

**Minutes of the
Biological and Environmental Research Advisory Committee Meeting
October 16, 2006
Marriott North Bethesda Hotel and Conference Center
North Bethesda, Md.**

BERAC members present:

Michelle S. Broido, Chair
S. James Adelstein
Eugene W. Bierly
Robert E. Dickinson
James R. Ehleringer
Raymond F. Gesteland
Keith O. Hodgson
David T. Kingsbury
Steven M. Larson

Joyce E. Penner
Margaret A. Riley
Christopher R. Somerville
James M. Tiedje
Warren M. Washington
Raymond E. Wildung
Barbara J. Wold
John C. Wooley
Mavrik Zavarin

BERAC members absent:

Joanna S. Fowler
Margaret S. Leinen
Patricia A. Maurice

John Pierce
David A. Randall
Melvin I. Simon

Designated Federal Official:

David Thomassen, Chief Scientist, Office of Biological and Environmental Research

Minutes prepared by:

Frederick M. O'Hara, Jr., BERAC Recording Secretary, Oak Ridge Institute for
Science and Education

About 50 others attended in the course of the day-long meeting.

**Monday, October 16, 2006
Morning Session**

Chairwoman Broido called the meeting to order at 8:30 a.m.

Jerry Elwood: Office of Biological and Environmental Research (BER) Update

The Acting Associate Director of BER thanked the Committee for its hard work in responding to the charges of the past few months. DOE does not have an FY07 authorization and is operating under a continuing resolution until at least Nov. 17, 2006. That resolution allows BER to continue ongoing activities under the terms and conditions of FY06 appropriations, but does not allow new program starts or the cancellation of existing programs. It does allow new starts of projects in existing programs. The rate of spending is the limiting factor. The FY06 appropriation to BER was \$564 million, and the FY07 request was \$510 million. The House mark was \$540 million (+\$30 million

above the request for “directed university and hospital earmarks”), and the Senate mark was \$560 million (+\$50 million for earmarks).

In the Life and Medical Sciences Division, there is considerable interest in the Funding Opportunity Announcement for the Genomics: GTL Bioenergy Centers. Funding decisions are expected in late FY 2007. The artificial retina project will implant a 60-electrode prototype in patients next year. The National Academy of Sciences (NAS) study on the state of nuclear medicine in the U.S. is to be completed in mid-2007. Several BERAC members are on the committee.

One BER staff member left, a new American Association for the Advancement of Science (AAAS) Fellow working on GTL issues joined BER, and two positions in Life and Medical Sciences are in the process of being filled.

Solicitations are out on GTL Bioenergy Research Centers (proposals due February 1, 2007), Plant Feedstock Genomics for Bioenergy [joint with the U.S. Department of Agriculture (USDA); applications due January 30, 2007], and GTL (to be released in November).

Roger Kornberg’s 2006 Nobel Prize in Chemistry was enabled in part by BER facilities at the Stanford Linear Accelerator Center (SLAC).

In the Climate Change Research Division, a draft Strategic Plan will be ready for BERAC review by the spring meeting.

BER has a commitment to produce 3 of the 21 Climate Change Science Program Synthesis and Assessment Reports (required by the Global Change Research Act of 1990) by the end of 2007.

Bob Vallario, a detailee from SC [Office of Science] Office of Planning and Analysis will manage the Integrated Assessment Research Program. One Intergovernmental Personnel Act position is open in the Climate Change Research Division. Solicitations are out for FY07 SciDAC [Scientific Discovery Through Advanced Computing] university grants on climate modeling, Atmospheric Radiation Measurement (ARM) Science Program research on clouds, and Atmospheric Science Program research on aerosols. Following BERAC guidance, the Terrestrial Carbon Processes (TCP) Program issued a solicitation and received 120 high quality proposals. A follow-up BERAC review of CO₂ experiments was requested. In FY07, research awards will be made for AmeriFlux, CO₂ experiments, soil carbon processes, and integrated terrestrial-carbon modeling.

SC will issue an announcement in December to fill the position of the Environmental Remediation Sciences Division (ERSD) Director. An ERSD research call received 180 proposals, reviews are complete, and awards are pending a FY07 budget. A field-center call received 5 proposals which will be reviewed in November. Solicitations for FY08 funding will be released in December. The Environmental Molecular Sciences

Laboratory equipment refresh plan is nearing completion: a series of workshops identified science needs and technology opportunities, key scientific gaps have been filled, computer floor space has been added, and a supercomputer acquisition is in process.

In FY07, BERAC will be asked to review the Integrated Assessment Research Program, the enhanced-CO₂ experiments, the ARM facility, and Climate Change Research.

Dr. Elwood thanked the members of BER who helped him so far in his position as Acting Associate Director.

Discussion:

Asked about the \$54 million difference between the FY06 and FY07 budgets, Elwood responded that the difference was primarily due to congressionally directed projects added in FY06.

Administrative Discussion

Three BERAC reviews are anticipated in early FY07 prior to the spring 2007 meeting – Integrated Assessment Program, ARM facility review, Climate Change Research COV. For the Integrated Assessment charge, a chair may have been identified, and a cochair from BERAC is needed. The charge has been completed and posted on the website. Ehleringer, Penner, and Bierly expressed possible interest.

Two other climate-change charges are being drafted. The Climate Change COV review is due, and a leader for that COV is needed, also. This round of COVs will primarily look at the recommendations from the first round of visitations and the recommendations from the subcommittee reviews. There will be a lot more documentation of the program available that did not exist in the first round of visitations. Would it be practical to join the COV and ARM review through overlapping memberships. Those on the ARM Infrastructure Subcommittee could stay an extra day after the COV meeting to hear briefings on ARM. The prior COV process covered the full Division, with six or seven programs reviewed. Experts were selected in each of these six or seven fields. They looked at the grants to universities and national laboratories to see what was funded, the review process used, how the program manager interacted, and how well an area was supported. Cross-cutting issues, such as budgeting and staffing, were also looked at. The NSF forms were used to assess how well things were done. The COV worked closely with upper management of the Division and documented what needed to be done in the future. The reports and responses from the three prior COVs are available on the web. The draft of the COV report would be needed by the spring meeting. The next COV report will be needed by spring 2008 on the ERSD, and the third a year after that on the Life and Medical Sciences Division.

Concern was expressed about piggybacking the ARM infrastructure report on the COV; the COV could use the results from the ARM review. Penner agreed to chair the ARM infrastructure review. Warren Washington will chair the Climate Change COV.

David Thomassen: Genomics: GTL Program Status

This is the highest-priority program of the Office, but there is no assurance that the doubling of the combined budgets for DOE, National Science Foundation (NSF), and National Institute of Standards and Technology (NIST) described in the American Competitiveness Initiative will carry through to any specific program like GTL. There is high enthusiasm for the GTL's bioenergy research centers. The rest of the GTL program is being maintained since the combined wisdom of a larger community, not just the Bioenergy Research Centers, is needed. The gaps in the GTL program need to be anticipated, identified, and filled, and the GTL Program will be a combination of these large research centers and smaller single investigator type grants.

In fairness to all potential applicants, the Funding Opportunity Announcement for the Centers is not being discussed at this meeting. Information is posted on the web, and everyone is being given an equal opportunity to compete for these grants. A budget of \$250 million over 5 years is anticipated for these centers. The solicitation is open to everyone; partnerships are encouraged. "Bioenergy" is broadly defined. A white paper has been issued on the bioenergy research centers that updates the GTL roadmap. A solicitation on energy feed stocks has been jointly issued with the USDA. There is a statement in the white paper that other centers (on carbon cycling and remediation) are possible in the future. Challenges include balancing fundamental research and transferring the information produced.

The next GTL contractor meeting is currently being planned. It will be held February 11-14, 2007, at the Marriott Bethesda North Hotel and Conference Center. It will include sessions on energy from biomass.

Discussion:

The \$250 million covers \$25 million per year for each of the two centers. Additional funds (about \$90 million) are available for other GTL research. Most of that funding is tied up in research mortgages at any one time but some funds are available in FY07 – about \$20 million - assuming we receive our FY07 request. Some of those funds will be used to forward-fund research beyond FY07. Money for solicitations to PIs outside the centers will be given out in FY07 and FY08. The amount depends on how much is received in response to the budget request; it may be as large as \$20 million. It is not known at this point what the size of an individual grant might be. These smaller budget items will be weighed on merit as well as on how well they fill gaps in the program. If there is a center focused on a topic, the PI grants should not copy but complement what is being done at the center. The Office is not yet ready to share details on the review process. NSF, which has funded 40 centers, of which 17 are active today, has learned a lot about center operation that BER could tap into.

In the past, there has been some inter-office rivalry on plant research. That situation has been resolved dividing responsibilities for genomics (BER) and biomimetics (Basic Energy Sciences).

A break was declared at 9:56 a.m. The meeting was called back into session at 10:33 a.m.

James Ehleringer: Review of DOE Free-Air Carbon Dioxide Enrichment (FACE) and Open-Topped Chamber (OTC) Projects of DOE

The Subcommittee was charged to review/assess information from existing FACE DOE experiments; assess their potential to yield new findings, if continued; provide recommendations on whether existing experiments have reached or are reaching a point of diminishing scientific return; and provide recommendations on which experiments should be maintained or discontinued. It was also to assess the escalating costs of FACE experiments and how such costs might be reduced (CO₂ is about 25% of the operating costs); the scientific need and technical feasibility of modifying FACE experimental approaches to consider other uses; and alternative approaches for conducting FACE-type experiments that offer significant cost advantages.

The Subcommittee found that

- DOE has been the lead federal agency in ecosystem climate-change experiments.
- FACE studies have achieved the most realistic elevated CO₂ (eCO₂) environment for ecosystem studies using all types of related experimental approaches to date.
- FACE studies have been quite productive and have produced fundamental new insights into carbon dynamics (which are mostly belowground processes) that were not predictable from pot- and greenhouse-scale studies.
- Generalities have emerged, supporting the development of models to predict carbon dynamics at multiple scales and which models are important to forming climate policy at national and global scales.
- Net primary production is enhanced across all sites, with the aboveground effect greatest in high-productivity ecosystems. Elevated CO₂ (eCO₂) did not affect nitrogen mineralization, suggesting progressive nitrogen limitation on ecosystems.
- Surprises include (1) the important influence of belowground processes on the carbon cycle and on turnover processes and (2) the interactive importance of factors like moisture, trace gases, and nutrients in moderating, enhancing, or diminishing the effects of eCO₂ on enhancing carbon fixation.
- The current FACE design and plot sizes impose constraints on the experimental sampling of aboveground and belowground materials, leading to a useful life expectancy of only 10 to 12 years per experiment.
- Harvesting plans of an eCO₂ project (which would yield very useful samples for future research on, analyses of, and insights into detailed processes) were not described in any of the provided documents for FACE or OTC projects.
- Earlier recommendations on data-sharing policies and data-archiving protocols should be more fully and more rapidly implemented.

The Subcommittee recommends that

1. Several current projects should enter a harvesting (final) phase of an eCO₂ experiment life cycle during FY07, and the others should enter the harvesting phase by FY10.

2. A (series of) workshop(s) should be immediately initiated to plan the next generation of eCO₂ experiments, incorporating multiple interacting factors and potentially different eCO₂ designs and/or technologies.
3. Because single-factor approaches are limited, no new eCO₂ projects should be initiated until after those workshops design multiple-factor eCO₂ experiments.
4. Harvesting a site should be factored into funding for any FACE/OTC projects.
5. As soon as harvesting is scheduled, workshops (including modelers) should be held at FACE/OTC projects to plan for the harvesting phase of the project.
6. Funding should be provided after turning off the CO₂ to allow publishing of original research, within-site syntheses, and cross-site syntheses.

The Subcommittee developed a decision flowchart on when existing FACE/OTC projects should enter the harvesting phase: Nevada and Maryland in FY07; Florida in FY07 or FY10; and Oak Ridge, Duke, and Rhineland no later than FY10.

Before and during harvesting, model simulations should be conducted to identify data gaps, and short-term experiments should be conducted. Aboveground and belowground materials should be harvested and archived for analysis by all interested investigators. Long-term archiving and public access should be provided for experimental-treatment data, process data results, and other parameters measured and models produced in the experiment. Consideration should be given to setting aside a portion of the experimental plot for future studies. Experiments with multiple-level CO₂ treatments and multiple drivers (temperature, nutrients, moisture, and bio-complexity) with alternative designs should consider operational CO₂, site location as a factor in CO₂ cost savings, larger plot sizes, replication, soil carbon sequestration, and subplot treatments.

Discussion:

The Subcommittee was complimented for its responsiveness and comprehensiveness. An opportunity for cooperation between DOE and NSF's National Ecological Observatory Network (NEON) [a long-term (30-year) observatory] was noted. The most successful eCO₂ design has been Brookhaven National Laboratory's. Future designs will probably be based on DOE's designs. The report calls for precipitation augmentation and lessening, as was done at the Throughfall Displacement Experiment at ORNL. Nitrogen enhancement was suggested to determine why accelerated respiratory rates are seen belowground. No tropical forests are involved because of costs, as seen in a pilot study in Panama.

A driving force in future design should be sensors that limit the degradative effects of monitoring belowground processes.

This program could use tools from GTL, although there is currently no motion in that direction. That could be a task for the future carbon-sequestration research center being thought about.

A motion was made by Bierly and seconded by Hodgson to accept this report as described subject to its completion, a review, and approval by a subset of this Committee. The motion passed unanimously. A break for lunch was declared at 11:30 a.m.

Afternoon Session

The meeting was called back into session at 1:03 p.m.

David Kingsbury: Community Cyberinfrastructure for Advanced Marine Microbial Ecology Research and Analysis (CAMERA)

Metagenomics, the analysis of the genome structure of a composite of all organisms in an environment, will vastly increase the amount of data to be analyzed. The acquisition of genomic information has been exponential since 2000. The Sargasso Sea experiment yielded more than 1 billion base pairs of nonredundant sequence; displayed the gene content, diversity, and relative abundance of the organisms; produced sequences from at least 1800 genomic species (148 previously unknown); and identified more than 1.2 million unknown genes. This genetic diversity is broader than anything thought possible. This approach opened a new way to study microbes in the ocean or any complex ecosystem.

DOE and the Moore Foundation funded a transect of the whole world, and many marine organisms are being sequenced. The annotation process is complex. The organisms coming out of this transect are largely bacterial. Cyberinfrastructure is needed to access the metadata so it can be analyzed. CAMERA serves that need with data and application services; tools and workflows; computational data, utilization, and collaborative environments; and outreach and training and environmental genomics to produce annotations of data sets, assemblies, alignments, and precomputed clusters. The databases are being structured to be extensible and now include site metadata and sampling metadata.

An initial set of tools has been assembled. A scientific advisory board has been set up. Targeted workshops are being held for early adopters. Partnerships with metagenomics projects are being put in place. A “sprint” mode will be up and running by the end of 2006. The future home of the Moore Foundation Funded Marine Microbial Ecology Metagenomics Complex will be a major computer facility. It will use the Lambda Rail, allowing a lot of data to be transferred rapidly and easily. Everything will be connected to the tera-grid. The center’s team also does creative visualization, employing the OptiPortal with twenty 24-inch monitors, providing high-definition video. One proposed deployment is for a sea-floor fiber-optic molecular-biology laboratory.

Discussion:

Surprises that were found included the number of photosystems that exist and the number of organisms (~80%) with photosystems. Also surprising was the distribution of groups of organisms and the nonhomogeneity of the oceans. There are a lot of minor players in these ecosystems. There is also a great variety of physiological difference (about one-third of the genome) within an organism. Asked if small data sets can be put into the system, analyzed, and then taken out, Kingsbury replied that users can put in prepublication data, which will then become part of the database upon publication.

Christopher Somerville: PART Measures for Life Sciences and Medical Division

The current Life Sciences Program Assessment Rating Tool (PART) measure is, by 2015, to characterize the multiprotein complexes (or the lack thereof) involving a scientifically significant fraction of a microbe's proteins and to develop computational models to direct the use and design of microbial communities to clean up waste, sequester carbon, or produce hydrogen.

BERAC's assessment of this measure was facilitated by the fact that, in February 2006, the National Research Council (NRC) conducted a review of DOE's Genomics: GTL Program to determine if it is scientifically and technically well tailored to the challenges in energy technology development and environmental remediation. The NRC concluded that it is, endorsed DOE's use of a systems approach to achieve its mission goals through Genomics: GTL, supported DOE's plan to increase funding of the program to \$200 million per year for basic research, suggested that plant-biology research be included in the program, and endorsed a continued focus on the following areas for plants and microbes.

The BERAC Subcommittee concluded that the Genomics: GTL's investments in metagenomic research are laying a sound foundation for future modeling of microbial communities and that the program is on target to achieve a long-term grade of Excellent for this measure. Moreover, if the program had continued with its plans to develop a high-throughput user facility for the isolation and characterization of multiprotein complexes, it would likely have received a long-term grade of Excellent for this original measure.

The Subcommittee found that the goal of developing computational models to direct the use and design of microbial communities to clean up waste, sequester carbon, or produce hydrogen is still highly relevant and critical to the long-term success of the program. However, this measure was developed before a focus on liquid transportation fuels was added. The Subcommittee therefore recommends that the measure be modified to include work on plants and biofuels, such as cellulosic ethanol.

The Subcommittee proposed a grading system for the development of a systems-biology understanding and of computational models that accurately describe the capabilities and potential of key microbes, microbial communities, or plants to produce biofuels, to clean up waste, or to sequester carbon. The grade would be

- Excellent if these items were developed and validated experimentally by the use or reengineering of those microbes, microbial communities, or plants community based on model predictions.
- Good if these items were developed and validated by their consistency with available data.
- Fair if these items were developed but not validated.
- Poor if these items were developed but robust computational models describing these systems were not developed.

It is recommended that performance be measured every 3 years by expert reviewers using this grading scale and quantitative metrics related to new molecular components identified in genetic and biochemical pathways relevant to the DOE mission, new engineered plant traits and microbial capabilities developed, development of fundamental knowledge about conversion of biomass to biofuel, improvements in yield from a particular feedstock, improvements in the efficiency of conversion, decreases in process energy costs, papers published, and patents filed.

The Subcommittee is confident that Genomics: GTL is well poised to allow the program to earn a long-term rating of excellent on the Life Sciences PART Measure, given the capabilities of the BER program and the findings of the NRC and the Subcommittee.

Discussion:

Tiedje moved and Hodgson seconded that this report be accepted pending editorial review. The motion passed unanimously. A break was declared at 2:17 p.m. The meeting was called back to order at 2:49 p.m.

Joyce Penner: PART Measures for Climate Change Research Division

BER's Climate Change research includes the ARM Program, Atmospheric Science Program, Terrestrial Carbon Processes Program, Climate Change Prediction Program (and SciDAC), Program in Ecosystem Research, and Integrated Assessment Research. The core research includes climate forcing, climate-change modeling, climate-change response, and climate-change mitigation. The Subcommittee concluded that the program has the right breadth (assuming that the ocean carbon cycle research is provided by another agency) and that progress toward the long-term goal is excellent. It does have suggestions on individual programs. It also believes that the 2015 long-term goal should be generalized to better reflect the breadth of the program.

The ARM Program with its innovative data collection, data collected over a wide geographic area, and strong use of data by modeling groups should be encouraged to work more closely with the Climate Change Prediction Program.

The Atmospheric Science Program makes excellent use of joint field programs with ARM as well as with other agencies. Success will require integrating program results into climate models [e.g., by determining historical forcing by aerosols for use in the next Intergovernmental Panel on Climate Change (IPCC) assessment].

The TCP Program's time-series observations provide new insights on carbon, water, and energy balances and on factors influencing interannual variations in the carbon cycle. The incorporation of human-dominated landscapes into AmeriFlux and the TCP is applauded. Expansion into urbanizing landscapes and understanding interactions between climate and the carbon cycle would further strengthen the program. It also needs to enhance synthesis modeling.

The Climate Change Prediction Program (CCPP) (along with SciDAC) can be expected to deliver improved models and to reduce differences between observed and model-simulated temperature and precipitation. The Subcommittee did have concerns about the straightforward coupling of carbon cycle, ecological, and ice-sheet components (which are very sensitive to temperature and precipitation biases) to present-day climate models. These climate models should be improved without these components to see if the current biases can be substantially reduced while atmosphere-ocean general-circulation models (GCMs) are improved to produce a fully coupled system.

The Program in Ecosystem Research (PER) is looking at a very broad range of issues, but it is not clear how and whether these results can be integrated into models. The Program could benefit from an increase in budget, and it might be best to reduce the diversity of projects.

The Integrated Assessment Research Program's high-quality research is at the forefront in connecting climate-change modeling and economic theory. It must maintain continued understanding of the more-advanced physical-biological-ecological models while focusing on improving the "human-dimension" part of these models.

The annual performance metrics do not adequately reflect the breadth of the program. Each of the annual goals should determine a roadmap to the final goal. DOE should explicitly state that the program will continue to improve atmosphere-ocean GCMs by improving the representation of precipitation and temperature at subcontinental scales while also developing coupled Earth-system models.

The long-term goal is currently "to deliver improved climate data and models for policy makers to determine safe levels of greenhouse gases." The Subcommittee recommends the wording: "to deliver improved scientific data and models about the potential effects of increased atmospheric greenhouse-gas levels on the Earth's biosphere and climate for policy makers to determine safe levels of greenhouse gases in the atmosphere."

Measures of success in meeting the long-term goal were proposed:

- Poor: (1) The discrepancies existing in 2001 between observed data and atmosphere-ocean GCM results continue and (2) Earth-system models are being assessed for the first time.
- Fair: (1) Discrepancies between observed data and atmosphere-ocean GCM results are reduced 25% and (2) discrepancies in Earth-system models are not improved upon.
- Good: Discrepancies between observed data and atmosphere-ocean GCM results are reduced by 50% and (2) the discrepancies of Earth-system models existing in 2011 are reduced.
- Excellent: Discrepancies between observed data and atmosphere-ocean GCM results are reduced by at least 50% and (2) the discrepancies of Earth-system models are no larger than those of the atmosphere-ocean GCM results of 2001.

Discussion:

It was suggested that these measures favored temperature over precipitation but that the new Cloud Technology Center will address some of these problems. It was noted that one will get not only the process but also interannual variation from these measures. Penner replied that that is vague here.

As the ratings are worded, it does not say whether DOE or other agencies are responsible for these advances. The answer is both: DOE supports modeling, but there is modeling elsewhere, also. One must also obtain the data, which are used by all climate-modeling centers. However, one should not set up BER to fail because others do not make advances. The measures and rating should be self-contained within the BER program and not reliant on research at other agencies. The annual measures have to be cut and dried (quantitative) and obvious to someone not in the field. The Subcommittee responded to the question whether the annual measures would lead to the long-term measures.

Currently, the overall assessment of the program is one of excellence. Progress toward the long-term goal may be maintained by achieving greater integration and getting global modelers to use the excellent data being collected. One way to accomplish this is to write requests for proposals (RFPs) with these needs explicitly stated as part of the RFP.

DOE does not sponsor all of these activities, and it was suggested that the measure should refer to “DOE-sponsored” activities. The charge asked, if these goals were not met, why? One reason may be “DOE is not funding these models.”

Ehleringer moved and Bierly seconded that this report be accepted with the discussed addition to the long-term measures and editorial review. The motion passed unanimously.

James Tiedje: PART Measures for Environmental Remediation Sciences Division (ERSD)

This program’s long-term measure is, by 2015, to provide sufficient scientific understanding to allow a significant fraction of DOE sites to incorporate coupled biological, chemical, and physical processes into decision making for environmental remediation and long-term stewardship.

The research program is aligned with DOE Program needs. Basic science calls are consistent with the Strategic Plan. The Division has assessed its progress toward the long-term measure through annual measures. The long-term measure is ambitious, and the path to completion will not be linear. The Division has a searchable database of funded projects. The COV evaluation in 2004 found the program well aligned with its mission, that it has catalyzed many interlaboratory collaborations, that its research is of the highest quality, and that much of its work is at the cutting edge. The Subcommittee found that progress toward the long-term measure during the past 3 years has been excellent, as evidenced by the Division’s Strategy Flowchart.

The Subcommittee found the long-term measure to be reasonable and appropriate. The measure includes definitions (from Excellent to Poor). This ranking is best quantified by

a broad review of ERSD research and Environmental Management remediation strategies because simple statistical approaches will likely be misleading.

The Subcommittee found that the Division's overall achievement of the long-term measure is possible and that a reasonable pathway toward achievement (the ERSD Strategic Plan) exists and is being implemented. The success of the Field Research Center (FRC) at Oak Ridge National Laboratory is in line with the long-term measure. There is anecdotal evidence that documents the use of science findings at several DOE sites and with several contaminant problems. Expectations of future progress are well-founded.

The Subcommittee recommended that BER

- Identify sites to which the long-term measure should apply,
- Seek opportunities to provide supporting discussion in support of meeting its annual measures,
- Maintain the ERSD online project database,
- Continue to post quality quarterly technical progress reports,
- Focus on fundamental science but enhance efforts to involve DOE Program Offices, and
- Consider impacts of any budget reductions and appropriately revise measures.

Discussion:

A motion was made by Bierly and seconded by Hodgson to accept and approve the Subcommittee's report pending recommended clarifications and editorial review. The motion passed unanimously.

Administrative Discussion

The climate-change COV report has to be approved at the spring meeting, which will be in late April 2007. Warren Washington agreed to chair that COV. Joyce Penner has agreed to chair the review of the ARM Program infrastructure. The integrated-assessment charge will be addressed by a subcommittee, also in time for approval at the spring meeting. The ESRD Strategic Plan will be brought forward by Tiedje and his ESRD Subcommittee for consideration for approval.

Asked if Orbach would be briefed about the proceedings of this Committee, Thomassen pointed out that a summary letter routinely goes to the Director of the Office of Science. Concern was expressed that BERAC does not get the attention from the Director that other advisory committees do and that that lack of attention should be communicated to him.

Broido opened the floor for public comment. There being none, the meeting was adjourned at 4:03 p.m.

Respectfully submitted,
Frederick M. O'Hara, Jr.
Recording Secretary, Oct. 30, 2006