals (FWPs) of the participating national labs.

Specific Comments and Recommendations

- The COV emphasizes that the sequencing services offered by the JGI to the scientific community represent an unparalleled resource. Through the CSP program, JGI has delivered sequences for microbes, plants (poplar, soybean and sorghum) and metagenomes for samples such as compost, bioreactors and the termite hindgut. ***The COV recommends that the JGI maintain this high level of community involvement through the CSP program.***

- The JGI should be at the forefront of innovative informatics efforts to support its growing sequencing capacity. Current investments in informatics development fall short of what is needed. As more complex genomes enter the JGI sequencing pipeline and next generation sequencing becomes the norm, JGI must position itself to provide high-quality sequence data that is immediately usable for its stakeholders. ***The COV recommends that JGI's investment into informatics be increased significantly, not just to keep pace with current sequencing demands, but also to anticipate future needs associated with data generated via next generation sequencing.***

- The current review mechanisms for the CSP seem to work well overall. However, the COV noted two aspects of the review process that deserve attention. First, the panels are disproportionately filled with scientists from the San Francisco Bay area. Although the previous COV commented on this problem, the bias was still evident in the 2005 and 2006 review panels. In 2007, the geographic distribution of the reviewers was more balanced, but still contained a high proportion of California residents. Even though these Californians represented multiple institutions, the regional bias could lead to a perception of conflict of interest, and should be avoided in the future. ***The COV recommends that LMSD require a more balanced portfolio of CSP panels and actively engage in ensuring an immediate resolution of this inadequacy. This is an easy problem to solve and should have been accomplished by the 2006 review panels.***

- The second aspect of the CSP review process that deserves attention is the nature of the reviews provided for the CSP proposals. Although usually pertinent, the reviews were extremely short. The COV assumes that the format of these reviews reflects the instructions that the reviewers are given (although we did not have access to the charge to reviewers used by the JGI). We urge the JGI not to miss the opportunity to get more thorough information from the reviewers that includes not only the mission relevance, but also the biological importance of the proposed sequencing effort. ***The COV recommends that the CSP program adopt the same type of rigorous review procedures–with thorough documentation–used by other programs in DOE or similar sequencing programs that have been funded by the National Science Foundation (e.g., Microbial Sequencing or Comparative Plant Genomics).***

- The precise role of LMSD in administrative oversight of the JGI should be clarified. The organizational chart on the JGI website does not acknowledge any administrative effort by DOE. The CSP program seems to be administered nearly exclusively by JGI with the involvement of the DOE PM limited to final veto power of proposals based on mission relevance. The role of DOE in evaluation of the national laboratory FWPs is similarly fuzzy. The documentation provided to us did not make it clear that the external review of the national lab contributions was anything more than perfunctory. This is unfortunate, as the reviews we saw were substantive and could have provided a sound basis for improving the performance and capabilities of the JGI program. ***The COV recommends that the DOE provide a more hands-on approach to administration of the JGI, at least those portions funded by LMSD.***

- ***We concur with the previous COV recommendation that JGI consider how its resources could be used to support some "big science" sequencing efforts. We urge JGI to consider soliciting community ideas for large-scale transformative sequencing projects.***

- We understand that some of the sequencing capacity of JGI will be devoted to the needs of the newly formed BRCs. ***The COV urges DOE to ensure that this increased requirement is not met at the expense of the community-available sequencing***. This incredible resource is of immense value to the scientific community, and DOE should be commended for making it available.

Low Dose Radiation Research Program

Overview

The Low Dose Radiation Program is unique in that it supports research on the biological effects of radiation doses less than 0.1 Gy. Doses in this range are of particular concern as nuclear power is being reconsidered as a partial solution to the country's energy needs. Human health risks from these lose doses are generally perceived by the public to be much greater than is supported by epidemiological data. In fact, increases in cancer incidence due to these low level exposures are difficult, if not impossible, to detect against the high cancer incidence already present in un-irradiated populations. This is currently an area of great controversy in the field.

The Low Dose Program supports animal, tissue and cell culture (both monolayer and 3D) studies of molecular responses to ionizing radiation. The COV noted that at the start of this program, the prevailing thought was that radiation effects would not be detectable below 0.2 Gy. The Low Dose Program has not only shown that the effects can be seen, but that they are complex. Seminal findings supported by this program include the revelation that the mechanisms in cellular transformation/carcinogenesis appear to differ between low and high radiation doses, and the observation that irradiated cells in a Petri dish may display characteristics of cancer cells, but behave perfectly normally in tissues, where their behavior is governed by their neighboring cells.

Specific Comments and Recommendations

- The Program Manager is to be commended for her vision and leadership of the Low Dose Program. Her background in radiation biology and radiation physics and her experience as a researcher are considered to be definite assets to the program. It was clear that she is dedicated to ensuring the success of the program. The COV felt that the recent addition of support staff to the Program will be a help, given the heavy workload and tight schedule associated with managing a program of this size (over 70 grants).

- The review of applications is now lead by the chairman of the review panel, as recommended in the previous COV report. The review panels are comprised of researchers with appropriate experience, and include members of both genders, national laboratories and universities, and from throughout the United States.

- Evidence of the quality of research supported by the Low Dose Program includes over 500 publications, including many in high-profile journals such as *Cell*, *Nature Reviews Cancer*, *PNAS*, *Radiation Research*, *Molecular Cellular Biology*, and *EMBO Journal*.

- Although the Program already funds innovative proposals***, the COV recommends increasing the number of small pilot projects to ensure that riskier ideas have a chance to be tested and developed for larger scale support.***

- The Program supports an appropriate balance of investigators from National Laboratories and universities, new and experienced investigators located throughout the United States and representing various disciplines, including multidisciplinary teams. Additionally, funds were earmarked for "Glue" Grants that support innovative and collaborative postdoctoral fellow and graduate student research.

- ***The COV recommends that the PM be provided with additional support in terms of travel funds and time to attend relevant national and international meetings***. This is essential because of the importance of the Program Manager's scientific expertise in ensuring the continued success of the program.

Ethical, Legal, and Social Issues Program

Overview

The important role of research on the ethical, legal and social implications of research programs in the natural sciences was recognized at the outset of the Human Genome Project. It was subsequently recognized as equally important to the overall mission of the DOE.

The original focus of ELSI in DOE concerned genetic privacy, complex traits, human subjects, intellectual property and education. The solicitation in FY2004 concerned Genetics in the Workplace, Complex & Multiple Traits, and Innovative or Exploratory Activities, and was reviewed by the previous COV. The most recent solicitation, in FY2007, concerned the ethical, legal and societal implications of research on alternative bioenergy technologies, synthetic genomics and nanotechnologies. Twenty applications were received and, based primarily on the ratings resulting from the *ad hoc* review panel, ten projects were approved for funding. Seven of these funded projects were in the area of bioenergy, two in nanotechnology, and one in synthetic biology. An additional application on the topic of communication/education was funded as a renewal of a previous solicitation. Overall, the solicitation and *ad hoc* review process appears to have worked well, although the senior PM would have liked to see more applications in the area of synthetic biology.

Specific Comments and Recommendations

- It would be helpful if the timing of the solicitation and review process would permit the program manager to obtain investigator responses to the reviews. There were instances of reviewer errors that could have been easily clarified by the PIs, if time permitted.

- ***The COV recommends that BERAC consider establishing a scientific advisory committee for ELSI, which would aid the PM in the development of solicitations. The membership of the advisory panel should include expertise in social sciences.***

- ***The COV recommends the gradual expansion of this important program, provided that the solicitations can be refined to generate a larger number of applications worthy of funding.***

Workshops

The workshop review process is streamlined, and as best as the COV could tell, optimized to opportunistically provide as much workshop/conference/session support as possible within the available funds. Review processes are streamlined to a 1-4 in-house reviewer system, which is documented for each submission. This system allows for fast request-to-funds times of 2-3 months. Sponsoring workshops and conferences/sessions is a very important activity for DOE OBER because of its high leverage in improving communication and collaboration in the scientific community.

SBIR/STTR Projects

The SBIR and STTR competitions are primarily managed through the DOE SBIR office. Program offices such as OBER yearly update the Phase I call topics, which are later announced through normal DOE channels. Following receipt of the applications, they are distributed to technical representatives within this division. These representatives check applications for cogency to the call and then report suitable review reviewers to the SBIR office. Representatives receive the reviews and have a very limited capability to adjust the summary scores. The SBIR office runs the rest of the process, which is responsible for final funding decisions.

Congressional Mandates

Congressional mandates are not a part of the President's DOE request. For historical reasons, this division handles over 100 projects funded at over $120M annually. For the most part, these projects are not managed or judged by this

office. Scientific projects are reviewed for appropriateness to DOE missions. Initiation and closeout is handled by three staff members, and requires about 10% of each of their time.

Documentation is complete, and includes the application, reviews, written summaries of the decisions from the program manager, funding statements, and final reports in many (but not all) cases.

APPENDIX A: COV Charge Letter

Under Secretary for Science
Washington, DC 20585

January 23, 2008

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 Life and Medical Sciences Division (LMSD) in BER to manage the LMSD-supported research programs. The operation of the DOE Joint Genome Institute, a national scientific user facility, will not be included in this review, having undergone a BERAC review in November 2005; the charge for that separate review is forthcoming. 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 the Life Sciences Research Division and its 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 Medical Sciences programs were merged with the Life Sciences Research programs in FY 2006 and thus will be undergoing their first COV review.

The panel should provide an assessment of the processes used to solicit, review, and recommend proposal funding actions. It should also assess the processes used to manage ongoing research programs in the LMSD, especially the decision-making processes. I would like the panel to consider and provide evaluation of the following two major elements.

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 the research to mission needs of DOE, (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 LMSD during FY 2005-2007, and the panel should provide comments on how they have changed based on the recommendations of the previous Life Sciences Research Division 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 may also examine any documents related to LMSD program implementation. The panel is asked to review the aforementioned processes used by all LMSD 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 peer-reviewed research programs, either at DOE or other science agencies in the Federal government. There should be an attempt to balance 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 LMSD, as well as some familiarity with DOE programs.

The COV should take place in the early summer of 2008 at the BER/DOE Germantown location at 19901 Germantown Road, Germantown, Maryland. A presentation on the status and progress of the COV to BERAC is requested at the Fall 2008 meeting. Following acceptance of the full BERAC committee, the COV report with findings and recommendations is to be presented to me, as the Under Secretary for Science.

If you have any questions regarding this charge, please contact Sharlene Weatherwax, 301-903-6165, or by email at Sharlene.weatherwax@science.doe.gov.

Sincerely,

Raymond L. Orbach

cc: Sharlene Weatherwax
David Thomassen
Jerry Elwood

APPENDIX B: COV Members List

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List of Participants

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APPENDIX C: COV Agenda

DOE BER LMSD COV Agenda

Sunday, June 8 (Courtyard Marriott Washingtonian)

6:00 pm	Welcome, Introductions & Agenda Overview and Charge to Committee Opening Remarks & Orientation Working Dinner (buffet style)	Peg Riley, COV Chair Anna Palmisano, BER Associate Director David Thomassen, Acting LMSD Director
	Overview and Background presentation Organizational overview Progress since last COV Conclusion, Non-disclosure/Conflict of Interest discussion	Sharlene Weatherwax
8:00 pm	Q&A / Discussion	All
8:30 pm	Adjourn	

Monday, June 9 (DOE Headquarters, Germantown)

7:30	Meet in lobby of Courtyard Marriott Hotel (Gaithersburg) Depart in vans for DOE Germantown Undergo security (badging) and screening procedures	
8:30	Review of primary topics--Breakout sessions Preliminary briefings by program staff	E-401--main room (snacks) J117--GTL E301—Artificial Retina G207— Structural Biology E114—Low Dose H406-- Radiochemistry J108—BRC and JGI
12:00	Lunch (provided)	E-401

1:00	Breakout sessions – continued One-on-one discussions with LMSD staff as needed	
3:00	Afternoon break – snacks & drinks	E-401
5:00	Meeting with LMSD staff (questions, requests for further information)	
5:30	Return to hotel	
	Dinner – on your own	
7:00	Executive session – findings, additional needs, writing assignments	Courtyard Marriott—COV members only

Tuesday, June 10 (DOE Headquarters, Germantown)

7:30	Meet in lobby of Marriott Hotel (Gaithersburg) Depart in vans for DOE Germantown Undergo security (badging) and screening procedures	
8:30	Review of secondary topics –Breakout Sessions Briefings by program staff	COV and relevant staff
12:00	Lunch (provided)	E-401
1:00	Breakout sessions – continued One-on-one discussions with LMSD staff as needed	
3:00	Afternoon break – snacks & drinks	E-401
5:00	Meeting with LMSD staff (questions, requests for further information)	
5:30	Return to hotel	
	Dinner on your own	
7:00	Executive session – findings, additional needs, writing assignments	Courtyard Marriott—COV members only

Wednesday, June 11 (DOE Headquarters, Germantown)

7:30	Meet in lobby of Marriott Hotel (Gaithersburg) Depart in vans for DOE Germantown Undergo security (badging) and screening procedures	
8:30	Review –meet in Breakout Sessions	COV and relevant staff
10:00	Report preliminary findings to LMSD staff	E-301 All
12:00	Lunch (provided)	
1:00	Final writing One-on-one discussions with LMSD staff as needed	
3:00	Return to hotel—COV concludes	

APPENDIX D: LMSD Staff Members and Responsibilities

Topic	Reviewers	Program Manager Presenting
GTL	Riley, DeLong, Goldner, Callis	Weatherwax
JGI	Nelson, Dorit, Last, Cone	Drell
Artificial Retina	Liu, Anderson, Andreou, Mortimer	Cole
Radiochemistry and Instrumentation	Hartman-Siantar, Tewson, Hutchins	Srivastava
Low Dose	Meyn, Sutherland, Azzam, Stone	Metting
Structural Biology	Blasie, Brooks, Moore	Hirsch
Bioenergy Research Centers	Riley, DeLong, Callis, Liu, Anderson, Andreou, Mortimer	Hirsch, Glynn
Carbon Sequestration	Goldner, Last, Cone	Weatherwax, Amthor
ELSI	Nelson, Stone, Blasie	Drell
Workshops, Earmarks, SBIR	Hartman-Siantar, Tewson, Hutchins	Katz, Srivastava, Stodolsky
JGI (second day)	Meyn, Sutherland, Azzam	Stodolsky
Computational Biology	Dorit, Brooks, Moore	Houghton

APPENDIX E: COV Member Assignments

Reviewer	Primary	Secondary
Riley	GTL	Bioenergy Research Centers
DeLong	GTL	Bioenergy Research Centers
Goldner	GTL	Carbon Sequestration
Callis	GTL	Bioenergy Research Centers
Nelson	JGI	ELSI
Dorit	JGI	Computational biology
Last	JGI	Carbon Sequestration
Cone	JGI	Carbon Sequestration
Liu	Artificial Retina	Bioenergy Research Centers
Anderson	Artificial Retina	Bioenergy Research Centers
Mortimer	Artificial Retina	Bioenergy Research Centers
Andreou	Artificial Retina	Bioenergy Research Centers
Hartmann-Siantar	Radiochemistry	Workshops
Tewson	Radiochemistry	Workshops
Hutchins	Radiochemistry	Workshops
Meyn	Low Dose	JGI
Azzam	Low Dose	JGI
Sutherland	Low Dose	JGI
Stone	Low Dose	ELSI
Blasie	Structural Bio	ELSI
Brooks	Structural Bio	Computational Biology
Moore	Structural Bio	Computational Biology

APPENDIX F: COV Responses to Questions

Genomics: GTL Program

FY 2008 Committee of Visitors Report
DOE Life and Medical Sciences Division, SC-23.2

Date of COV: June 8-11, 2008
Program: Genomics:GTL
Number of actions reviewed by COV: Awards: 27 Declinations: 27 Other:
Total number of actions within program during period being reviewed by COV: **Awards: 43 Declinations: 105 Other:**
Manner in which reviewed actions were selected: All funded proposals provided in the room were reviewed, and a selection of unfunded proposals were also reviewed. (Some were not available due to COI of COV members) Some unfunded proposals were reviewed at random; others were selected based on their relatively high scores, which were close to funded proposals.

A. Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Is the review mechanism appropriate? (Panels, ad hoc reviews, site visits) Comments: It has evolved to become thorough, complete and fair with respect to both the panel and written reviews, the overall assessment provided to the PI and the documentation of the decision making process. The membership of panels and ad hoc reviewers included broad technical and scientific cross section of leaders in the various appropriate fields. The whole process seems considerably improved over what was reported on by the last COV. There was still some concern that local reviewers (in particular for 07-12) were overused.	Yes
2. Is the review process efficient and effective? Comments: While not well evidenced in printed documentation, the process for selection of proposals from originally submitted pre-proposals appeared fair and even. As explained to the COV,	Yes

this was based on the consensus review of all program managers based on programmatic needs and consistency. In general the pre-proposal process seemed an efficient way to provide quick feedback, avoid unnecessary work for proposers who missed the mark, and reduce the final overall burden for panelists, reviewers and program managers. It would be useful to include in the "Summary of the review and selection process for proposals submitted…" a copy of the spreadsheet used by the PM to cull pre-proposals. The comments solicited and received from the reviewers were very thorough, relevant, fair and appropriate, and provided a good balance between solicitation relevance, scientific merit, PI experience, and probability of success. There were a good number of reviews and balance of reviewers. Good balance between technologists and biologists. 04-32 was a teleconference review and the top few proposers came and gave a presentation to panel. This is well above and beyond what is done by most other agencies. This review process for the big GTLs seemed very appropriate. The efficiency of this process is more than evident by the speed with which decisions are made and funding is appropriated.	
3. Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines? Comments: Yes. In general the reviews were more concerned with technical and scientific merit of each proposal as opposed to its mission, but some decisions were clearly made on the basis of both merit and relevance. Since we don't see the pre-proposals, we don't know what was culled from the pile and can only assume that the program managers have done their job and removed proposals not consistent with the solicitation.	Yes
4. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: In the 04-32 declinations, the documentation in the file made it difficult to discern what was sent to the PI. This problem seems to have been resolved in the 07 solicitations.	Yes

5. Is the time to decision appropriate: Comments: Yes. The efficiency of this process is more than evident by the speed with which decisions are made and funding is appropriated. The pre-proposal process may facilitate this turn around. This fast turn-around continues to be one of the great strengths of DOE. DOE should be giving lessons to other government agencies on efficient proposal processing.	Yes

6. Discuss any issues identified by the COV concerning the quality and effectiveness of the programs use of merit review procedures: It seems like the DOE PMs are very effective users of outside reviewers. The process seems much less formal than other agencies, which could have pitfalls, but overall DOE seems to use merit review very effectively.

B. Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

QUALITY AND EFFECTIVENESS OF SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Did the program make use of an adequate number of reviewers for a balanced review? Comments: Yes. There were minimums of three written reviews for every proposal investigated, up to seven. This is outstanding compared to other agencies.	Yes
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: Yes. Many of these proposals required diverse expertise to evaluate, and the panels and assigned reviewers in general had diverse backgrounds that were well matched to the proposals.	Yes
3. Did the program make appropriate use of reviewers to reflect balance? Comments: There is still some concern that reviewers from the Washington metropolitan area are favored because of proximity (3 out of 14 for 07-12 were from NIST) but overall there seemed to be a good balance of background and expertise. Demographics were apparently not collected on the reviewers.	Yes
4. Did the program recognize and resolve conflicts of interest when appropriate? Comments:	Data Not Available
5. Discuss any concerns identified that are relevant to selection of reviewers. Despite their efforts, there is some concern that since the PMs do not attend many meetings, the reviewer choices may not reflect the larger community and recent trends. To insure the best access to reviewers, PMs should have the time and funding to attend relevant conferences where state-of-the-art technologies, new scientific ideas and younger PIs are likely to be present. Our impression is that the PMs are doing a good job, but it could be improved with more outreach.	

C. Questions concerning the resulting portfolio of awards under review.
Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Overall quality of the research projects supported by the program. Comments: In general, GTL has supported some revolutionary programs with high visibility, good publications, etc. However, most of the proposals/solicitations reviewed were awarded in Fall 2007, so the COV cannot comment on the quality of the work resulting from awarded proposals. The overall scientific quality and originality of successful proposals in 2007 however appeared quite high. For the large projects funded through 04-32, we found evaluation in the course of the afternoon would be impossible but for the fact that one of us was very familiar with some of this work. A proper evaluation would require access to at least a subset of the proposals, anonymyzed reviews and progress reports a couple of weeks before the site visit, with each COV member responsible for evaluating the outcomes of some small subset of proposals. We appreciate the fact that this means more work for already overworked PMs. Recommendations: A better format for reporting progress. The FWPs are very difficult to follow The COV was able to review products resulting from successful awards from the 04-32 (2005 awards). For Part II (Genome scale analysis of biochemical pathways; 3 awardees Banfield, Lovley, McAdams) the quality and quantity of the work is outstanding. Banfield's work has been breaking revolutionary new ground in the area of microbial community population genomics, 'metaproteomics', and evolution and variability in natural microbial populations. It is high profile, innovative and groundbreaking work. Lovely's research is likewise groundbreaking, in the area of microbial fuel cells, and systems biology of Geobacter and metal reduction in the laboratory, and in natural environments. The molecular details (including physiology, transcriptional regulation, flux	For the most part, Data not Available in time to do this.

analysis and environmental variability) of metal respiration in Geobacter has provided important insights into these processes, a large number of high profile publications, and two very important application areas : microbial fuel cells, and uranium immobilization using metal reducing bacteria in situ. Likewise, work of McAdams Shapiro and collaborators has resulted in high quality, high profile work that has led to a number of new insights into cell signaling pathways and regulation of cell development, transcriptional regulation, and control and modulation of complex intracellular biochemical networks.	
2. Are awards appropriate in size and duration for the scope of the projects? Comments: For the smaller projects the scope and duration seems appropriate. For the larger 04-32 projects, the duration and scope is less clear. The Buchanan proposal seemed to have funding before FY 04; it was reviewed and modified in 05 (sharper focus, smaller budge resulted). The end is not clear and progress reports were disorganized and impossible to understand in one afternoon.	Yes and data not available
3. Does the program portfolio have an appropriate balance of high-risk proposals? Comments: The large proposals each have a high-risk component to them. The smaller proposals have a good balance of new high-risk technologies and combinations of older technologies in novel but less risky configurations.	Yes
4. Does the program portfolio have an appropriate balance of multidisciplinary proposals? Comments: Yes, the interdisciplinary component seems very strong. The whole systems approach permeates these proposals.	Yes
5. Does the program portfolio have an appropriate balance of innovative proposals? Comments: Compared to other agencies we find the funded proposals be very innovative and risky with high potential payoff.	Yes

6. Does the program portfolio have an appropriate balance of funding for awards to individuals and the national laboratories? Comments: We do not understand what the appropriate balance might be. For 07-12, the vast majority of proposals were from labs, but only 3 projects from the labs were funded, while all 6 from universities were funded (although there seems to be some disagreement between the summary statement and the actually proposals – the Lu proposal was	Data not available

not funded and is from a university, for example). At least one very highly rated lab proposal was NOT funded and the justification for this seems inappropriate.	
7. Does the program portfolio have an appropriate balance of awards to new investigators? Comments: We cannot tell from the provided materials who is a new investigator.	Data not available
8. Does the program portfolio have an appropriate balance of geographical distribution of Principal Investigators? Comments: What is an appropriate balance? Certainly the portfolio seems to include universities and labs in various locations. It would be nice to have this information in the summary statement, along with some instruction as to what constitutes a good geographical balance.	Data not available
9. Does the program portfolio have an appropriate balance across disciplines and sub-disciplines of the activity and of emerging opportunities? Comments: The panel felt that the PMs do an excellent job of recruiting and funding across disciplines.	Yes
10. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Comments: Yes, but there was some question about how these solicitations are generated and whether or not they really represent the best directions. It is clear that the PMs go out of their way to identify directions that will fulfill agency mission.	Yes
11. Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio. We understand that DOE has a policy of not soliciting demographic information but information such as, race, sex, is this a new or established investigator, etc, of both applicants and awardees might be useful to establish program balance. Recommendations: A better format for reporting progress. The FWPs are very difficult to follow.	

D. Management of the program under review. Please comment on:

1. Management of the program. There have been dramatic improvements over the past 3 years, in the documentation of the review process, and the process itself (solicitation, review, and awarding of proposals). Tracking of progress still needs work, as judged by our review of the 04-32 proposals. However, based on our evaluation of the 04-32 large projects, we are concerned about how well progress will be tracked for the newer proposals (for which the initial documentation is excellent). We would

like to see clear documentation of progress, including for example, publication lists, patents, conference proceedings, and/or technological milestones. The FWP format is not sufficient to evaluate the progress of the grants.
2. Responsiveness of the program to emerging research. The DOE is very pro-active in identifying and funding emerging technologies. As an example we point the emphasis on systems approaches (large scale biology) back to the year 2000, well before most other agencies had identified this opportunity. Newer examples of this include microbial community analysis using genomics and proteomics, microbial fuel cell work, and the emphasis on biomass conversion.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio under review. Overall program planning is forward looking and effective; however the COV recognizes that the excellent responsiveness of the PMs to emerging technologies also means that mistakes will occasionally be made. Examples include solicitation 7-12b that was recalled and an RFP that was recalled in response to a NAS report (in 2006?).
4. Concerns identified that are relevant to the management of the program. FWPs are not sufficient to evaluate progress. We strongly suggest a better format for progress reports that includes at least a list of publications, patents, technological developments and/or conference proceedings and a short narrative discussing the impact and output of the program.

Bioenergy Research Centers

FY 2008 Committee of Visitors Report
DOE Life and Medical Sciences Division, SC-23.2

Date of COV: June 8-11, 2008
Program: Bioenergy Research Centers
Number of actions reviewed by COV: 9 **Awards: 3 Declinations: 6 Other:**
Total number of actions within program during period being reviewed by COV: 12 **Awards: 3 Declinations: 9 Other:**
Manner in which reviewed actions were selected: all review actions were examined

A. Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Is the review mechanism appropriate? (Panels, ad hoc reviews, site visits) Comments: The proposals were evaluated and placed into one of four categories by a review panel: Excellent, Very Good, Good and Poor. The proposals were ranked by the number of votes in each of the four categories. Approximately 10 staff members from BER Medical and Life Sciences division made the decision to select 4 proposals that had the highest total aggregate of Excellent and Very Good for a second cycle of reviews. There was no pre-conceived notion of how many proposals would make it to the second review cycle. The relevance of reviewer expertise, conflict of interests and timing conflicts resulted in a reduced membership panel. The second panel had 17 members including 15 reviewers that participated in the first panel. In general, each reviewer reviewed two or more projects. Every member of the review panel voted regardless of whether they read the proposal. Three projects were selected out of the four proposals in the competition using the same procedure. It should be noted that the selected projects were ranked in the same order in both the first and second review cycles.	Yes

The 10 staff members from BER Medical and Life Sciences evaluated the results from the second review panel and agreed that there was a clear selection of top three proposals. The selection statement was finalized and signed before the public announcement was made.	
2. Is the review process efficient and effective? Comments: The process was quite elaborate and meticulous yet it resulted in an efficient review process. Conference calls with the reviewers ensured a timely and effective review process prior to the panel meeting, for both the first and the second panel. During the review process and in particular during the reverse-site reviews the panelists were given specific instructions as to how to pose questions to members of the teams in the four selected projects. A brief presentation by the leader(s) of each of the 4 projects was followed by questions that were limited to clarifications. This ensured that a fair and equitable process.	Yes
3. Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines? Comments: This was a highly focused program at the frontier between basic and applied research aimed at lab demonstrations. It is envisioned that it is not until year 5 of the project that the lab work will move to pilot production. There is extensive documentation on the review criteria outlined in the public opportunity announcements. The guidelines for the review process were clearly stated and articulated to both PeerNet (for the reviewers) and the Funding Opportunity Announcement (FOA).	Yes
4. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: The panel reviewers were asked to provide detailed comments on the proposals. The final signed selection statement for the GTL Bioenergy Research Centers articulates well the rationale for selection of the three Centers.	Yes

5. Is the time to decision appropriate: Comments: It is remarkable that the process for such a large program was conducted in such a timely manner.	Yes
6. Discuss any issues identified by the COV concerning the quality and effectiveness of the programs use of merit review procedures: The FO Announcement was the brainchild of the DOE Biological and Environmental Research, Life and Medical Sciences division and prepared in collaboration with other DOE offices including Main Office of Science. The original solicitation was open to all researchers, in DOE laboratories, Universities, private organizations as well as other non-profit organizations. The actual	

solicitation came out of the Office of Science in Chicago because the requests for Center proposals had large budgets. The actual review was carried at BER Life and Medical Sciences division. Normally the DOE labs are not allowed to compete with the private sector (profit and non-profit). This call for proposals is an exception to the accepted procedures and it was approved by a presidential mandate. The President of the United States ultimately approved the funding for three Research Centers. Despite opposition from the office of Operations and procurement in Chicago, the program officers in BER Life and Medical Sciences division insisted in a program review that included a reverse-site visit and an in-person interaction between members of the review panel and a small team from each of the 4 selected institutions. The team not only evaluated the technical aspects of the proposal but the interpersonal interactions between the members of each consortium, ensuring that the funded groups were not merely a group on paper, but that there was a substantial interaction.

B. Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

QUALITY AND EFFECTIVENESS OF SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Did the program make use of an adequate number of reviewers for a balanced review? Comments: Twelve proposals were evaluated at an *ad-hoc* merit review panel of 32 reviewers that met as a group. The panel members were in phone communication with the program officers as needed to ask questions.	Yes
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: The reviewers included a diverse group of expertise from the United States and abroad. The foreign expertise was essential. Because of the large number of collaborating institutions submitting proposals, the available pool of US expertise was limited due to conflicts of interest.	Yes
3. Did the program make appropriate use of reviewers to reflect balance? Comments: The program had an outstanding selection of reviewers. Some reviewers only provided reviews on specific areas of their expertise and participated in some of the discussions where this was deemed appropriate.	Yes
4. Did the program recognize and resolve conflicts of interest when appropriate?	Yes

Comments: There is a standard conflict of interest form that all reviewers signed. Some reviewers excused themselves from the discussion of proposals that had potential conflicts of interests. During the second review one reviewer discovered that he had a potential conflict of interest. At that point the reviewer was excused from the discussion on that particular project.	
5. Discuss any concerns identified that are relevant to selection of reviewers. There are some questions about whether the expertise of engineers and their relevance to the reviewing and scalability of the project were sufficient.	

C. Questions concerning the resulting portfolio of awards under review.
Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Overall quality of the research projects supported by the program. Comments: The quality of the research projects is outstanding. At the same time the scientific program managers are aware that the scientific community in emerging science and technology areas is limited. The three funded BRCs provide sufficient coverage for diverse research efforts while conducting first class research.	Yes
2. Are awards appropriate in size and duration for the scope of the projects? Comments: The awards are commensurate with concerted initiatives of this scope that involve not only theoretical and computational work but large component of experimental and field studies. It was recognized by some reviewers that the large-scale production of bio-fuels would likely not be feasible in the 5-year span of the projects. However the centers are expected to be funded beyond the duration of this funding cycle contingent upon satisfactory progress and a third year review and the availability of funds.	Yes
3. Does the program portfolio have an appropriate balance of high-risk proposals? Comments: The program portfolio involves just 3 funded projects each one with multiple sub-projects; some of higher risk than others. For example, the characterization of the cell walls is straightforward while genetically engineering new plants that have optimum characteristics for bio-fuel production is a higher risk and more open-ended problem.	Yes

4. Does the program portfolio have an appropriate balance of multidisciplinary proposals? Comments: By definition the program involves multi-site and multi-disciplinary proposals.	Yes
5. Does the program portfolio have an appropriate balance of innovative proposals? Comments: There were only 3 awards, so it's hard to comment on this.	Yes

6. Does the program portfolio have an appropriate balance of funding for awards to individuals and the national laboratories? Comments: Two of the three projects involve National Laboratories, and Universities. The third project is entirely a University-lead project with industrial partners.	Yes
7. Does the program portfolio have an appropriate balance of awards to new investigators?	N/A
8. Does the program portfolio have an appropriate balance of geographical distribution of Principal Investigators? Comments: The three projects span all geographical regions of the United States.	Yes
9. Does the program portfolio have an appropriate balance across disciplines and sub-disciplines of the activity and of emerging opportunities? Comments: The BRCs are given the freedom to decide the research to be conducted in the BRCs. Each BRC is required to have a stated policy and mechanism to re-direct funds and prioritize funding to areas where there are emerging opportunities.	Yes
10. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Comments: The program was conceived following the President's Advanced Energy and Competitiveness Initiative (January 2006), and the recommendation in the NRC report to eliminate the large facilities from the GTL program and instead support vertically integrated research institutes focused on mission areas beginning with Bioenergy (February 2006). At the same time BER had planned a road map on biofuels. The transformation of the research needs into a funding opportunities announcement proceeded with a remarkably fast pace. There is no question that the selected projects span an outstanding expertise to spur transformational discoveries in basic science to make production of cellulosic ethanol and other fiber plant-based biofuels cost-effective and	Yes

economically viable.	

11. Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio.
Genomics is foundational in these projects and it is clear that the funded BRCs need to work with the Joint Genomic Institute (JGI). To facilitate this collaboration some discretional funding was allocated to JGI. The scientific program officers at BER have ensured that there is some interaction among the three BRCs and all questions of intellectual property have been ironed out.

D. Management of the program under review. Please comment on:

1. Management of the program.

The program has identified several areas that needed to be addressed at the outset. Each of the funded projects was requested to prepare a presentation identifying the specific science to be conducted in the centers and provide information on the management team. DOE BER provided assistance to the funded centers in putting together their individual management plans.
Each team was also asked to meet 5 milestones that provided a framework in which they could conduct the research. It is understood that research is the prime focus of the three research centers and hence sometimes the milestones may not be met. The researchers in the Centers were encouraged to identify the "show-stoppers" in the proposed research activities.

One of the key issues that had to be addressed was related to intellectual property. After long negotiations it was agreed that above $200K, the royalties were to be allocated to the 60% to the DOE Bioenergy Research Centers (BRCs) and 40% were to be allocated to the home institution. It was remarkable that all negotiations were completed in time for a September 1st decision and official contract awards.

The scientific officers in BER Life and Medical Sciences division have consulted other members of the division as to how to manage a program of this size and scope.

The BER scientific officers were encouraged to develop strong internal scientific advisory committees and evaluation procedures that will provide feedback and ensure that the activities of the BRC are on track.

The DOE scientific officers conduct telephone teleconference every other week in which time is allocated to scientific (75%) and administrative (25%) issues.

2. Responsiveness of the program to emerging needs of the scientific/technological needs of the nation.

In more than one way, this program has been another example of how the resources of the National Laboratories, collaborating universities and companies

can be networked in a fashion that extracts research products totaling far beyond the sum of the components. The program had the feel of a “mini-Manhattan” project.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio under review. The program was planned and developed through extensive internal discussions (BER, SC-2, SC-1 staff) under the leadership of the Under Secretary of Science and with consultations with Academy members and outside experts.
4. Concerns identified that are relevant to the management of the program. The scientific officers have done an outstanding job in putting this program together in a short period of time. It is expected that the LMSD will conduct annual site reviews of the three BRCs. It is imperative that DOE provides adequate support to conduct the annual reviews. Expenses for the scientific staff at BER and for external scientific advisors (perhaps a subset of the original review panel) to visit the sites should be provided. The management in LMSD of the project lacks support in two distinct areas. The first and more challenging area is that of scientific support staff. In particular, training of more junior scientific program officers in LMSD to handle the management of projects of such scope does not exist. The goal is that the best of these trainees become the next generation of program officers. The second is that of administrative support. The program officers should not be spending their time photocopying, creating spreadsheets, etc. Their time is better spent communicating with the scientific community and monitoring the funded projects and their scientific outputs.

Computational Biology

FY 2008 Committee of Visitors Report
DOE Life and Medical Sciences Division, SC-23.2

Date of COV: June 8-11, 2008
Program: Computational Biology
Number of actions reviewed by COV: Awards: Declinations: Other:
Total number of actions within program during period being reviewed by COV: **Awards: 4 Declinations: ~25 Other:**
Manner in which reviewed actions were selected: All accepted proposals were read and about half the rejects, which were selected at random.

A. Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Is the review mechanism appropriate? (Panels, ad hoc reviews, site visits) Comments: This is a small program that uses ad hoc reviews. Reviews appear to be thoughtful and complete.	Yes
2. Is the review process efficient and effective?	Yes
3. Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines?	Yes
4. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation?	Yes

5. Is the time to decision appropriate:	Yes
6. Discuss any issues identified by the COV concerning the quality and effectiveness of the programs use of merit review procedures: It would be helpful if solicitations gave some indication of the scale of the awards being contemplated. One of the applications submitted in connection with a recent solicitation had a budget 10 times the size of the entire program budget. A lot of time would have been saved if this had been realized at the outset.	

B. Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

QUALITY AND EFFECTIVENESS OF SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Did the program make use of an adequate number of reviewers for a balanced review?	Yes
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: We believe the selection of reviewers has been outstanding.	Yes
3. Did the program make appropriate use of reviewers to reflect balance?	Yes
4. Did the program recognize and resolve conflicts of interest when appropriate?	N/A
5. Discuss any concerns identified that are relevant to selection of reviewers. None.	

C. Questions concerning the resulting portfolio of awards under review.
Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Overall quality of the research projects supported by the program. Comments: Three of the four awards made make good sense. The fourth is a grant that was initially rejected, but then resurrected in an *ad hoc* way because it seemed relevant to DOE objectives. It is in fact two independent projects submitted as a single package. The first component of the project is of less than completely compelling quality. The second component makes sense in the context of supercomputing and molecular dynamics, but seems unrelated to the first part.	N/A
2. Are awards appropriate in size and duration for the scope of the projects?	Yes
3. Does the program portfolio have an appropriate balance of high-risk proposals?	Yes
4. Does the program portfolio have an appropriate balance of multidisciplinary proposals? Comments: The computations proposed do tie into	Yes

experiment.	
5. Does the program portfolio have an appropriate balance of innovative proposals? Comments: This program needs to figure out what its niche should be in computational biology. NIH has a large presence in this area, and it is not clear how this DOE program should position itself. The grants that were funded do not appear to be particularly innovative. Special attention needs to be paid to developing an approach that will give DOE some leverage in this area.	No

6. Does the program portfolio have an appropriate balance of funding for awards to individuals and the national laboratories? Comments: The number of grants made is very small. All were to people at National Labs. Part of the reason may be that the most recent solicitation emphasized the use of DOEW supercomputers, which may have biased things in that direction.	No
7. Does the program portfolio have an appropriate balance of awards to new investigators?	N/A
8. Does the program portfolio have an appropriate balance of geographical distribution of Principal Investigators?	Yes
9. Does the program portfolio have an appropriate balance across disciplines and sub-disciplines of the activity and of emerging opportunities?	N/A
10. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Comments: The program seems to be organized to support supercomputing at DOE centers. Done right, this could be a productive direction to take. However, one got the sense that it constrained the application received unnecessarily.	Yes
11. Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio. We encourage DOE to obtain advice from professional computational biologists when setting priorities in this area.	

D. Management of the program under review. Please comment on:

1. Management of the program. On the whole, this program has been well managed. We feel that its manager would benefit if he had some more formal system in place that would enable him to call on experienced outsiders for advice abut directions to take.
2. Responsiveness of the program to emerging research. The computational component of modern biology is moving very fast today, and it is unreasonable to expect any single individual to keep track of all of it emerging opportunities. This

fact underlines the need of the manager of this program to seek outside advice on a regular basis.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio under review. (see above).
4. Concerns identified that are relevant to the management of the program. Because of the size of the staff, the background of the individual managing this program could have an undue influence on its directions. It would helpful is two people were paying attention to this area.

Structural Biology Facility Program

FY 2008 Committee of Visitors Report
DOE Life and Medical Sciences Division, SC-23.2

Date of COV: June 8-11, 2008
Program: Structural Biology
Number of actions reviewed by COV: Awards: Declinations: Other:
Total number of actions within program during period being reviewed by COV: **Awards: 10 Declinations: 0 Other:**
Manner in which reviewed actions were selected:

A. Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Is the review mechanism appropriate? (Panels, ad hoc reviews, site visits) Comments: Many of these programs were reviewed jointly with NIH, and NIH managed the reviews. This is probably a reasonable process were applicable. NIH reviews involve site visits, and the DOE led reviews are primarily done by mail-in.	Yes
2. Is the review process efficient and effective?	Yes
3. Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines? Comments: There are no solicitations in this program, but the reviews are consistent with DOE's mission to support user facilities for structural biology.	Yes
4. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: (see #6)	Yes

5. Is the time to decision appropriate:	Yes
6. Discuss any issues identified by the COV concerning the quality and effectiveness of the programs use of merit review procedures: In some instances PIs are apparently permitted to rebut reviews, but there is no indication that reviewers evaluate these rebuttals. We recommend that reviewers be asked to respond to rebuttals so that their sufficiency can be evaluated.	

B. Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

QUALITY AND EFFECTIVENESS OF SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Did the program make use of an adequate number of reviewers for a balanced review?	Yes
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: We believe the selection of reviewers has been outstanding.	Yes
3. Did the program make appropriate use of reviewers to reflect balance? Comments: The balance between scientific and technical expertise was appropriate.	Yes
4. Did the program recognize and resolve conflicts of interest when appropriate? Comments: We note one example where there could have been a conflict of interest, namely in the evaluation of the Cornell detector development grant where one of the more critical reviewer was a competitor.	Yes
5. Discuss any concerns identified that are relevant to selection of reviewers. None. The Program Director, Roland Hirsch, has done a remarkable job managing this program, and has been especially adept at coping with the difficulties that come with cooperating with NIH, which has an entirely different institutional mind set.	

C. Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Overall quality of the research projects supported by the program. Comments: Structural Biology today is almost entirely a facilities support program that does not directly fund scientific projects.	N/A
2. Are awards appropriate in size and duration for the scope of the projects?	Yes

Comments: It should be noted that the facilities funding provided through this program is a small fraction of DOE's total investment in them. It is very important that this flow of funding be maintained because DOE is far better positioned to see to the advancement of the relevant technologies than the other agency (NIH) that makes heavy use of structural biology facilities.	
3. Does the program portfolio have an appropriate balance of high-risk proposals? Comments: For example, DOE's investment in neutron protein crystallography at LANL, and X-ray detector development.	Yes
4. Does the program portfolio have an appropriate balance of multidisciplinary proposals?	N/A
5. Does the program portfolio have an appropriate balance of innovative proposals? Comments: (see #3. This program deals only with facilities.)	N/A

6. Does the program portfolio have an appropriate balance of funding for awards to individuals and the national laboratories? Comments: Most of the funds dispensed by this program go to support established facilities, but a small fraction goes to individual investigators who are developing novel technologies that might someday warrant expansion into user facilities.	Yes
7. Does the program portfolio have an appropriate balance of awards to new investigators? Comments: It is probably not appropriate for new (young) investigators to get deeply involved in technique development work of this sort.	No
8. Does the program portfolio have an appropriate balance of geographical distribution of Principal Investigators?	Yes
9. Does the program portfolio have an appropriate balance across disciplines and sub-disciplines of the activity and of emerging opportunities?	N/A
10. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Comments: If the centers supported by this program were to shut down it would be a national disaster.	Yes
11. Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio. We encourage DOE to obtain advice from structural biologists who belong to BERAC while setting future priorities in this area.	

D. Management of the program under review. Please comment on:

1. Management of the program. The management system that seems to be standard in the Life &Medical Sciences Division, which empowers in-house staff to make scientific decisions to a far greater degree than staff at NIH and NSF are generally allowed to do, has worked well for this program where the emphasis is on facilities, not on the science that is to be done with them. The informal system that has evolved for obtaining information from the field about appropriate directions to take has led to good decisions. DOE should take pride in what has been accomplished.
2. Responsiveness of the program to emerging research. On the whole this program has responded well to emerging opportunities. The one area in which it might want to consider making new investments is in the applications of neutron radiation to structural biology. There should be a larger presence of biology at SNS than there is today.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio under review. (see above).
4. Concerns identified that are relevant to the management of the program. We think it important that DOE develop a succession plan so that when Roland Hirsch steps down, there is someone who is up to speed already on the staff. Dr. Hirsch's success in managing the structural biology program derives in large part from his intimate knowledge of the field and of the people who work in it. Unless care is taken, those connections will be broken when he leaves.

Radiochemistry and Instrumentation Program

FY 2008 Committee of Visitors Report
DOE Life and Medical Sciences Division, SC-23.2

Date of COV: June 8-11, 2008
Program: Radiochemistry/Instrumentation
Number of actions reviewed by COV: **Awards: ~30 Declinations: ? Other: 1**
Total number of actions within program during period being reviewed by COV: **Awards: 10 Declinations: 0 Other: 1 (site-visit review)**
Manner in which reviewed actions were selected: random

A. Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Is the review mechanism appropriate? (Panels, ad hoc reviews, site visits) Comments: The primary review mechanisms are independent, external review for individual applications and review panel for solicitations and large project renewals. The review mechanism is tailored to the scope of the project under review, with the appropriate size and scope of reviewers/review committee.	Yes
2. Is the review process efficient and effective? Comments: We believe that Radiochemistry's size-tailored review process is an efficient use of resources. We calculate that the last major project-renewal review cost less than 1% of the annual budget, which was an excellent investment, especially considering that this project turned out to be essentially the only project funded in FY06. The overall annual project-review cost is about $100,000.	Yes
3. Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines? Comments: Reviewers comments are complete, follow a standardized form, and follow the announcement and guidelines.	Yes
4. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation?	Yes

Comments: For the proposals we reviewed, there is a 3-4 page, complete recommendation summary provided by the program manager. In many cases the actual program reviewer's comments were also available. All provided sufficient information and justification for the recommendation.	

5. Is the time to decision appropriate: Comments: In times when funding is available for programs, the time between proposal submission and review decision is remarkably fast, ranging from a few months to as short as weeks, and proposal submission-to-funding times of a few months.	Yes
6. Discuss any issues identified by the COV concerning the quality and effectiveness of the programs use of merit review procedures: The quality and effectiveness of review processes in Radiochemistry/Instrumentation have been well optimized based on decades of funding outstanding programs. However, the dramatic, downward swing in funding over this review period has stressed the process to the point of non-existence (e.g., there were no direct solicitations in the FY05-07 review period). This lack of funding will seriously influence the development of molecular imaging over the next decade. Even the recent solicitation for FY08 is for one-year pilot projects, which shows a lack of commitment to this historically rich area of contribution by the DOE.	

B. Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

QUALITY AND EFFECTIVENESS OF SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Did the program make use of an adequate number of reviewers for a balanced review? Comments: The main review panels we looked at served the 2004 BNL review and the 03-14 solicitation. In both cases, the review panels consisted of greater than 10 reviewers, from a variety of multidisciplinary backgrounds.	Yes
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: Reviewers were leading experts in the field, covering all the disciplines represented in the solicitation / program review.	Yes
3. Did the program make appropriate use of reviewers to reflect balance? Comments: Review panels were balanced across disciplines and institutions, and membership between the panels we looked at	Yes

did not overlap significantly.	
4. Did the program recognize and resolve conflicts of interest when appropriate?	Not Available
5. Discuss any concerns identified that are relevant to selection of reviewers. N/A	

C. Questions concerning the resulting portfolio of awards under review.
Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Overall quality of the research projects supported by the program. Comments: For the one program consistently supported in this period (BNL), the research quality is exceptional. Another program that appeared in the portfolio for one year (MIND Institute) was historically an earmark and was included in this portfolio, in our view, by irregularities in the portfolio envelope, which was driven down to essentially one project the year before.	Appropriate
2. Are awards appropriate in size and duration for the scope of the projects? Comments: Due to severe budget cuts, it appeared to be impossible to support the goals and awarded grants for the 2003 call for proposals.	Not Appropriate
3. Does the program portfolio have an appropriate balance of high-risk proposals? Comments: For the one project consistently funded over this review period, sub-projects comprised an appropriate mix of high, medium and low-risk efforts.	Appropriate
4. Does the program portfolio have an appropriate balance of multidisciplinary proposals? Comments: When the program was fully funded (FY05) there was an appropriate mix of multidisciplinary projects, spanning chemistry to instrumentation to direct medical applications. This changed somewhat in the funding crisis of FY06 and continuing on through FY07, as no new proposals were funded. The decision to keep one strong project alive was a good one, in that it maintained an internationally recognized multidisciplinary team that covers all the major disciplines in this field.	Appropriate
5. Does the program portfolio have an appropriate balance of	

innovative proposals? Comments: When the program was fully funded (FY05) there was an appropriate balance of innovative proposals. Even in an extremely difficult funding situation, the program manager has done an admirable job in maintaining a balance in innovation, primarily by relying on one flagship project that has a range of level-of-innovation in its scope.	Appropriate

6. Does the program portfolio have an appropriate balance of funding for awards to individuals and the national laboratories? Comments: When the program was fully funded (FY05) there was an appropriate balance of funding between individuals and national laboratories, with funding going to some 25 universities while still supporting major, coordinated efforts at the national labs. In the crisis of FY06-07, funding was limited a national laboratory + an earmarked institute. This is not an appropriate balance for a program of the traditional size and scope of radiochemistry in OBER.	Not Appropriate
7. Does the program portfolio have an appropriate balance of awards to new investigators? Comments: When the program was fully funded (FY05) there was an appropriate balance of awards to new investigators. In the crisis of FY06-07, funding was limited a national laboratory + an earmarked institute. This provided a dearth of opportunity for young investigators in radiochemistry, significantly impairing the development of the field for the future.	Not Appropriate
8. Does the program portfolio have an appropriate balance of geographical distribution of Principal Investigators? Comments: When the program was fully funded (FY05) there was an appropriate geographical distribution of Principal Investigators. In FY06-07 there was a good distribution of investigators across Long Island and sometimes New Mexico, but not across the United States.	Not Appropriate
9. Does the program portfolio have an appropriate balance across disciplines and sub-disciplines of the activity and of emerging opportunities? Comments: When the program was fully funded (FY05) it supported a healthy variety of disciplines and sub-disciplines across the field of radiochemistry and radio-instrumentation. And, while the remaining flagship program is highly multidisciplinary in nature, the full breadth of discipline and sub-discipline support has been lost in FY06-FY07.	Not Appropriate
10. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Comments: National Priorities: YES - Affordable healthcare is	Appropriate

a top priority of the United States. Personalized medicine and effective, early diagnosis promise to be some of the most effective ways to reduce cost. Molecular imaging is one of the main scientific avenues being pursued to accomplish this. Basic radiochemistry and instrumentation research provides the platform upon which molecular imaging is developed and translated to patient care. Agency Mission: DEPENDS – if the agency's mission is still defined by the Atomic Energy Act, this work fits exactly within the mission of the peaceful use of the atom. However, based on the statements presented to this committee, work directly impacting human health appears to no longer fit within the OBER mission. This program relates directly to many well-funded efforts across the NIH. However the structure of the NIH is not suitable for support of the basic radiochemical and instrumentation research itself. The niche of the DOE has always been the peaceful (medical) use of the atom, including the fundamental infrastructure on which nuclear medicine and molecular imaging is based. There is no substitute sponsor for this work. The radiochemistry program could have strong ties with the growing NNSA program in nuclear forensics, which relies fundamentally on radiochemistry as one of its core disciplines.	

11. Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio.

It can be argued that, historically, radiochemistry and instrumentation has done more concrete good in terms of saving lives than any pursuit in DOE. Cases in point being TC99m, PET, SPECT, and targeted radionuclide therapy, which all had their origins in this program. Millions of patients benefit from these procedures every year.

When OBER divested in support to various institutions, examples of the radiochemistry and technology-support that have been lost are:

- Microfluidics for radiochemical production
- Basic copper isotope chemistry for diagnostics and therapeutics
- Development of detector technology (high spatial resolution, high detector sensitivities) that enables the move to small animal systems, which are an indispensable part of the translational pipeline from basic research to patient care.

D. Management of the program under review. Please comment on:

1. Management of the program. Historically, program has been well managed, with some documentation of annual reports, and reviews by the program manager. The program manager has a technical background in this area and is kept up-to-date in the field through DOE-sponsored workshops and participation in the nuclear medicine community. Over the years, the program management in this office has been very closely linked with the Principal Investigators and institutions where they have had major investments. The positive side of this is that investigators and institutions can count on DOE for flexible, loyal support. The down side of this system is that it is difficult for new institutions/programs with fundamentally new ideas to break into flagship-institution network.
2. Responsiveness of the program to emerging research. With the exception of the FY06-07 period (funding not available), responsiveness to emerging research has been good. In fact, DOE funding has support much of the absolute cutting edge work in this field, as evidenced through funding of such areas as exotic methods of radioisotope reactions (microfluidics), exotic metals for diagnostics and therapy, and small, mobile animal imaging.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio under review. This program is truly workshop-driven, with external advisors providing excellent scientific input to drive research priorities. This was demonstrated for both the FY03 solicitation and the FY08 solicitation. However, the shortage of funds produced by the FY06 budget resulted in Brookhaven being the only laboratory supported. This decision was apparently not a result of peer review or input from the community, but was made by the department. In fairness, this was a difficult situation and committees are not always the best venues to resolve difficult decisions. We believe that fundamental decision to support one strong institution over several sub-critically funded ones was sound. Previous peer review demonstrated the strength of the Brookhaven program and made it the logical selection for limited means. However, the selection of a single flagship institution was apparently not done through a peer-reviewed process.
4. Concerns identified that are relevant to the management of the program. In the past, and to some extent in the 03-14 solicitation, this program has ventured into the medical imaging agent/drug development territory. We believe that this departs from the fundamental radiochemical instrumentation mission and raises the most questions about overlap with NIH missions. One path forward would be to focus on a strong program in basic radiochemistry and radio-instrumentation for a broad range of possible applications, including medical ones. The downside of this path is that it has a less direct link with disease diagnosis and patient response. The upside is that it is more consistent with overall Office of Science themes.

Artificial Retina Program

FY 2008 Committee of Visitors Report
DOE Life and Medical Sciences Division, SC-23.2

Date of COV: June 8-11, 2008
Program: Artificial Retina Project
Number of actions reviewed by COV: N/A
Total number of actions within program during period being reviewed by COV: N/A
Manner in which reviewed actions were selected: N/A

A. Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Is the review mechanism appropriate? (Panels, ad hoc reviews, site visits) Comments: The original project was reviewed for funding in 2001 out of a very broad solicitation on the general subject matter of microelectronics for medicine. Approximately 17 projects were submitted under the original solicitation and seven were funded, including the artificial retina project. The artificial retina project, became the major thrust of research in the Medical Sciences. The project was reviewed again in 2003 due to changes in the location of the project (from JHU to USC). The artificial retina project was reviewed again in 2007 from a panel of reviews that ranked individual projects. There was no COV review in 2005 as the Medical sciences program was eliminated that year and merged with the Life Sciences programs. The present COV review will focus on the 2007 review of the artificial retina project and the continuation funding of its constituent sub-project components.	Yes
2. Is the review process efficient and effective? Comments: The project continues to be an appropriate mix of partners from National Labs, Universities and industry and the review process to assess its progress is both efficient and effective. One of the constituent projects was eliminated as a result of this review.	Yes
3. Are reviews consistent with priorities and criteria stated in the	Yes

program's solicitations, announcements, and guidelines? Comments: There was no solicitation in 2007 hence the reviews focus on the performance of the individual sub-components and their potential contribution to the overall goals and objectives for the umbrella artificial retina project. The 2007 review has a strong review panel in a reverse-site visit. Given that it is not possible to conduct site reviews for 7 individual labs, a rotating site review at one of the major research institutions (for example USC) would have been beneficial.	
4. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation?	N/A

5. Is the time to decision appropriate: Comments: This is a continuation project.	N/A
6. Discuss any issues identified by the COV concerning the quality and effectiveness of the programs use of merit review procedures: In the original 2001 and 2003 reviews of the project, the external peer-review was not as rigorous as the one that one might have expected from a comparable NIH or NSF project. The 2007 review process on the other hand, was excellent. We recommend that the external review process be expanded. We also recommend that a panel be established for on-site review and that the composition of the panel is such that it ensures consistency and continuity of the review process.	

B. Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

QUALITY AND EFFECTIVENESS OF SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Did the program make use of an adequate number of reviewers for a balanced review? Comments: The 2007 panel had 6 reviewers, a good number for a project of this scope with every sub-project being reviewed by 4 people.	Yes
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: The 2007 review panel had a diverse and highly qualified composition. This ensured an in-depth evaluation of a	Yes

diverse project with components ranging from materials science to microelectronics to medical prosthesis.	
3. Did the program make appropriate use of reviewers to reflect balance? Comments:	Yes
4. Did the program recognize and resolve conflicts of interest when appropriate?	Yes
5. Discuss any concerns identified that are relevant to selection of reviewers. There were no concerns as relate to the selection of the panelists. The physician member of the panel was valuable, and was a uniquely good choice for this task.	

C. Questions concerning the resulting portfolio of awards under review.
Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Overall quality of the research projects supported by the program. Comments: This is a continuation project.	N/A
2. Are awards appropriate in size and duration for the scope of the projects? Comments: This is a continuation project	N/A
3. Does the program portfolio have an appropriate balance of high-risk proposals? Comments: This is a continuation project.	N/A
4. Does the program portfolio have an appropriate balance of multidisciplinary proposals?	N/A
5. Does the program portfolio have an appropriate balance of innovative proposals? Comments: Only a single project.	N/A

6. Does the program portfolio have an appropriate balance of funding for awards to individuals and the national laboratories? Comments: The components of the project, not necessarily the portfolio of awarded projects are balanced between industry, national labs and universities.	Yes
7. Does the program portfolio have an appropriate balance of awards to new investigators? Comments: The Caltech project was added as a new project just before the 2007 review.	Yes
8. Does the program portfolio have an appropriate balance of	Yes

geographical distribution of Principal Investigators? Comments: All four DOE national labs are represented on the project.	
9. Does the program portfolio have an appropriate balance across disciplines and sub-disciplines of the activity and of emerging opportunities?	N/A
10. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Comments: It is of the utmost importance that the assets of the National Laboratories be utilized to advance the economic and technological competitiveness in the industrial sector that is aimed at improving the quality of life in the USA, in addition to developing weapon systems.	Yes
11. Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio. The artificial retina project is an inspirational choice as a target for utilizing National Laboratory resources and emerged as the leading research direction out of an original solicitation (2003) that had a broad scope. A larger and diverse portfolio of research efforts in the field of life sciences could perhaps have contributed in greater number of contributions in enabling technologies for non-weapon related applications.	

D. Management of the program under review. Please comment on:

1. Management of the program. The project is lead by an individual who has had the vision and passion to see the value of involving the existing expertise in the DOE National Laboratories to advance science and technology in a field outside their traditional scope and mission. Through his in-depth understanding of the capabilities in the individual laboratories he was able to see the relevance of the technologies in the life sciences and in particular that of medical prosthesis.
2. Responsiveness of the program to emerging needs of the scientific/technological needs of the nation. In more than one way, this program has been another example of how the resources of the National Laboratories, collaborating universities and companies can be networked in a fashion that extracts research products totaling far beyond the sum of the components. Work leading to enabling instrumentation for genomic research is another example.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio under review. The original farsighted program announcement to National Laboratory, which

cast a rather broad net quickly, funneled down to a single project partly because of limited resources.
4. Concerns identified that are relevant to the management of the program. While communication between DOE management and the project components appears to be very good based on reports and frequent telephone reviews but could benefit from first-hand visits and coordination by the program manager. Termination of the project before a significant turning point is reached is not in the best interest of DOE and its image. The retinal prosthesis and related applications of the technology can be better assured of success by support to at least the 250 site stage. Lessons learned from this project are numerous and should be put into practice. Examples are the methods of management for Laboratory, University and Company consortiums and the CRADA agreement developed for intellectual property.

Carbon Sequestration Project

FY 2008 Committee of Visitors Report
DOE Life and Medical Sciences Division, SC-23.2

Date of COV: June 8-11, 2008
Program: Carbon Sequestration
Number of actions reviewed by COV: Awards: Declinations: Other:
Total number of actions within program during period being reviewed by COV: 72 Awards: 28 Declinations: 44 Other:
Manner in which reviewed actions were selected: **Proposals for solicitations 05-10, 06-03, and 07-03 were provided in the room.** **6 funded and 21 declined from 06-03** **8 funded and 22 declined from 07-03** **12 funded and 11 declined from 05-10**

A. Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Is the review mechanism appropriate? (Panels, ad hoc reviews, site visits) Comments. Panel reviews were used for these solicitations, with no fewer than 3 reviews for any reviewed proposal. In general the reviews were quite thorough. Several proposals in response to 07-03 clearly did not address the solicitation and were cut by the PM, which also seemed appropriate.	Yes
2. Is the review process efficient and effective? Comments: For 05-10 the pre-apps were due Jan 18, apps 3/18, review was on 5/24, decisions seem to have been made by mid-June and funding was provided for start dates around 8/15. For 06-03, pre-apps were due 12/15, apps 2/23, the review was on April 20-21 2006, decisions seem to have been made by early June and funding was received between July and September. This process seems very efficient, even given the challenges of dual-agency funding of 06-03.	Yes
3. Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines?	Yes

Comments. In general the reviews are consistent with the priorities and criteria stated in the solicitations. For 06-03 and 07-03 the reasons given to PIs for declinations were sometimes not as well spelled out as for 05-10.	
4. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: The selection statements were very thorough for this program. The format, with a summary and programmatic slant, does a good job of justifying decisions. The summary sheets provided by the PMs were particularly useful to the COV. We would suggest also including dates of reviews and time-to-funding for the solicitations and the funding. In 06-03 and 07-03 the names of the reviewers were not included in the individual jackets. This information would have helped us interpret proposal rankings better. For 05-10 we were provided a spreadsheet with the reviewer's scores on each proposal, which was useful; we would suggest generally including this in the summary sheet as well.	Yes

5. Is the time to decision appropriate: Comments: See above.	Yes
6. Discuss any issues identified by the COV concerning the quality and effectiveness of the programs use of merit review procedures: None.	

B. Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

QUALITY AND EFFECTIVENESS OF SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Did the program make use of an adequate number of reviewers for a balanced review?	Yes
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: The reviewers were exceptionally well qualified.	Yes
3. Did the program make appropriate use of reviewers to reflect balance? Comments: We do not understand this question. If this refers to scientific balance, then yes, the reviewers reflect a cross-section of the science represented by the solicitation.	Yes
4. Did the program recognize and resolve conflicts of interest	Data not

when appropriate? Comments: We did not discover any documentation of conflicts of interest.	available
5. Discuss any concerns identified that are relevant to selection of reviewers. Individual reviewers not identified for this repot. For 06-03 and 07-03 we were provided with the full list of reviewers contacted to serve on these panels, not just those who attended the panel review. This was very helpful because it enabled us to see that the people contacted were top in their fields. Different people served on the two panels, which is good, even though the solicitations were identical.	

C. Questions concerning the resulting portfolio of awards under review.
Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Overall quality of the research projects supported by the program. Comments: There are no progress reports yet for 06 or 07 solicitations. There was not enough time to read the proposals and evaluate the research from the proposals (although this is probably not something we are expected to do). If BERAC wants a good answer to this question, we need to be provided with review materials several weeks before the site visit.	Data not available in time…
2. Are awards appropriate in size and duration for the scope of the projects?	Yes
3. Does the program portfolio have an appropriate balance of high-risk proposals? Comments: Certainly there were proposals that the reviewers identified as high-risk high-payoff. Otherwise there isn't really time to evaluate this in the span of an afternoon.	Yes
4. Does the program portfolio have an appropriate balance of multidisciplinary proposals? Comments: This portfolio seems narrower than some others at LMSD but it may be appropriate for this focus area.	Yes
5. Does the program portfolio have an appropriate balance of innovative proposals?	Yes

6. Does the program portfolio have an appropriate balance of funding for awards to individuals and the national laboratories? Yes, the ratio of submitted to funded proposals seemed similar.	Yes
7. Does the program portfolio have an appropriate balance of awards to new investigators? We were not provided with demographic information.	Data not provided
8. Does the program portfolio have an appropriate balance of geographical distribution of Principal Investigators?	Yes
9. Does the program portfolio have an appropriate balance across disciplines and sub-disciplines of the activity and of emerging opportunities? Yes, the portfolios seem to match the desired outcome stated in the solicitation.	Yes
10. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs?	Yes
11. Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio. Demographic information would be nice.	

D. Management of the program under review. Please comment on:

1. Management of the program. Excellent. See written comments.
2. Responsiveness of the program to emerging research. The response of the program to federally mandated initiatives is good. There appears to be good outreach to solicit community input.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio under review. Program staff is diligent in their efforts to solicit input from the community, peers, and other agency personnel, especially for the joint funded programs with USDA.
4. Concerns identified that are relevant to the management of the program. The COV was very impressed with the professional approach of the program staff. The numbers of program officers and support staff are insufficient for the increasing emphasis on plant sciences.

Joint Genome Institute

FY 2008 Committee of Visitors Report
DOE Life and Medical Sciences Division, SC-23.2

Date of COV: June 8-11, 2008
Program: JGI
Number of actions reviewed by COV: N/A **Awards: Declinations: Other:**
Total number of actions within program during period being reviewed by COV: N/A **Awards: Declinations: Other:**
Manner in which reviewed actions were selected: N/A

A. Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Is the review mechanism appropriate? (Panels, ad hoc reviews, site visits) Comments: We were surprised to see some full CSP proposals centered on topics that did not appear to be part of the BER mission. This led us to question the mechanism for evaluating letters of intent and soliciting full proposals. We found many of the proposals had cursory review comment and some had only one review. This raises two concerns. There is insufficient feedback for the proposals and there is very little information to inform evaluation at higher levels. Whereas we were able to see a list of proposals and the eventual decision for those proposals, we were disconcerted that we did not have access to the selection statement enumerating the rationale behind the selection decisions (particularly when highly ranked proposals were not chosen). For the proposals we examined, there were input comments from multiple reviewers that were brief but seemed to be well considered. They appear to be adequate for judging the suitability of the organisms for sequencing in the JGI context.	No
2. Is the review process efficient and effective? Comments: One of BER's goals should be to ensure that the	No

human and infrastructural resources generate the best possible science. Given the umbrella-like structure of the JGI, the independent funding and review of each segment may not be the best avenue to achieve this goal. The external reviews of the Field Work Proposals we examined raised significant concerns that were more or less discounted in the selection statement. The program should find a way to encourage cooperation and articulation among the national laboratories that are part of the JGI, particularly in the areas of annotation and functional analysis of the sequence information generated by the PGF.	
3. Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines? Comments: For many of the CSP proposals, it is easy to see how they fit the mission of DOE. What is not so clear, is how that criterion is weighted with scientific merit and feasibility in selection of projects for addition to the sequencing queue. We believe that the call for proposals and instructions for reviewers should place greater emphasis on justifying how the organism of interest uniquely addresses both the DOE mission and an important scientific question. For example, novelty should not be the sole criterion for judging an organism worthy of sequencing effort. The application for one CSP proposal we examined did have a section asking for the scientific importance. If investigators are not addressing this item adequately, the instructions for filling out the application should stress the importance of this to the consideration of their proposals.	Somewhat
4. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: The comments of the reviewers were succinct yet pertinent. We did not see any indication of the reasons for DOE approval/denial in the files we examined.	No

5. Is the time to decision appropriate: Comments: Inadequate information available to judge.	Not enough information
6. Discuss any issues identified by the COV concerning the quality and effectiveness of the programs use of merit review procedures: The procedures are adequate and appropriate.	

B. Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

QUALITY AND EFFECTIVENESS OF SELECTION OF REVIEWERS	YES, NO, DATA NOT

	AVAILABLE, or NOT APPLICABLE
1. Did the program make use of an adequate number of reviewers for a balanced review? Comments: For the CSP proposals, only two reviews were available for each proposal. In at least one case, only one review was provided. This is insufficient.	No
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: The program used outstanding reviewers with strong expertise in relevant areas of biology and technology.	Yes
3. Did the program make appropriate use of reviewers to reflect balance? Comments: For CSP proposals, panel makeup in 2005 and 2006 was skewed toward scientists from California and the National Labs. In 2007, we were pleased to see that the makeup was more geographically distributed; however, we urge the group to try to include reviewers from some of the other academic genome sequencing facilities. We were not able to determine other important criteria for 'balance' including gender, ethnicity or stage of career.	No
4. Did the program recognize and resolve conflicts of interest when appropriate? Comments: We noted in the CSP 2007 proposals that one of proposals had a co-PI, who was also on the review panel. We view this as a serious conflict of interest.	Data not available
5. Discuss any concerns identified that are relevant to selection of reviewers. It was not clear to us how reviewers were selected for the CSP program.	

C. Questions concerning the resulting portfolio of awards under review.
Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Overall quality of the research projects supported by the program. Comments: The CSP projects represented provide the community with an invaluable resource for a wide variety of organisms. The program is commended for making this level and caliber of sequencing throughput available to the community.	Appropriate

2. Are awards appropriate in size and duration for the scope of the projects?	Appropriate
3. Does the program portfolio have an appropriate balance of high-risk proposals? Comments: The portfolio appears to reflect the broad range of science in the pool of proposals. We did not have adequate information to evaluate the approaches used to vet pre-proposals or to select proposals for sequencing. The solicitation process should be modified to explicitly encourage submission of high-risk proposals.	Appropriate
4. Does the program portfolio have an appropriate balance of multidisciplinary proposals?	N/A
5. Does the program portfolio have an appropriate balance of innovative proposals? Comments: Given that DNA sequencing has become a commodity and many organisms and populations have been sequenced, it becomes increasingly difficult to make new discoveries. As the field of genomics matures, the simple production of data is no longer a justification for supporting a sequencing project. Selection should be based on the downstream uses of the data.	Appropriate

6. Does the program portfolio have an appropriate balance of funding for awards to individuals and the national laboratories? Comments: We note that about 20% of the proposals were from investigators at national laboratories.	Appropriate
7. Does the program portfolio have an appropriate balance of awards to new investigators?	Data not available
8. Does the program portfolio have an appropriate balance of geographical distribution of Principal Investigators? Comments: The portfolio is well balanced across the US and globally.	Appropriate
9. Does the program portfolio have an appropriate balance across disciplines and sub-disciplines of the activity and of emerging opportunities? Comments: As mentioned by the previous COV, the focus on current DOE mission priorities is excluding significant areas of science.	?
10. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Comments: The program fits a unique niche by generating large amounts of sequence data.	Appropriate
11. Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio. We have concerns about the ability of the bioinformatics infrastructure to analyze	

and interpret data such that it is useful to the average biologist.

D. Management of the program under review. Please comment on:

1. Management of the program. The program staff does a remarkable job considering the size of the research budget and complexity of the portfolio. The program officers operate well as a team enabling them to work effectively at the programmatic interfaces. Requiring program managers to simultaneously run the scientific program and identify exciting emerging areas places an undue burden on the PMs. We applaud the use of mechanisms such as the scientific advisory board and workshops to identify new avenues for support; nonetheless, BER is not taking full advantage of the community of scientists at large.
2. Responsiveness of the program to emerging research. BER is in a position to be particularly agile and responsive to emerging research areas. This is especially true at the National Labs, where the infrastructure is already in place.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio under review. We did not have access to sufficient information to evaluate this.
4. Concerns identified that are relevant to the management of the program. The field of genomics biology is moving too fast to do strategic planning only every five years. We urge the program to develop a more dynamic approach to anticipating and acting on future opportunities. This approach needs to make better use of the stakeholders who use the facilities. The value of the data generated by the JGI is unequivocally dependent on the center's informatics capabilities. The informatics efforts of the JGI are not keeping pace with sequence data generation. Relative allocation of data generation vs. data analysis needs to be reexamined now and at regular intervals. The quality of raw sequence generated at JGI must be matched by outstanding informatics.

Comments: The program is getting quality proposals, even though the RFAs, as written, do not necessarily demand quality. Scientific justification should be stronger. We acknowledge that this program provides an incredibly unique function and has produced unparalleled data with value to the community at large. The program managers are performing a Herculean task in managing the programs with limited staffing and resources. They are to be commended, but they need help. The continuing success of BER depends on its ability to solicit and identify research proposals with clear scientific merit. This in turn will

depend on making an explicit criterion in the preparation and evaluation of proposals. Proposals for the CSP are submitted as white papers directly to JGI. A JGI committee evaluates the white papers and decides which should be asked for full proposals. Proposals are then submitted to JGI and reviewed by a panel of reviewers selected by JGI. We are hopeful that funding of the bioenergy research centers will not be at the expense of the community-available sequencing.

Low Dose Radiation Research Program

FY 2008 Committee of Visitors Report
DOE Life and Medical Sciences Division, SC-23.2

Date of COV: June 8-11, 2008
Program: Low Dose Radiation Research
Number of actions reviewed by COV: Awards: Declinations: Other:
Total number of actions within program during period being reviewed by COV: **Awards: Declinations: Other:**
Manner in which reviewed actions were selected:

A. Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Is the review mechanism appropriate? (Panels, ad hoc reviews, site visits) Comments: The availability of funding and areas of emphasis are initiated by the issuance of an Office of Science Notice. The application process is begun by the submission of a letter of intent, which enables program directors to identify potential applicants not responsive to the Notice. This was deemed useful to the DOE, to the applicants, and to the reviewers, saving time for all when the project is not responsive to the solicitation. Investigators submitting rejected pre-applications may still submit a full application. This allows the DOE and the applicant to reconsider/revise the project. The electronic submission of preliminary comments by reviewers prior to the face-to-face meeting of the review panel enables reviewers to conduct the meeting more efficiently.	Yes
2. Is the review process efficient and effective? Comments: The following schedule applied for the most recent solicitation, Notice 06-10: Announcement in Federal Register: 1/31/06 Letter of Intent receipt date: 2/22/06 Responses to Letter of Intent sent to potential applicants: 3/3/06 Applications received 4/26/06	Yes

Review 7/12-14/06 The time between announcement and the review of applications was 4-6 months. This was a very efficient timeline. The use of electronic communications and PeerNet software before and during the review process was very efficient. The addition of a chairperson during the review meeting has been a positive step.	
3. Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines? Comments: Priorities and criteria in the program's solicitations, announcements, and guidelines were carefully adhered to throughout the processes employed. Reviewers in their reviews addressed specific questions on these topics.	Yes
4. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: The COV was pleased to see that the review process is well documented, and that the Program Director makes great effort to be fair to the applicants and, at the same time, to support the mission of DOE and of the Low Dose Program in particular. The concerns of the previous COV about the lack of documentation concerning the declined applications and communication with those applicants have now been rectified.	Yes

5. Is the time to decision appropriate: Comments: The decision letters go out to each applicant approximately 3-4 months after the review of the applications. This is an efficient and appropriate process. Given the small number of staff to carry out these processes, this is commendable.	Yes
6. Discuss any issues identified by the COV concerning the quality and effectiveness of the programs use of merit review procedures: Given the small number of staff to carry out these processes, the quality and effectiveness of the use of merit review is commendable. Dr. Noelle Metting, who has been managing this program for the past 7 years, is to be congratulated for the wonderful job she has done in managing the review process. Her background in radiation biology and radiation physics is a distinct asset to the program.	

B. Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

QUALITY AND EFFECTIVENESS OF SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT

	APPLICABLE
1. Did the program make use of an adequate number of reviewers for a balanced review? Comments: A primary and secondary reviewer and a discussant are assigned to each application. All review committee members hear the reviews and vote on the score, except those with a conflict of interest. This is adequate.	Yes
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: Generally, the reviewer quality is very high, with appropriate expertise.	Yes
3. Did the program make appropriate use of reviewers to reflect balance? Comments: The review teams are balanced by gender and less- vs. more-experienced investigators, geography, radiobiologists vs. non-radiobiologists, and representatives of national laboratories vs. universities. The COV felt that the Program Manager has done an outstanding job of assembling review panels to reflect balance across the scientific disciplines of the applications.	Yes
4. Did the program recognize and resolve conflicts of interest when appropriate? Comments: Conflicts of interest are identified before the review, and reviewers are asked to notify the program manager of previously unidentified conflicts of interest. Conflicted reviewers leave the room during the discussion of the relevant applications, and do not participate in the voting on the score.	Yes
5. Discuss any concerns identified that are relevant to selection of reviewers. No additional concerns were identified.	

C. Questions concerning the resulting portfolio of awards under review.
Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Overall quality of the research projects supported by the program. Comments: Judging by the quality of the research presented at the Low Dose Workshops, and the number of publications in highly respected journals (e.g., *Cell*, *Nature Reviews*	Appropriate

Cancer, *PNAS*, *Radiation Research*, *Molecular Cellular Biology*, and *EMBO Journal*), the research projects supported by the program are outstanding.	
2. Are awards appropriate in size and duration for the scope of the projects? Comments: Most of the awards are for 3 years, though the range is 1-5 years. The total amount of the awards is $400,000-1,100,000 for universities, and $1,000,000-2,000,000 for national labs, which have large overhead rates. Pilot projects funded for one to two years are a good way to obtain information on the feasibility of riskier ideas.	Appropriate
3. Does the program portfolio have an appropriate balance of high-risk proposals? Comments: The COV recommends that program management reconsider instituting a category of pilot projects that would be of shorter duration that would be devoted to high-risk applications. If successful, these could provide preliminary data for applications for larger awards. In the prior COV report, it was recommended that funds be set aside for grants for postdocs. In response, the latest Notice includes a solicitation for applications from postdocs.	No
4. Does the program portfolio have an appropriate balance of multidisciplinary proposals? Comments: There continues to be an appropriate balance of multi-disciplinary proposals, as judged by the number of proposals that have co-PIs whose areas of expertise are different from the PI.	Yes
5. Does the program portfolio have an appropriate balance of innovative proposals? Comments: The competitive nature of the application process ensures that only innovative proposals are funded. In many cases the technologies are not novel, but are being employed in innovative ways in the research projects. Some of the models are innovative, particularly the 3D tissue models. Some aspects are being investigated only in the LDR program. The concept of studying the effects of doses below 0.1 Gy is very important because of the amplification of the signal generated. The public health consequences of these very low doses are not known, but of great concern to the public regarding the risks involved in nuclear power generation and environmental remediation.	Yes

6. Does the program portfolio have an appropriate balance of funding for awards to individuals and the national laboratories? Comments: Of the total projects funded, 20 of 71 are at	Yes

national labs. This seems reasonable.	
7. Does the program portfolio have an appropriate balance of awards to new investigators? Comments: While there doesn't seem to be a large number of young investigators, there are a number of grantees that are new to DOE funding. The pilot projects mentioned above could be a means to encourage new investigators in the Low Dose Program.	Yes
8. Does the program portfolio have an appropriate balance of geographical distribution of Principal Investigators? Comments: There is a wide geographic distribution of the awards. The decisions appear to have been based on the science, rather than geographic bias.	Yes
9. Does the program portfolio have an appropriate balance across disciplines and sub-disciplines of the activity and of emerging opportunities? Comments: There is a nice distribution among disparate disciplines. Some projects involve emerging opportunities, such as for example, nanotechnology, or high-resolution infrared spectromicroscopy.	Yes
10. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Comments: Obtaining more information on the effects of low doses of ionizing radiation is absolutely relevant to national priorities, agency mission, relevant fields and other customer needs for accurate, reliable information on ionizing radiation.	Yes
11. Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio. The COV predicts that the Low Dose Program will become even more important as nuclear power generation is reconsidered, as well as the increasing medical use of ionizing radiation in CT scans, fluoroscopies, and radioisotopes in nuclear medicine.	

D. Management of the program under review. Please comment on:

1. Management of the program. Outstanding. Future expansion of the program is encouraged, but will require additional resources for program management. The Low Dose Investigators' Workshop has been growing in importance as a central forum for discussing issues in low dose research and has been contributing to our understanding of risk from low doses. The quality of these workshops has been increasing during the time Dr. Metting has been holding them, and has been reflected in comments by participants at the meetings.
2. Responsiveness of the program to emerging research. Dr. Metting has had the vision to guide the program into important new areas, including carrying studies of the bystander effect into 3D culture studies,

additional animal models, exploration of nanotechnology, genome-wide and proteome-wide methods, and epigenetic research. Awareness of international efforts is to be encouraged.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio under review. The COV in consultation with the program manager discovered that considerable program planning and prioritization has taken place, and will continue. The planning precedes the issuance of the Notice, and continues throughout review, selection, and management of the funded projects. The projects are oriented toward the greater understanding of risk from low doses of ionizing radiation. The planning process is going to be continued in the preparation of a Roadmap for future directions of the Low Dose Program.
4. Concerns identified that are relevant to the management of the program. As stated above, future expansion of the program is encouraged, but will require additional resources, both financial and for program management. This should include travel funds for the program manager to national and international meetings to gain awareness of emerging opportunities, and to network with other scientists.

Ethical, Legal, and Social Issues Program

FY 2008 Committee of Visitors Report
DOE Life and Medical Sciences Division, SC-23.2

Date of COV: June 8-11, 2008
Program: ELSI
Number of actions reviewed by COV: Awards: Declinations: Other:
Total number of actions within program during period being reviewed by COV: **Awards: Declinations: Other:**
Manner in which reviewed actions were selected:

A. Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Is the review mechanism appropriate? (Panels, ad hoc reviews, site visits) Comments: The review mechanism starts with submission of a pre-proposal by potential applicants in response to a solicitation announcement. The pre-proposals are reviewed by the Program Manager and staff, and PIs of those not responsive to the solicitation are advised not to submit a full application, although they may still do so. Applicants in the "maybe" category are given advice on how they might modify their proposal to increase their likelihood of success. After receipt of the full proposal, review panels are selected with appropriate expertise. Panels meet in a face-to-face meeting to review the applications. Each application is assigned to a primary and two secondary reviewers. This is reasonable and appropriate.	Yes
2. Is the review process efficient and effective? Comments: Solicitations are usually issued in Nov-Dec, or Feb-Mar if the DOE budget is late. The pre-proposal due date is 3 weeks later. Proposals are due 4-5 wks after applicants are notified that they may submit. Reviewers are selected and the panel meets 5 weeks later, in late May or early June.	Yes
3. Are reviews consistent with priorities and criteria stated in the	Yes

program's solicitations, announcements, and guidelines? The reviews are consistent with the ELSI priorities and criteria in the solicitations.	
4. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: Documentation of recommendations is complete. Unsuccessful applicants are notified of the reasons for the decision, which includes both reviewers' comments and programmatic relevance.	Yes

5. Is the time to decision appropriate: Comments: DOE staff makes decisions within one week after review of the applications, and successful applicants are notified one week later. Unsuccessful applicants are notified by the end of June or early July. Since all funding decisions must be made by the end of June to allow administrative processing to be completed by the end of the fiscal year on September 30. It appears that solicitations cannot be issued until DOE's budget is approved each fiscal year, and when this is late, it places the program managers under severe time constraints.	Yes
6. Discuss any issues identified by the COV concerning the quality and effectiveness of the programs use of merit review procedures: none	

B. Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

QUALITY AND EFFECTIVENESS OF SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Did the program make use of an adequate number of reviewers for a balanced review? Comments: All applications are reviewed by a minimum of 3 reviewers, one primary and 2 secondary. This is adequate.	Yes
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: Review panels are comprised of members selected after the applications have been received, based on the expertise needed for each application.	Yes
3. Did the program make appropriate use of reviewers to reflect balance? Comments: The review teams are balanced by gender and less- vs. more-experienced investigators, geography, natural scientists and social scientists, economics, a judge, technology	Yes

transfer experts, and representatives of national laboratories vs. universities. The COV felt that the Program Manager has done an outstanding job of assembling review panels to reflect balance across the topics of the applications.	
4. Did the program recognize and resolve conflicts of interest when appropriate? Comments: Reviewers with conflicts of interest are identified before the meeting of the review panel. These and any others that are identified during the meeting are asked to absent themselves during the review of the relevant applications.	Yes
5. Discuss any concerns identified that are relevant to selection of reviewers. None.	

C. Questions concerning the resulting portfolio of awards under review.
Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Overall quality of the research projects supported by the program. Comments: The highest-ranking projects were funded. One lower-ranking project (in terms of inconsistency in the reviews) was funded. From the program manager's notes, the reviewers disagreed on its merits. It was apparently considered "high-risk," and worth funding for one year as a pilot.	Appropriate
2. Are awards appropriate in size and duration for the scope of the projects? Comments: All awards, with the exception of the 1-year pilot project mentioned above, are for 3 years. The 3-year totals ranged from $176,000 to $900,000.	Appropriate
3. Does the program portfolio have an appropriate balance of high-risk proposals? Comments: There is an element of risk in all the projects, but risk is difficult to measure. As noted above, one one-year pilot project was funded.	Yes
4. Does the program portfolio have an appropriate balance of multidisciplinary proposals? Comments: There are some multi-disciplinary proposals in the portfolio. The program manager stressed that multi-disciplinary labs are favored.	Yes
5. Does the program portfolio have an appropriate balance of	Yes

innovative proposals? Comments: The topics of the grants in this portfolio are all innovative.	

6. Does the program portfolio have an appropriate balance of funding for awards to individuals and the national laboratories? Comments: Of 6 applications from national laboratories, 3 were funded.	Yes
7. Does the program portfolio have an appropriate balance of awards to new investigators? Comments: At least two investigators are assistant professors, and some investigators were new to DOE funding.	Yes
8. Does the program portfolio have an appropriate balance of geographical distribution of Principal Investigators? Comments: There is a geographical balance.	Yes
9. Does the program portfolio have an appropriate balance across disciplines and sub-disciplines of the activity and of emerging opportunities? Comments: Given the limited budget in the program, the distribution among disciplines seems appropriate. With a larger budget, more topics could be included, and more grants funded on nanotech (2 projects now), synthetic biology (1 project) and communication/education (1 project). Ten projects were funded for the full 3 years, and one was cut to a one-year pilot.	Yes
10. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Comments: This is important work, and should be expanded. Ethical and legal considerations are absolutely relevant to national priorities, agency mission, relevant fields and societal needs.	Yes
11. Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio. None	

D. Management of the program under review. Please comment on:

1. Management of the program. The Program Manager and his assistant are doing an excellent job with a small program that should be expanded.
2. Responsiveness of the program to emerging research. Given the small budget for this program, it is difficult to fault it for its limited scope.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio under review.
4. Concerns identified that are relevant to the management of the program.

The program should be gradually expanded, given its importance, and could benefit from an external advisory committee. It would appear to be desirable to refine the solicitations to result in a larger number of applications generally worthy of funding, while still covering the areas of importance, and thereby justifying the expansion. Issuing solicitations earlier in the fiscal year, even before receiving the DOE funding for the year, could make the review and funding process smoother and less hectic.

Workshops

FY 2008 Committee of Visitors Report
DOE Life and Medical Sciences Division, SC-23.2

Date of COV: June 8-11, 2008
Program: Workshops
Number of actions reviewed by COV: Awards: 52 Declinations: 0 Other: 2
Total number of actions within program during period being reviewed by COV: **Awards: 30 Declinations: 0 Other: 1 (site-visit review)**
Manner in which reviewed actions were selected: random

A. Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Is the review mechanism appropriate? (Panels, ad hoc reviews, site visits) Comments: The primary review mechanism is review by 1-4 office staff.	Yes
2. Is the review process efficient and effective? Comments: We found that very few proposals are rejected, therefore a streamlined, internal process makes sense.	Yes
3. Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines? Comments: There are no specific, published guidelines for conference/workshop support. However, reviews assess scientific quality and appropriateness of meeting for DOE OBER objectives.	Yes
4. Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments: Documentation is complete, and includes the application, reviews, a written summary of the decision from the program manager, funding statements, and final reports in some (but not all) cases.	Yes

5. Is the time to decision appropriate:	Yes

Comments: Funding decisions appear to be made within about a 2-3 month period	
6. Discuss any issues identified by the COV concerning the quality and effectiveness of the programs use of merit review procedures: None.	

B. Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

QUALITY AND EFFECTIVENESS OF SELECTION OF REVIEWERS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Did the program make use of an adequate number of reviewers for a balanced review? Comments: Reviews are done by the in-house staff, which is reasonable for the scope and nature of the projects.	Yes
2. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: The program management staff in this office does have technical qualifications in the workshop areas, and they are very well qualified to determine whether these activities fall within the scope of their portfolios.	Yes
3. Did the program make appropriate use of reviewers to reflect balance?	Yes
4. Did the program recognize and resolve conflicts of interest when appropriate? Comments: We saw no evidence of conflict of interest.	Data not available
5. Discuss any concerns identified that are relevant to selection of reviewers. N/A	

C. Questions concerning the resulting portfolio of awards under review.
Provide comments in the space below the question. Discuss areas of concern in the space provided.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Overall quality of the research projects supported by the program. Comments: The workshops and conference activities supported are generally of high quality and are well attended.	Appropriate
2. Are awards appropriate in size and duration for the scope	Appropriate

of the projects?	
3. Does the program portfolio have an appropriate balance of high-risk proposals?	N/A
4. Does the program portfolio have an appropriate balance of multidisciplinary proposals? Comments: Workshops and conferences cover a very wide range of topics, possibly broader than the division itself. We were not able to easily assess whether projects reflected the percentage funding of research within the division.	Appropriate
5. Does the program portfolio have an appropriate balance of innovative proposals?	Appropriate

6. Does the program portfolio have an appropriate balance of funding for awards to individuals and the national laboratories? Comments: Very few awards (none by title) to national laboratories. This should be more balanced.	Appropriate
7. Does the program portfolio have an appropriate balance of awards to new investigators? Comments: Generally, new investigators do not typically offer conferences/workshops, so the lack of new investigators seems appropriate in this case.	Appropriate
8. Does the program portfolio have an appropriate balance of geographical distribution of Principal Investigators? Comments: Venues appear to be distributed around the country, and around the world.	Appropriate
9. Does the program portfolio have an appropriate balance across disciplines and sub-disciplines of the activity and of emerging opportunities? Comments: Workshops tend to be tailored towards emerging opportunities. From what we reviewed, proposals covered the general breadth of the organization.	Appropriate
10. Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Comments: Sponsoring workshops and conferences/sessions is a very important activity for DOE OBER because of its high leverage in improving communication and collaboration in the scientific community.	Appropriate
11. Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio. A few funded proposals were substantially larger than the majority. It is not clear that these funding decisions were strategic.	

D. Management of the program under review. Please comment on:

1. Management of the program. Documentation seemed to be in order.
2. Responsiveness of the program to emerging research. This seems good to us, however we are not experts in this area.
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio under review. Workshop support, independent of directed workshops meant for shaping solicitations, is guided by the requests submitted, with no documented evidence of proposals rejected. This style of management, while inappropriate for almost any other area, is reasonable here.
4. Concerns identified that are relevant to the management of the program.

APPENDIX G: List of Acronyms Used in This Report

AR	Artificial Retina Program
BER/OBER	Office of Biological and Environmental Research
BERAC	Biological and Environmental Research Advisory Committee
BNL	Brookhaven National Laboratory
BRC	Bioenergy Research Center
COV	Committee of Visitors
CRADA	Cooperative Research and Development Agreement
CS	Carbon Sequestration Project
CSP	Community Sequencing Program
CSREES	Cooperative State Research, Education, and Extension Service
DOD	Department of Defense
DOE	Department of Energy
DOEW	Department of Energy Report
ELSI	Ethical, Legal and Social Issues Program
FOA	Funding Opportunity Announcement
FWP	Field Work Proposal
GTL	Genomes to Life Program
IP	Intellectual Property
JGI	Joint Genome Institute
JHU	Johns Hopkins University
LANL	Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LDR	Low Dose Radiation Program
LLNL	Lawrence Livermore National Laboratory
LMSD	Life and Medical Sciences Division
MIND	Music Intelligence Neural Development Institute
ORNL	Oak Ridge National Laboratory
NIH	National Institutes of Health
NNSA	National Nuclear Security Administration
NRC	Nuclear Regulatory Commission
NSF	National Science Foundation
NSLSII	National Synchrotron Light Source II
PET	Positron Emission Tomography
PGF	Production Genomics Facility
PI	Principle Investigator
PM	Program Manager
PNAS	Proceedings of the National Academy of Sciences (Journal)
PNNL	Pacific Northwest National Laboratory
RFA/RFP	Request for Applications/Request for Applications
RI	Radiochemistry and Instrumentation Program
SB	Structural Biology Program
SNS	Spallation Neutron Source
SPECT	Single Photon Emission Computed Tomography
USC	University of Southern California
USDA	United States Department of Agriculture